

Nitrogen is a neglected threat to biodiversity

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Habitat destruction and the direct exploitation of species often occupy center stage in discussions of biodiversity perils. However, indirect harms, such as that posed by nitrogen pollution, remain underappreciated and poorly understood despite playing a key role in species declines. In an article for the journal *BioScience*, a team of environmental researchers led by Daniel Hernández of Carleton College, in Minnesota, outline the challenges associated with nitrogen.

To better understand nitrogen-induced biodiversity imperilment, the authors surveyed 1400 [species](#) listed under the Endangered Species Act, finding a total of 78 that face known hazards from [excess nitrogen](#). The mechanisms of nitrogen's impacts are diverse, encompassing direct toxicity, depleted oxygen resulting from excess fertilization, and incursions by invasive species that outcompete local populations or exclude their food sources. In many instances, direct attribution of declines to [nitrogen pollution](#) was hampered by "sometimes long and difficult-to-trace chains of causation from climate and atmospheric stressors to impacts," say the authors.

In recent years, the amount of nitrogen pollution has grown steadily. Fertilizer use, leguminous crop agriculture, and [fossil fuel burning](#) have more than doubled the amount of global reactive nitrogen, and in the United States, human-derived nitrogen additions are thought to be fourfold greater than natural sources. Despite this trend, say the authors, "existing laws and policies to protect biodiversity were largely developed before these threats were fully recognized."

Even with the dearth of regulatory approaches for managing nitrogen pollution, the authors point to a case study of grasslands in California indicating that nitrogen's impacts on imperiled species can be substantiated "through a range of investigations at the atmosphere-ecosystem interface and the intersections of ecosystem, community, and population ecology, involving both historical and comparative approaches," which could aid future management efforts.

If regulatory structures can be appropriately modernized to encompass such approaches, efforts to mitigate nitrogen's species imperilment may be fruitful, say the authors, because unlike global threats that resist local solutions, nitrogen pollution "can be more readily addressed within the boundaries of a single nation, region, or watershed."

More information: *BioScience*, [dx.doi.org/10.1093/biosci/biw003](https://doi.org/10.1093/biosci/biw003)

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