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Confronting Amphibian Declines and Extinctions

Stopping further global losses of amphibian populations and species requires an unprecedented conservation response.

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Amphibian declines and extinctions are global and rapid: 32.5% of 5743 described species are threatened, with at least 9, and perhaps 122, becoming extinct since 1980 (*1*). Species have disappeared across the entire taxonomic group and in nearly all regions of the planet. These figures are probably underestimates as entire clades of species are threatened. For example, of the 113 species of harlequin toads (genus *Atelopus*), 30 are possibly extinct, and only 10 have stable populations (*2*). Nearly a quarter of known amphibian species were deemed "data-deficient" with respect to conservation status in the recent global assessment (*1*). Losing biodiversity at this taxonomic scale impacts ecosystem goods and services [e.g. (*3*, *4*)]. As amphibian species disappear, we also lose their untapped potential for advances in biomedicine and biotechnology in general (*5*).

Losses result from familiar threats (land-use change, commercial overexploitation, and exotic species) and from the emerging infectious disease chytridiomycosis, caused by the fungus *Batrachochytrium dendrobatidis* (*Bd*). Predictions are that within 4 to 6 months of *Bd* arrival at a site where it has not previously been present, ~50% of amphibian species and ~80% of individuals may disappear (*6*). Global climate change may be encouraging local conditions ideal for *Bd*'s persistence and/or spread (*7*), commercial trade of wildlife may also contribute (*8*), and pollution may increase susceptibility of species to pathogens (*9*, *10*). Traditional programs and current laws and policies alone are insufficient to address global threats that cross boundaries of reserves and nations.

Global leaders in research, conservation, and policy agreed on an Amphibian Conservation Action Plan (ACAP) and Declaration in 2005 (see Supporting Online Material). A new, international body was recommended to coordinate and facilitate conservation programs for amphibians and to garner and administer funds. Thus, we call for formation of The Amphibian Survival Alliance (ASA)—led by an international secretariat of the Amphibian Specialist Group of the Species Survival Commission of IUCN (World Conservation Union). An initial 5-year budget requires at least U.S.$400 million.

Conservation activities should remain in affected countries where possible, with coordination and support through ASA, to engage and employ local scientists. A special initiative would be regional centers for disease research and captive breeding. Centers would exist within government agencies, zoos, or universities and would be staffed by local scientists, wildlife managers, and conservationists. ASA would create and support readily available databases from the global network of centers, as well as research and training in countries with few amphibian experts. Such dedicated research capacity in affected regions is required for this global crisis, as well as to keep amphibian research and conservation at the forefront of policy-making.

Chytridiomycosis deserves especial attention because of its massive impacts on amphibian diversity (*11*, *12*). Natural-agent control of *Bd* or selecting for resistance in amphibians may be possible (*13*, *14*). In the meantime, we must implement coordinated in situ actions (e.g., surveys, monitoring, and habitat protection) and ex situ husbandry programs (e.g., survival-assurance and research colonies) at unprecedented scales. Amphibian salvage operations are possible at an ecosystem level (*15*). Ex situ programs may be the only option to avoid extinction for many species [e.g., Kihansi Spray Toad and Panamanian Golden Frog (*16*, *17*)], while research progresses on disease control, treatment, and evolution of resistance (*18*).

The ASA model builds on programs such as the Turtle Survival Alliance (*19*), Global Environment Facility (GEF) Coral Program (*20*), and an Australian threat abatement plan (*21*). Success will depend on a paradigm shift in the scale of the coordinated response, with stakeholders from the academic, conservation, zoo, ethics, policy, global change, private sector, and international biodiversity convention communities uniting for one goal. Support from individuals, governments, foundations, and the wider conservation community is essential.

The Panamanian Golden Frog, *Atelopus zeteki*, is nearly extinct in the wild as a combined result of habitat change, illegal collecting, and fungal disease; the species is currently secure in several ex situ programs.

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Supporting Online Material
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