

Research shows that animals need time to survive

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To understand how climate change may affect species survival, we need to understand how climate influences their time-keeping.

New research published in the journal *Biological Reviews* points to time as a major factor in determining whether a species is capable of surviving in a particular habitat.

In their paper ‘Time as an ecological constraint’ (*Biological Reviews*, August 2009), Professor Robin Dunbar of the University of Oxford, Dr Amanda Korstjens of Bournemouth University, and Dr Julia Lehmann of Roehampton University accept that both climate and the availability of food are crucial in determining whether animals can reproduce and survive in a given habitat.

However, their latest research shows that the critical constraint on animals, through which these factors have their effect, is time because it limits an animal’s ability to harvest sufficient resources to meet its physiological requirements. On the micro-scale, time has always been an important issue for behavioural ecologists but it has not been a major focus of interest in population or conservation biology until now.

For this study, the researchers produced a systems model of time budgets revolving around core activities of animals including periods spent feeding, moving around, resting and engaging in social interactions. The team then considered abiotic variables on these activities such as temperature, seasonality and rainfall and biotic variables including the

composition of an animal's diet, its body mass, the quality and distribution of vegetation in the habitat and forest cover. Other factors included the size of any animal community groupings and susceptibility to predators.

The study considered that some species such as primates, elephants, horses, dogs, some cetaceans (whales, dolphins and porpoises) and birds may have to devote a significant proportion of their day 'distracted' by [social interaction](#) in order to create bonded groups. These trade-offs limit the time that individuals can devote to foraging for food which, in turn, affects that species' capacity to survive in a particular habitat.

Time is also a factor for animals that are unable to compensate for a decline in the foraging quality of their habitats. Physiological cycles impose a limit on how long an animal can afford to build up a nutrient diet which imposes a natural time cycle within which all of their essential activities must be completed.

Foraging is not the only demand on an animal's time. There is a well understood trade-off between feeding and risk of attack from predators and time is required (albeit in some cases only at certain times of year) for activities such as mating and parental investment not to mention territorial defence.

“While it is sometimes possible to create savings in time by eating or moving faster time is not especially elastic. Few species have the capacity to “create” time in the way that Red Knots, a breed of sandpiper, have been shown to do when they exploit tidal lags to support their efforts to forage along the coastlines of northern Canada and Europe.

“Our approach undoubtedly provides valuable predictive insights into extinction risk,” they continue. “Our claim is that an approach that

focuses on time constraints provides additional insights into the mechanisms that underpin an animal's relationship with its habitat because that animal's time allocations to essential activities are the interface between a habitat's environmental characteristics and the animal's ability to survive there.

“In short, they allow us to say something about why a species can or cannot survive at a given location, and, where it can survive, how much demographic stress it is likely to face,” the team concludes. “A persuasive argument can therefore be made for the suggestion that the real constraint is the extent to which animals can schedule their activities to meet their physiological demands and the way these demands are affected by the intersection of the climatic and environmental variables that determine them and the time available in which to accomplish them.”

More information: *Biological Reviews*, Volume 84, Issue 3, Pages 413-429. Published online at: [www3.interscience.wiley.com/cgi ... /122410017/HTMLSTART](http://www3.interscience.wiley.com/cgi-bin/jlist/122410017/HTMLSTART)

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