Human-wildlife overlap expected to increase across more than half of land on Earth by 2070

August 21 2024

Credit: CC0 Public Domain

As the human population grows, more than half of Earth's land will experience an increasing overlap between humans and animals by 2070, according to a University of Michigan study.

Greater human-wildlife overlap could lead to more conflict between people and animals, say the U-M researchers. But understanding where the overlap is likely to occur—and which animals are likely to interact with humans in specific areas—will be crucial information for urban planners, conservationists and countries that have pledged international

conservation commitments. Their findings are published in *Science Advances*.

"We found that the overlap between populations of humans and wildlife will increase across about 57% of the global lands, but it will decrease across only about 12% of the global lands. We also found that agricultural and forest areas will experience substantial increases of overlap in the future," said Deqiang Ma, lead author of the study and a postdoctoral research fellow at the U-M Institute for Global Change Biology in the School for Environment and Sustainability.

The study showed that the human-wildlife overlap will be driven by human population growth rather than climate change. That is, the increase in people settling in previously undeveloped areas will drive the overlap rather than climate change, causing animals to shift where they live.

"In many places around the world, more people will interact with wildlife in the coming decades and often those wildlife communities will comprise different kinds of animals than the ones that live there now," said Neil Carter, principal investigator of the study and associate professor of environment and sustainability.

"This means that all sorts of novel interactions, good and bad, between people and wildlife will emerge in the near future."

A human-driven issue

To calculate future human-wildlife overlap, the researchers created an index that combined estimates of where people are likely to populate land as well as the spatial distributions of 22,374 species of terrestrial amphibians, birds, mammals and reptiles.

They drew information about the spatial distribution of vertebrates from previously published data that forecasts where species will live based on their climatic niches. Their estimates of where people are likely to live were based on projections of economic development, global society and demographics.

"The index we created showed that the majority of global lands will experience increases in human-wildlife overlap, and this increasing overlap is the result of the expansion of human population much more so than changes in species distributions caused by climate change," Ma said.

Specifically, the researchers found that areas that currently have and are projected to have high human-wildlife overlap in 2015 and 2070 are concentrated in regions where human population density is already high, including China and India.

In addition to those places where overlap is already high, "another area of major concern are forests, particularly in forests in Africa and South America where we're seeing a large increase in the overlap in the future," Carter said. "The reason that is concerning is because those areas have very high biodiversity that would experience greater pressure in the future."

The researchers also found that median species richness—the variety of species in a given area—is projected to decrease across most forests in Africa and South America. In South America, mammal richness is projected to decline by 33%, amphibian richness by 45%, reptile richness by 40% and bird richness by 37%. In Africa, mammal richness is projected to decline by 21% and bird richness by 26%.

The need for biodiversity

Preserving biodiversity in these zones of overlap has real benefits, Carter says.

"There are cases of human-wildlife interactions that are both good and bad, but we anticipate that they're going to become more pronounced. For example, COVID19 was the result of human contact with wild animals, and there is concern that new diseases will emerge from greater encounters between people and certain wildlife species," he said. "But you also have species that provide important benefits to people, like reducing the abundances of pests."

For example, part of Ma's data analysis looked at birds that eat insects in agricultural areas and examined where those birds will go under climate change. He found that more than two-thirds of the croplands that will likely experience an increase of human-wildlife overlap by 2070 will see a decline in bird species that can help reduce crop pests.

"What we're doing is finding those areas and saying, if you have cropland or pastures here, are you going to have species move into those areas or species moving away from those areas," Carter said.

"Are those new croplands or pastures going to be an additional threat to the species or could there be ecosystem services harnessed for free?"

Scavengers such as vultures and hyenas also play a critical role by cleaning waste from urban areas and other landscapes, Carter said. By clearing waste, scavengers can reduce the prevalence of some human diseases such as rabies, anthrax and bovine tuberculosis.

"Hyenas and other species that are vilified or persecuted because they are scavengers provide a lot of disease reduction benefits," Carter said. "On one hand, they're viewed as a threat, but on the other hand, they're providing free health benefits."

Equitable conservation

Future conservation strategies will have to evolve, especially in regions that previously haven't seen much human settlement, according to the researchers. In the past, a core conservation strategy was to establish protected areas where human access is restricted. This is becoming harder to implement because there are fewer such places.

"There's also a significant environmental justice argument around the validity of telling communities that may have lived in a certain area for generations that they have to move," Carter said.

"Our study suggests that with more areas of the world expected to be shared both by people and wildlife, conservation planning will have to get more creative and inclusive."

Conservationists will need to engage local communities to build interest in helping improve the conservation process. This process may include establishing habitat corridors to connect existing protected areas to potentially new areas or to create temporary protected areas during critical periods for wildlife, like breeding periods, as well as other conservation innovations.

"We care a lot about which areas can support populations of endangered species, like tigers, and how human communities interact with these species," Carter said.

"In some places it's going to be really hard to do everything at once: to grow crops and have urban areas and protect these species and their habitats. But if we can start planning now, we have a lot of tools to help us promote sustainable coexistence."

Co-authors of the study include Briana Abrahms of the University of

Washington, U-M ecologist Jacob Allgeier, Tim Newbold of the University College London and U-M evolutionary ecologist Brian Weeks.

More information: Deqiang Ma et al, Global Expansion of Human-Wildlife Overlap in the 21st Century, *Science Advances* (2024). DOI: 10.1126/sciadv.adp7706. www.science.org/doi/10.1126/sciadv.adp7706

Provided by University of Michigan