

Gene editing, extinction and ethics: Why open conversation is key

New paper asks if there are cases where deliberate extinction is justified

By Gabriela Harrod, ASU News
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In a new paper published in *Science*, researchers are challenging one of conservation's deepest assumptions — that extinction is always a failure to be avoided.

With new genome-editing tools making it technically possible to eliminate entire species, the question is no longer just scientific, but ethical: When, if ever, should we consider driving a species extinct on purpose?

The study, titled "[Deliberate extinction by genome modification: An ethical challenge](#)," brought together ethicists, conservation biologists, ecologists and social scientists to explore this complex question. ASU School of Life Sciences Professor [James Collins](#) co-authored the piece, which argues that while extinction should never be taken lightly, there may be "extremely rare and compelling" cases where it is justified.

"This is a research area that is inherently counterintuitive," Collins said. "At a time when biodiversity is more valued than ever, the idea that it could be ethically permissible to deliberately eradicate a species seems paradoxical. But we're asking: Are there situations where it makes sense?"

According to [Gregory Kaebnick](#), a senior research scholar at [The Hastings Center](#) and the paper's lead author, this conversation started over lunch during a National Academies meeting on gene drive research.

Collins posed the idea that full extinction might mark an ethical line that genome-editing technologies shouldn't cross.

"The answer we offer in this new paper is, in effect, 'almost, but not quite,'" Kaebnick said.

The team focused on three cases where extinction has become technically possible or ethically relevant: the New World screwworm, *Anopheles* mosquitoes and invasive rodents on islands.

The screwworm, a flesh-eating parasite that attacks warm-blooded animals, has already been eradicated from North and Central America using sterilization techniques. Genetically engineered alternatives could now offer the opportunity to eliminate the species globally. The authors suggest that because the screwworm's ecological role appears negligible and the suffering it causes is significant, its case may be uniquely strong.

"What really moved most of the people in our author group was concern about the suffering of domestic animals — animals whose welfare we're responsible for," Kaebnick said. "But trying to determine how much animal suffering is compelling enough to justify eradicating a fly that causes it? That's incredibly difficult."

By contrast, the ethical picture becomes murkier with *Anopheles gambiae*, which transmits malaria. While the disease kills hundreds of thousands annually, the authors point out that targeting the *Plasmodium* parasite directly could offer a less ethically fraught alternative to mosquito extinction.

The third case — invasive rats and mice that decimate island bird populations — raises concerns about unintended consequences. Gene drives could, in principle, suppress these rodent populations locally, but even a small risk of global extinction would be too high.

"There cannot be an alternative solution," Kaebnick noted, "for eradication to even begin to be ethically defensible."

One of the paper's strongest arguments centers not on biology, but governance: Who gets to decide whether a species should be driven extinct?

The authors advocate for strong community participation, especially from local and Indigenous groups most directly affected by any intervention.

"Real influence means the ability to shape a project, including to argue against it and really be heard," Kaebnick said.

But he also acknowledged that there's no universal model: "Meaningful community involvement might take various forms, depending on the community, who the stakeholders are, the power dynamics in it, even the issue itself."

[Rebecca Tiernan](#), a PhD candidate co-chaired by Collins and Regents Professor [Nancy Grimm](#) in the School of Life Sciences environmental life sciences program and the only graduate student on the author team, echoed that sentiment.

"The best outcomes come when the public isn't just consulted but collaborates," she said. "People need to feel like their values are being heard, not just after decisions are made but during the entire process."

Tiernan's role on the paper grew out of her broader research on conservation and public health. Though she didn't originally focus on genome editing, her work exploring international biopolicy and genetic data ethics made her a natural fit.

She also emphasized that her participation highlighted the importance of involving early-career scientists and students in complex policy discussions.

“It was a unique experience to be in the room with public health experts, conservationists and philosophers, all trying to work through these thorny questions together,” she said.

Ultimately, the authors do not prescribe a strict rulebook for when extinction might be justified. Instead, they call for careful, participatory decision-making rooted in humility and a willingness to confront uncomfortable trade-offs.

“What we’re really arguing,” Kaebnick said, “is that extinction should be considered only when there is no alternative, when the benefits are significant and the risks are clearly understood. But even then, it has to be a collective decision.”

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Text image(s)



James Collins