

Spotted hyenas adjust their foraging behavior in response to climate change

April 4 2022



Hyenas at a clan communal den in Kenya. Credit: Jan Zwillling/Leibniz-IZW

Spotted hyenas adjust to a decreased presence of migratory prey in their territories induced by climate change. This is the key result of a paper recently published in the scientific journal *Ecosphere*. A team of

researchers from the Leibniz Institute for Zoo and Wildlife Research (Leibniz-IZW), Germany, and the Center for Functional and Evolutionary Ecology (CEFE), France, investigated the relationship between rainfall volume and migratory herbivore presence in hyena clan territories in the Serengeti National Park, Tanzania, and the responses of lactating hyenas to recent changes in the climate-prey relationship. Using an observation-based dataset spanning three decades, they showed that the substantial increase in annual rainfall during this time halved the presence of migratory herds inside the hyena clan territories, but did not affect the ability of female hyenas to access their prey and successfully nurse their young. This suggests a high plasticity of foraging behavior of hyenas in response to changing environmental conditions.

It is crucial to understand the mechanisms and extent to which animals in diverse ecosystems are resilient to [climate change](#). Changes in the timing or amount of precipitation can alter vegetation growth and hence the distribution of migratory herbivores, such as the blue wildebeest (*Connochaetes taurinus*) and plains zebras (*Equus quagga*) in the Serengeti ecosystem in Tanzania, East Africa. Climate change may thus ultimately influence the location of profitable feeding areas for predators, such as spotted hyenas, who feed on these herbivores. A recent paper reveals that spotted hyenas (*Crocuta crocuta*) can adjust their foraging behavior to shifts in migratory prey presence in their territories that are linked to recent changes in pattern and amount of rainfall.

Scientists from the Leibniz-IZW and CEFE analyzed data from a long-term project on three clans of spotted hyenas in the center of the Serengeti National Park. The three clans have been monitored continuously from 1990 to 2019, on a near-daily basis. Weather data show that total [annual rainfall](#) substantially increased in the Serengeti over these three decades. Simultaneously, the presence of migratory herds in hyena clan territories essentially halved. "To assess how the

hyenas responded to these changes in rainfall patterns and prey abundance in their territories, we focused on maternal den attendance—the presence of lactating hyenas with entirely milk-dependent offspring at communal dens," says Morgane Gicquel, first author of the paper and doctoral student at the Leibniz-IZW.

The research team found that, over the course of a year, the probability of migratory herd presence in hyena clan territories increased with the amount of rainfall two months earlier, and that the probability of maternal den presence in clan territories also increased with that of migratory herd presence. As rainfall volume increased over the years, the presence of migratory herds in hyena clans decreased because the association between rainfall and herd presence became weaker. Surprisingly, maternal den attendance did not decrease throughout the entire study period and still matched periods of high prey abundance.

"The presence of mothers at the communal den is a key behavior directly related to cub survival. Spotted hyenas in the Serengeti National Park reproduce throughout the year. Their cubs entirely depend on milk for their first six months of life," explain Dr. Marion East and Prof Heribert Hofer, senior scientists at the Leibniz-IZW who investigated the hyenas in the Serengeti throughout the study period. "When large aggregations of migratory herbivores occur in the clan territory, all lactating mothers feed inside the territory and nurse their cubs daily. When migratory herds are absent, there is no other prey around and females fuel milk production by regularly commuting to distant areas to feed on migratory herbivores. After one to several days, they return to the communal dens to nurse their cubs."

It could be expected that a decline in migratory herd presence within clan territories increases the time mothers spent away from their cubs searching for prey. So why did maternal den presence not decrease in the hyena clans? "Our findings suggest that hyenas may not so much rely on

an expectation of where aggregations of migratory herds should be on a given month, but rather employ other means of locating good foraging locations when commuting," says Dr. Sarah Benhaiem, senior author of the paper and senior scientist at the Leibniz-IZW. A hyena might obtain information on the best direction to set out on a commuting trip from the direction from which well-fed clan members return to the den or the scent trail left by these members. Previous research by the Leibniz-IZW team had shown that hyenas use well established commuting routes which cross many territories. Dr. Sarah Benhaiem explains: "The use of these tracks would allow hyenas to obtain information on foraging success of animals from different clans they encounter on the way. This could help improve their efficiency in locating distant migratory herds."

"Our results suggest that hyenas appear to be well suited to cope with changes in the presence of migratory herds in their territories induced by climate change," says Morgane Gicquel. "This indicates a high plasticity in the response of this keystone predator to environmental variability," adds Dr. Sarah Cubaynes, a scientist at the CEFÉ and co-author of the paper. Although migratory herbivores in the Serengeti National Park are the main prey of several large carnivore species when they occur in their territories, only [hyenas](#) regularly commute long distances outside their clan territory to feed on migratory herbivores. Even so, the impact of potential changes in migratory herbivore movements might also affect other carnivores in this ecosystem.

More information: Morgane Gicquel et al, Climate change does not decouple interactions between a central-place-foraging predator and its migratory prey, *Ecosphere* (2022). [DOI: 10.1002/ecs2.4012](https://doi.org/10.1002/ecs2.4012)

Provided by Forschungsverbund Berlin e.V. (FVB)

Citation: Spotted hyenas adjust their foraging behavior in response to climate change (2022, April 4) retrieved 26 June 2024 from <https://phys.org/news/2022-04-hyenas-adjust-foraging-behavior-response.html>

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