Study finds all African carnivores at risk for range loss

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A new Yale School of the Environment-led analysis identifying gaps in maps that help forecast range contractions for African species found that all species studied have a portion of their range at risk and small carnivores warrant more concern.

The study, published in *Proceedings of the National Academy of Sciences* and led by YSE Knobloch Family Associate Professor of Wildlife and Land Conservation Nyeema C. Harris, assessed 91 African carnivores to identify gaps in capacity necessary for their conservation.

Harris's team found that contrary to current perceptions, many species that are currently classified as "least concern" on the International Union for the Conservation of Nature "Red List of Threatened Species" had high percentages of their range at risk of contraction. For example, the common slender mongoose (Herpestes sanguineus) and serval (Leptailurus serval) both have 16% of their ranges at risk of contraction while it was 70% for the Egyptian weasel (Mustela subpalmata). Harris says the most important finding of the study, which analyzed additional data not previously assessed, is that all species studied have some portion of their range at risk of contraction due to burgeoning threats, with an average of 15% of African carnivore ranges at-risk.

"There's a growing interest in relying on geospatial data to make conservation decisions but the range maps are flawed," says Harris. "Traditional gap analyses do not consider both threats and assets across the range that influence population persistence. We are introducing a novel approach by assessing these different variables."

Most surprising, she says, is the amount of contractions and variations in ranges of species the team's model was able to determine. The study reported that some large carnivores that are classified as endangered by the IUCN Red list, including the Ethiopian wolf (Canis simensis) and the African wild dog (Lycaon pictus), had 33% and 3% of range at risk of

contraction, respectively.

"We were able to get new insights about species that are largely unknown or understudied, and we identified that there are some conservation concerns because they have very small ranges comprised of more threats than assets," says Harris. "The model is giving us a broader understanding and a different approach to anticipating biodiversity losses, especially for species with limited information classified as 'data deficient' by the IUCN Redlist, such as the Ethiopian Genet (Genetta abyssinica, a catlike mammal) and Pousargues's mongoose (Dologale dybowskii), also known as African tropical savannah mongoose."

Africa contains a third of the world's carnivore species that persist in a landscape fraught with anthropogenic and environmental pressures, as well as rich biocultural diversity. The study examines possible assets to conservation, such as distribution of Indigenous lands and cultural diversity, and threats to carnivores, such as drought risks and exposure to urbanization or agriculture.

It highlights some anthropic factors that are helping conservation efforts. For example, customary laws and traditional ceremonies of the Nharira community in central Zimbabwe include biodiversity protection.

"The blanket inclusion of human density as inherently and exclusively an environmental stressor is not accurate," the authors note. "By seeking, incorporating, and respecting traditional ecological knowledge of people in places, conservation can progress to a more inclusive practice and promote species ranges under varying global change scenarios."

Harris says more work needs to be done to fill out the full extent of variables distributed across species ranges—an idea she calls textured range maps. She notes that such efforts can complement existing frameworks such as the IUCN Red List.

She says their model will be used for a global carnivore assessment, and she hopes other researchers will apply similar approaches to study different groups of conservation interests, such as primate and amphibians around the world.

"It will allow us to set a very explicit agenda around conservation strategy," she says.

The study was co-authored by YSE doctoral student Siria Gámez; Asia Murphy, postdoctoral fellow at the Department of Environmental Studies, University of California, Santa Cruz; Aalayna R. Green, doctoral student in natural resources at Cornell University; Daniel M. Mwamidi, doctoral student at the Institution of Environmental Science and Technology at the Autonomous University of Barcelona; and Gabriela C. Nunez-Mir, assistant professor of biological sciences at the University of Illinois, Chicago.

"I'm very proud of the collaborators and the partners involved in this work who bring different expertise and experiences," says Harris, noting the team of all Black and Latina scientists. "We are helping to change the narrative of who gets to ask the questions and advance conservation science."

  More information: Socio-ecological gap analysis to forecast species range contractions for conservation,, *Proceedings of the National Academy of Sciences* (2022). DOI: 10.1073/pnas.2201942119

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