

Human presence shifts balance between leopards and hyenas in East Africa

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Images from camera traps in Udzungwa. From the left: Female leopard, hyena, male leopard. Credit: Rasmus W. Havmøller

Who's stronger? A solitary leopard or cackle of hyenas? And which is best at getting along with humans?

University of Copenhagen researchers closely studied this in a large East African natural area surrounded by rural settlements. [The study](#) published in *Ecosphere*, demonstrates that the presence of humans has a

direct impact on the competitive relationship between the two large predator species: [leopards](#) (*Panthera pardus*)—the iconic spotted feline and the [spotted hyena](#) (*Crocuta crocuta*)—a kleptoparasite and pack hunter known for its comical appearance and characteristic "laugh."

"We humans continue eating our way into the little bit of wilderness left in the world. As we do, we impact wildlife. This study demonstrates that human disturbance upsets the balance between competing species and that this advantages [hyenas](#)," says Rasmus W. Havmøller, the study's first author and a postdoc at the University of Copenhagen's Natural History Museum of Denmark.

For months, Havmøller have been using camera traps to observe the dynamics between hyenas and leopards living in Tanzania's Udzungwa Mountains—an approximately 2,000 km² national park that is completely surrounded by agricultural and populated areas. The study is the first to combine camera observations of large predators over both time and space in a single analysis.

While the hyena as a species seems to be increasing in numbers, the population of leopards has been in significant decline for decades, both in Africa and worldwide. Since hyenas are the leopards' only competitor in this particular natural area, the ability of the two species to coexist is important for their survival. And here, the local population is an important factor.

"As the local people definitely don't like leopards, the leopards retreat as far away from humans as possible. Hyenas, on the other hand, benefit from the fact that humans don't feel threatened by or pursue them. Consequently, hyenas live in close to human populations and may even exploit humans as shields against the leopards," says Havmøller.

"But the areas nearest to humans are also the areas with the most prey.

And as hyenas assert dominance over these areas, it increases their ability to outcompete leopards and potentially threaten the leopard's adaptability," adds Havmøller.

Size matters

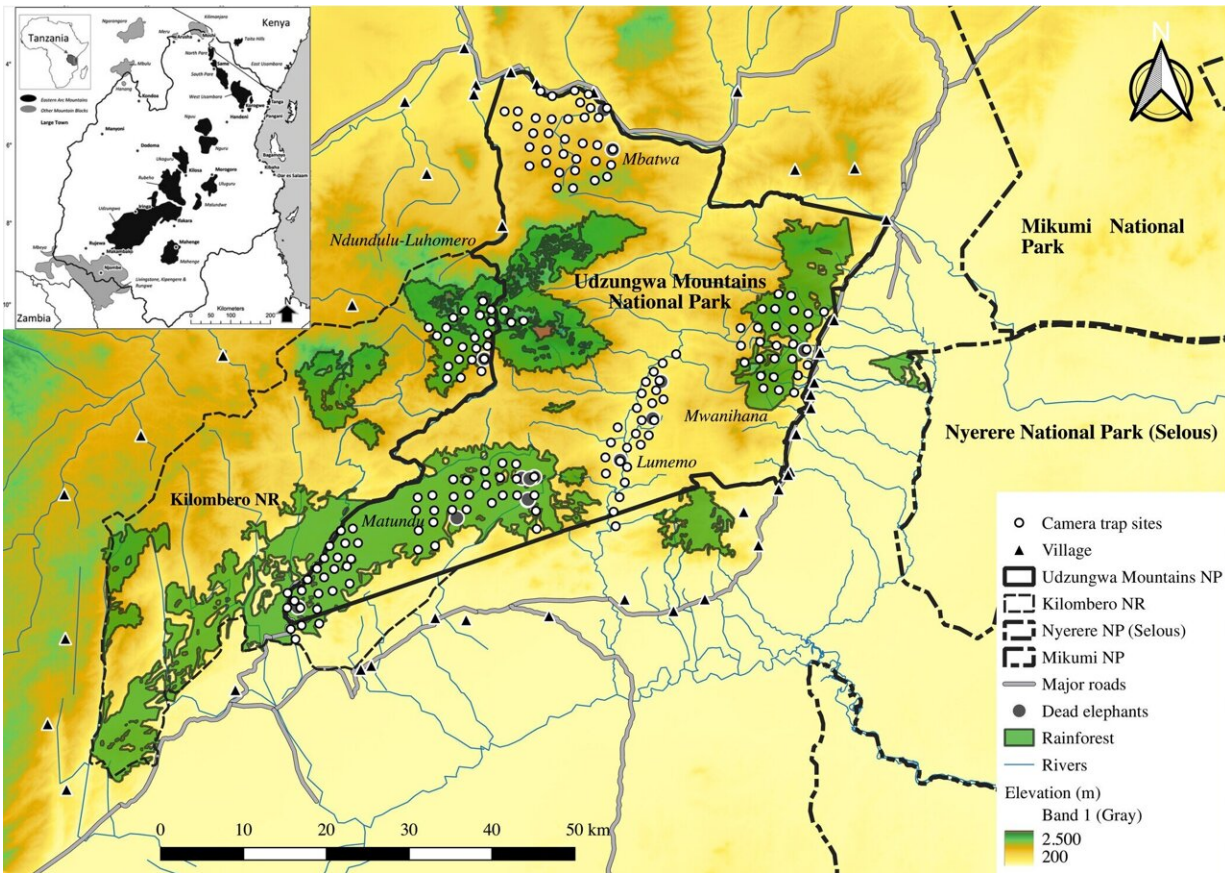
The researchers' observations confirm that size matters. While male leopards, which are larger, retain their dominance over hyenas, the situation is different for female leopards, which are smaller.

"Even though the male leopards are the ones in charge, the hyenas aren't exactly scared off by them. They simply hang out in the background—probably to follow the leopards and steal their prey. But the physical inferiority of the hyenas seems to be compensated for in the areas closest to humans, because male leopards pull out," says Havmøller.

"Female leopards, on the other hand, completely change their behavior when hyenas are in the area. They become diurnal, whereas hyenas are primarily nocturnal. This is probably because female leopards are smaller than hyenas, and that they will likely lose in any fight over prey."

Overall, the study shows that the hyenas benefit from living near humans.

"This suggests that the hyena's ability to adapt to areas of human activity may strengthen their overall success as a species and their competitive advantage over other [large predators](#) as we humans disturb more and more nature," says Havmøller.



Map of Udzungwa Mountains, Tanzania. Credit: *Ecosphere* (2024). DOI: 10.1002/ecs2.4913

When leopards are pressured, cascade effects may follow

According to the researcher, the shift in female leopard hunting patterns may have negative consequences. "If you open up for more tourism and build more roads in the [national park](#), the female leopards will be pressured immediately. They aren't able to differentiate between safari tourists—who are most active during the day—and poachers.

"In time, they will probably learn that safari guests aren't dangerous. But if there is a large and rapid influx into the area, you will probably see a

decline in their population," says Havmøller.

If leopards are seriously pressured out of the food chain, one should expect the emergence of what are known as cascade effects in the ecosystem. "Plucking a large predator like leopards out of a [food chain](#), which can be the ultimate consequence of human disturbances, may have very violent effects.

"Populations of other species, such as certain monkeys, whose populations are kept in check by leopards, will suddenly become too large and change the balance of the entire ecosystem," says the researcher.

As such, Havmøller hopes that the study will serve to encourage restraint when it comes to managing wilderness areas.

"Our results clearly indicate that human disturbances can change the competitive relationship between important predators. So, I hope that considerations will be made when expanding activities in wilderness areas, so as to roll them out slowly and give animals a chance to adapt.

"Furthermore, it would be good if the effects of human disturbances were monitored in more places using camera traps," concludes Havmøller.

Hyenas vs. leopards

- Leopards are unpopular among local people in many places because they may hunt livestock and attack humans. Hyenas, on the other hand, "clean up" by eating sick or dead livestock and don't pose a problem for humans.
- Female leopards (approx. 20 kg–43 kg) are about half the size of male leopards (approx. 51 kg–72 kg). Hyenas are in the middle

in terms of weight (approx. 48 kg–56 kg).

- Leopards are solitary hunters, whereas hyenas hunt in large cackles (clans), which can be an advantage for hyenas in confrontations with leopards.
- Hyenas are kleptoparasites that regularly steal the prey of other carnivores—including leopards.
- Leopards on the other hand, are masterful tree-climbers, which allows them to protect their prey from hyenas.

More information: Rasmus Worsøe Havmøller et al, Sex and size matter: Intricate dominance relationships in an East African large carnivore guild, *Ecosphere* (2024). [DOI: 10.1002/ecs2.4913](https://doi.org/10.1002/ecs2.4913)

Provided by University of Copenhagen

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