

The double threat of climate and land use change enhances risks to biodiversity

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Researchers from Aarhus University, Denmark, and the University of Wisconsin-Madison, USA, have developed a new approach to measure the combined exposure of species to both climate and land use change. This new metric was used to assess the risk to species in the face of combined rates of climate and land use for the US from 2001 to 2051.

Their results, which have just been published in *Nature Climate Change*, highlight areas expected to be most vulnerable to losses in biodiversity and ecosystem function due to the individual or combined effects of climate and land use change predicted by the mid-21st century. Exposure was highest in the Great Plains and Northeast U.S., suggesting that these areas will be particularly at risk to the combined effects of climate and land use change. Furthermore, the paper reports that climate is changing at a greater rate than land use change in most regions of the US and that the joint rates of climate and land use change are low across much of the interior west.

Different strategies for conservation and management

"By assessing climate and land use changes simultaneously, we found a substantially greater estimate of species exposure to global change threats than either land use or [climate change](#) alone," explains Alejandro Ordonez from Department of Bioscience, Aarhus University. "For example, in areas where climate and land use change will be slower, species may be able to persist in place and adapt to the changes, or move

into new suitable habitats. In contrast, the areas where climate change and land use change are accelerating will create the greatest threats to ecological communities, and ecosystems may not be able to keep up." Ordonez adds: "It would seem intuitive that such a combined map would have been done before, but this is the first time that we have been able to map this combined risk in to the future thanks to the socio-economic land use projections generated by two of the authors".

By integrating both future climate change and intensifying land use threats, the authors indicate that a different set of conservation priorities emerge than if one considers risk from climate change alone.

"We know that the impacts of both climate change and land use change will be highly localized, which means that management and adaptation-planning strategies must be flexible to account for the interactions of both. In our study, we use two regions to highlight how a set of broad-scale management strategies and interventions that can be useful for conservation decision-making, and to assess where and which adaptation efforts are most likely to be successful under unique combinations of risks due to climate and land use change," says Ordonez.

For example, within the U.S., regions exposed to both high rates of climate change and reductions in forest or rangelands may be priorities for [land acquisition](#) and protection efforts. However, potential reserve areas should be carefully evaluated in the context of urbanization given limited conservation resources, as this may require substantial investments for land acquisition.

More information: www.nature.com/nclimate/journal/nclimate2337.html

Provided by Aarhus University

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