Research briefing

Climate change and habitat loss push amphibians closer to extinction

Amphibians are the most vulnerable vertebrates worldwide, with 41% of species threatened with extinction. Habitat loss is the most common threat, and climate change is the main driver of increased extinction risk. Investment in amphibian conservation must be scaled up drastically and urgently to prevent further extinctions and reverse declines.

This is a summary of:

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The project

The 2004 Global Amphibian Assessment (GAA)¹ drew attention to the unfolding amphibian extinction crisis and showed that amphibians face a much greater threat than do mammals or birds. Since then, researchers have gathered more information on amphibian population trends, ecological requirements, threats and distributions. They have described more than 2,280 new species, including toads, newts and frogs. And they have engaged in conservation efforts to prevent further extinctions and population declines. Nearly two decades later, the Second Global Amphibian Assessment (GAA2) has comprehensively re-evaluated the conservation status of amphibians. This update is needed to guide scientific research, inform conservation planning, monitor conservation actions and measure progress towards achieving biodiversity targets.

The discovery

Using the International Union for Conservation of Nature's Red List categories and criteria², the GAA2 assessed the extinction risk of more than 8,000 amphibian species. The Red List Index, which measures the overall extinction risk facing a group of species, was calculated for amphibians³ and compared with that of other taxonomic groups. It was disaggregated to show trends between different kinds of amphibian, biogeographical area and breeding strategy. Trends in the Red List Index are driven only by genuine increases (status deterioration) or decreases (status improvement) in extinction risk. A primary driver (the main cause) was assigned for species that experienced a deterioration, and for improvements the primary threat mitigated was determined. All deteriorations were coded according to the dominant primary driver to provide information about the geographical variation of threatening processes (Fig. 1). There was also analysis of the relative importance of the primary drivers of deteriorations and of the threats mitigated for species that improved.

The Red List Index shows a continual downward trend for amphibians: almost 41% of species are now threatened with extinction, making them the mostthreatened vertebrates. Salamanders are the most-threatened amphibians, and the Neotropics (southern North America, South America and the Caribbean) is the mostthreatened area. Habitat loss continues to be the most common threat, affecting 93% of all

threatened species. When considering only species with a status that has deteriorated. however, disease, which causes rapid and widespread declines in population, is responsible for the greatest number of species becoming critically endangered. Climate change, which has caused reduced precipitation and increased intensity and frequency of droughts and fires, has driven the most status deteriorations from 2004 to 2022. The results highlight some good news, too: the status of 120 species has improved. Some of these species are showing resilience to disease, whereas others have been helped by conservation actions such as habitat protection and management.

The implications

The amphibian extinction crisis continues to worsen. Habitat loss is the most-common threat to amphibians, and disease most frequently drives species to the brink of extinction. Habitat protection is an effective way of reducing amphibian extinction risk. Information from the GAA2 can be used to identify the priorities for protecting these animals. The effects of climate change are emerging as a major driver of increases in extinction risk. This trend is expected to continue. Investigation and implementation of conservation actions that directly address the effects of climate change are therefore needed, especially for species that are imminently at risk of severe population declines.

Given the geographical bias and paucity of studies on the effects of climate change on amphibians⁴, we suspect that the GAA2 has underestimated the scope and severity of the situation. As research advances and more studies on the effects of climate change on amphibians are done, we expect that the climate will be viewed as an even greater threat to amphibians globally.

Now is the time for the world to prioritize investment in amphibian biodiversity. Regular monitoring and assessments of extinction risk are needed to continue identifying priorities and measuring the effects of conservation projects. With stronger political will and a substantial increase in investment, we can avoid further amphibian extinctions, recover species and rewild the planet.

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EXPERT OPINION

As I would have expected, given the vast amount of effort and input that has gone into its preparation, this work is both excellent and important. The key results — that amphibians are highly threatened and that by and large the threats to

them are increasing — are sadly not a surprise. The data are certainly valid and the way they have been treated is robust." (CC BY 4.0)

Ross Alford is at James Cook University, Townsville, Queensland, Australia.

FIGURE



Figure 1 | **Geographical pattern of the primary drivers of deteriorating status in 306 amphibians between 2004 and 2022.** The colours show the primary driver that affects the most species in cells of 7,775 square kilometres. Darker colours represent more species. Where two primary drivers contribute equally, an intermediate colour is shown. Stars indicate areas where the primary driver has not been determined or where there are numerous primary drivers. Luedtke, J. A. *et al./Nature* (CC BY 4.0).

BEHIND THE PAPER

More than a decade in the making, the GAA2 project worked country by country to evaluate the extinction risk of more than 8,000 amphibian species from all over the world. The GAA2 would not have been possible without the more than 1,000 scientists who contributed their time, expertise and data. Finding four species to be extinct was a particularly sombre task. Drawing on years of surveys, those four assessments were not made lightly. These, and the many other shared experiences of the co-authors and scientists who contributed to the GAA2, strengthened this community, forging new collaborations and renewing commitments to study and protect amphibians. This passion fuelled the project, despite the tragedies and challenges of the COVID-19 pandemic. It is with equal passion that the co-authors deliver these analyses to the world to encourage the transformative changes that will save amphibians.

K.N.

REFERENCES

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FROM THE EDITOR

This study stood out because of its comprehensive assessment of the threat status of amphibians worldwide. Although the main drivers of the population declines are not unexpected, it is important to show the growing effects of climate change and the positive impact of conservation interventions.

Editorial team, Nature