

Scientists propose panel to guide gene-editing decisions regarding conservation

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An Oregon State University environmental ethicist and scientists from nine other universities say an international oversight panel is needed to guide decisions about whether and when to employ gene-editing technology to solve ecological problems.

In a paper published today in *Science*, Michael Paul Nelson and collaborators including researchers from Yale, Harvard, Brown and MIT propose a coordinating body to act as a neutral third party in [gene-editing](#) decision-making. Nelson is a professor of environmental ethics and philosophy in the OSU College of Forestry.

Gene editing refers to causing specific changes to an organism's DNA; an enzyme makes a snip in the DNA at a specific sequence, and editing takes place when the cell repairs the cut. Editing can involve adding, subtracting or modifying DNA.

Changing the genome means altering the characteristics of an organism, and the applications are potentially limitless. Genetically modified mosquitoes, for example, could be a tool for suppressing malaria; corals could have their genomes changed such that they would better resist environmental stressors.

"But what if those gene-edited coral species dominated reef ecosystems at the expense of a diversity of naturally evolving coral species and the fish that depend on them?" said Nelson, the Ruth H. Spaniol Chair of Renewable Resources at OSU. "Or if a gene modification designed to suppress an invasive species escaped its release site and spread to a native population and suppressed that population too?"

Nelson notes that each decision to release a gene-edited organism should be considered through the lens of:

- What is the scope and intent of the alteration?
- What are the ecosystems that might be affected?
- What are the consequences for human health?
- What are the value systems of the communities that might be affected?

"Underlying all of this are differing views about what is considered 'natural' and to what degree humans should even be intervening in ecosystems," Nelson said. "Different societal views about the human relationship to nature need to shape decision-making, and local community knowledge and perspectives need to be engaged to address these context-dependent, value-based considerations."

Nelson and his co-authors, among them scientists from UCLA, Arizona State, Georgia Tech and the National Geographic Society, propose a coordinating body to bring together communities, technology developers, and governmental and nongovernmental organizations "in ways that ensure inclusive deliberations."

The coordinating body would set up a framework for deliberations that produce standardized reports and deliver recommendations, and also establish information-sharing protocols to connect deliberations around the globe.

"Characterizing what defines an affected 'local' community will be an important part of this process and will depend on the nature of the technology in question and how it is predicted to interact with the environment," Nelson said. "For example, if a self-propagating gene drive is under deliberation to counter malaria transmission, then representatives from much of sub-Saharan Africa would deserve a voice in deliberation. For cases where a technology is more limited in scope, predictive models could be used to define the communities most likely to be affected."

The authors envision the coordinating body operating with the shared support of multiple existing groups, such as the World Health Organization and the International Union for the Conservation of Nature.

"That would hasten its development so it could meet the rapid pace of gene-editing technologies," Nelson said. "Joint support would also lend immediate accountability and authority."

Funding could come from a trust built with contributions from concerned governments, intergovernmental organizations and NGOs.

The body's success will depend on inputs and expertise from a range of disciplines and world views, Nelson notes.

"This governance model proposes a connection between local needs and global frameworks and expertise," he said. "That has the potential to help us all realize the most profound benefit of gene editing: the opportunity to inspire a more healthy and just future for all who share our planet."

A key aspect of the panel would be a collection of neutral and informed facilitators, Nelson said.

"They'd understand existing power structures, and foster relationships between groups that hold disparate ideological stances, striving to cultivate certain virtues among deliberants," he said. "Transparency and trustworthiness are musts if this panel is to work, and facilitators will help everyone who participates understand that."

More information: Natalie Kofler et al. Editing nature: Local roots of global governance, *Science* (2018). [DOI: 10.1126/science.aat4612](https://doi.org/10.1126/science.aat4612)

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