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Testing the climate-niche paradigm for species extinction risk

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The increasing relevance of climate change as a threat of species extinction is a pressing concern, as highlighted by the recent IUCN Red List assessment for amphibians (Luedtke *et al.*, 2023). Despite the reported threats of climate change, measuring its influence across species remains complex and lacking the appropriate tools (Cazalis *et al.*, 2022). Changes in "climate niche", referring to the environmental conditions necessary for a species to thrive, have long been discussed and used to predict species distributions and extinctions. Here, we utilize the recently available Red List classifications to test this paradigm within state-of-the-art predictive models of comparative extinction risk. Using historical weather data from the ERA-5 reanalysis, we explore the predictive significance of a wide range of potential definitions of climate niche exceedance. Extinction risk models have consistently identified geographic range size and human population density as important correlates to extinction risk. Also controlling for factors such as habitat fragmentation, land use, human pressures, biogeographical realms and biological traits, we use a random forest model to predict the transitions between Red List categories for over 5,000 amphibian species and evaluate results against the official assessments. This approach tests the evidence base of the climate niche paradigm and evaluates its effectiveness as a tool for incorporating climate change into extinction risk models.

Luedtke, J.A., Chanson, J., Neam, K. *et al.* Ongoing declines for the world's amphibians in the face of emerging threats. *Nature* **622**, 308–314 (2023). <https://doi.org/10.1038/s41586-023-06578-4>

Cazalis, V., Di Marco, M., Butchart, S. H. *et al.*, Bridging the research-implementation gap in iucn red list assessments, *Trends in Ecology & Evolution* (2022). <https://doi.org/10.1016/j.tree.2021.12.002>