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TOO HOT TO BREED!

Heatwaves threaten animal reproduction and biodiversity, with potential cascading effects across generations

Heatwaves are one of the most serious threats posed by climate change to biodiversity, not only because they lead to mortality, but also, importantly, because they are compromising animals' ability to reproduce. This could have cascading effects that extend across generations, potentially reshaping animal populations.

Heatwaves are extreme climatic events characterized by temperatures several degrees above the seasonal average. They are increasing in duration, frequency and intensity on a global scale.

Heatwaves have been linked to mass mortality events in animals, with some cases leading to the death of thousands of individuals in just a few days. Less widely recognized is that, even when animals do survive a heatwave, they often incur significant costs. Heatwaves can profoundly impact animals by altering their physiology, behaviour and reproduction. These sublethal effects, even if not directly visible, can ultimately threaten animal populations.

A recent paper from National Biodiversity Future Center (NBFC) and University of Padova discuss the ways in which heatwaves can affect reproduction. The paper argues that many of these effects are cryptic, so not immediately visible, and yet can strongly influence sexual selection processes and population dynamics. In line with this, recent studies in various animal groups have shown that many individuals in a population can become sterile or show a reduced sexual activity following a heatwave. This paper highlights that when reproduction in a large part of the population is reduced, this can trigger a series of demographic effects, such as decreased genetic diversity and modified sexual selection processes, potentially favoring specific individuals or mating systems over others.

Chiara Morosinotto

«We have noticed that in many animal groups, when they manage to reproduce, the young born to parents exposed to heat waves are smaller in size and in poor physical condition - explains Dr Chiara Morosinotto, study coordinator for the University of Padua -. If heat stress perceived by parents leads to effects in their offspring that last until adulthood, there is a high chance that these effects are transferred to the offspring's offspring, thereby jumping from one generation to the next. Finally, with heatwaves becoming increasingly common, offspring of heatwave-stressed parents are likely to also directly experience heatwaves during their lifetime. Therefore, the damage caused by heatwaves could accumulate in individuals and across generations.»

Evidence for the impact of heatwaves on biodiversity is emerging across animal groups worldwide – from insects to fish, from sea urchins to birds, from snails to mammals. This article highlights the importance of further identifying and quantifying the costs of heatwaves on animal reproduction.

This will be crucial to assess the impact of these extreme climate events on a demographic and evolutionary timescale, which is essential under current ongoing climate change.

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