

# How technology and economics can help save endangered species

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A lot has changed in the world since the Endangered Species Act (ESA) was enacted 50 years ago in December 1973. Two researchers at The Ohio State University were among a group of experts invited by the

journal *Science* to discuss how the ESA has evolved and what its future might hold.

Tanya Berger-Wolf, faculty director of Ohio State's Translational Data Analytics Institute, led a group that wrote on "Sustainable, trustworthy, human-technology partnership." Amy Ando, professor and chair of the university's Department of Agricultural, Environmental, and Development Economics, wrote on "Harnessing economics for effective implementation."

Berger-Wolf and her colleagues wrote, "We are in the middle of a mass extinction without even knowing all that we are losing and how fast." But technology can help address that.

For example, they note the value of tools like camera traps that survey [animal species](#) and smartphone apps that allow [citizen scientists](#) to count insects, identify bird songs and report plant observations.

New tech has allowed scientists to monitor animal and plant populations at scale for the first time, said Berger-Wolf, who is also a professor of computer science and engineering, evolution, ecology and organism biology, and electrical and computer engineering. One challenge is to find new ways to extract all the information from these new sources of data.

"But even with all this data, we are still monitoring only a tiny fraction of the biodiversity out in the world," she said. "Without that information, we don't know what we have, how different [species](#) are doing and whether our policies to protect endangered species are working."

Most important, Berger-Wolf said, is the need to make sure to keep humans in the process. Technology needs to connect data, connect different regions of the world, connect people to nature and connect

people to people.

"We don't want to sever the connection between people and nature, we want to strengthen it," she said.

"We cannot rely on technology to save the world's biodiversity. It has to be an intentional partnership between humans and technology and AI."

Economics should be another partner in the fight to save endangered species, Ando said.

"There's this tendency to think that protecting endangered species is all about biology and ecology," Ando said. "But [various tools](#) in economics are very helpful in making sure the work we do to implement the Endangered Species Act is successful. That is not always obvious to people."

For example, bioeconomic research is a multidisciplinary effort between economists and biologists to work together to see how human behavior interacts with ecological processes and systems.

"We have to take into account feedback effects. People take an action, and that changes the ecosystem and that changes what people do," she said. "We need to capture those feedback effects."

The result can be novel ways to protect [endangered species](#), such as "pop-up" habitat modification. For example, ranchers can take down fences temporarily while elk are migrating to allow them to move freely. Rice fields can be temporarily flooded during shorebird migration to give them a place to rest and feed on their travels.

We can "draw upon economics to optimize the timing, location and extent of temporary actions to maximize their net benefits to society,"

Ando wrote in [Science](#).

Another way economics can help is to develop policies that protect species before they become so threatened that they need ESA protection.

A common issue is that multiple landowners will all need to work together to protect the habitat of threatened species. But often, if some landowners take action to protect a species, other landowners will think they don't have to.

"Economists have been working to understand how we can coordinate landowners where we don't have to implement draconian land use regulations, but still protect habitat," Ando said.

"That is a very promising tactic that can protect species and also reduce the cost to people of doing so."

**More information:** Robert L. Fischman et al, A landmark species protection law looks ahead, *Science* (2023). [DOI: 10.1126/science.adn3245](https://doi.org/10.1126/science.adn3245).  
[www.science.org/doi/10.1126/science.adn3245](https://www.science.org/doi/10.1126/science.adn3245)

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