Mapping climate corridors

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The corridors of land vital for many wildlife species in the face of climate change often are unprotected. Now, a recently published study from a University of Montana ecology professor and other researchers has tracked these shifting North American habitats.

Solomon Dobrowski, an associate professor of forest landscape ecology in UM's W.A. Franke College of Forestry & Conservation, was part of a team that used high-performance computing methods to map "climate corridors." *Global Change Biology* recently published the study. Climate corridors form the best route between current and future climate types. Because organisms need to avoid inhospitable climates, the corridors are often circuitous. Although previous studies have mapped climate connectivity areas over smaller regions, this is the first time scientists have mapped these areas over entire continents.

The researchers found that routes funneled along north-south trending passes and valley systems and along the leeward or drier slopes of north-south trending mountain ranges. Climate connectivity areas, where many potential dispersal routes overlap, often are distinct from protected areas and poorly captured by existing conservation strategies. Many of these merit increased levels of protection due to pressures from human land use.

"The paleo-ecological record provides clear evidence of plants and animals moving large distances in response to climate changes of the past, but those changes occurred over long time periods and without the human pressures we see now," Dobrowski said.

The researchers hope results from this study will help land managers create more effective responses to climate change by identifying landscape features that promote connectivity among protected areas.

"Even as governments step up their commitment to reduce future greenhouse gas emissions, this information can help planners identify climate corridors whose conservation would reduce loss of species from the climate change that is already locked into the system from past emissions," said Carlos Carroll of the Klamath Center for Conservation Research, lead author on the study.

Existing parks and protected areas with high importance for climate connectivity include southern Mexico, the southwestern U.S., and western and arctic Canada and Alaska. The Great Plains, eastern temperate forests, and high arctic and western Canadian Cordillera also hold crucial climate connectivity areas.

The study's authors also included researchers from the U.S. Forest Service and the University of Alberta as part of the AdaptWest Project, a high-resolution database that maps climate change-related threats to biodiversity across North America. The database is used by conservation organizations and agencies such as the Wilderness Society and the U.S. National Park Service to assess climate change vulnerability in different regions of the U.S. and Canada.

More information: Carlos Carroll et al. Climatic, topographic, and anthropogenic factors determine connectivity between current and future climate analogs in North America, *Global Change Biology* (2018). DOI: 10.1111/gcb.14373

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