Mexico's policies have saved the vaquita (*Phocoena sinus*) from imminent extinction, but the species remains at risk.

PHOTO: THOMAS A. JEFFERSON/VIVA VAQUITA

Edited by **Jennifer Sills**

Mexico must save the vaquita from gill nets

Between 1997 and 2018, Mexico's vaquita (*Phocoena sinus*) population fell from 600 to fewer than 20 individuals as a result of entanglement in gill nets (*1*). In 2022, the Mexican Navy placed hundreds of concrete blocks with entangling metal hooks to discourage gill net use within the last small area where vaquitas are concentrated. These conservation efforts appear to be paying off, but more must be done.

The concrete blocks have created a de facto sanctuary for the few surviving vaquitas. No gill nets were observed there during a 2023 vaquita survey (*2*), and monitoring by the Sea Shepherd Conservation Society documented a substantial decline in gill net use in the area (*2*, *3*). Genomic studies suggest that inbreeding depression risk for vaquitas is not extreme (*4*), and healthy adults and calves were seen in the past 2 years (*5*, *6*).

Mexico deserves praise for preventing the vaquita's immediate extinction, but only 12% of the porpoises' 2015 distribution area is currently protected (*7*). To enable full recovery, Mexico could greatly expand the use of anti–gill net devices into as much of the vaquita's full 2015 range as feasible. However, this action would further reduce the area available for fishing, likely leading to reduced income for fishers and social unrest.

Instead, fishers in Mexico should switch to vaquita-safe fishing gear. Although such gear has long been available, Mexico's national fisheries agency (Comisión Nacional de Acuacultura y Pesca) has made little progress on transitioning fishers (*8*, *9*). When President-Elect Claudia Sheinbaum takes office on 1 October, her administration should immediately implement a fishing gear transition by incentivizing behavioral change at all levels (*10*). The government should also pursue an integrated policy that emphasizes technical expertise in fishing gear and practice, community economic development, social participation in the regulatory process, and strict enforcement. The vaquita can only be saved when fishers have a direct stake in a healthy marine ecosystem, which includes being able to make a living without using gill nets.

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Safeguard stewards of biodiversity knowledge

In their Research Article "The global distribution of plants used by humans" (19 January, p. 293), S. Pironon *et al.* provide the first global assessment of the distribution and conservation status of 35,687 plants used by people. However, the paper includes no information about the identity of the original holders of this vast biodiversity knowledge. Biodiversity studies must properly recognize Indigenous Peoples and local communities to avoid the misunderstanding and appropriation of Indigenous and local knowledge systems by Western science (*1*). Scientific practices should be adjusted to safeguard the rights of the diverse stewards of biodiversity knowledge.

Indigenous and local knowledge systems have been marginalized and exploited for centuries (*1*, *2*). Although Western science has recently begun advocating for the central role of Indigenous Peoples and local communities as stewards of biodiversity knowledge (*3*, *4*), Indigenous communities still struggle to gain recognition of their intellectual and territorial rights (*5*). These rights include free, prior, and informed consent for activities that affect them or that use their knowledge and practices, including scientific research; authority to deny activities and research that negatively affect Indigenous cultures, territories, or knowledge; and participation in the construction of tools, products, and academic publications based on the knowledge of Indigenous and local communities. Although Pironon *et al.* and others recognize the importance of Indigenous communities, this universal term hides the immense cultural diversity of the more than 5000 distinct ethnic groups in the world (*6*).

Indigenous and local knowledge is linked to the cultural identity and territory of each community. Hence, maintaining the physical and intellectual integrity of biodiversity stewards and safeguarding their territories are prerequisites to keeping this knowledge alive. For Western science and policy to be able to protect Indigenous and local knowledge, data governance must require the inclusion of information about the data's original holders and effectively involve them in scientific practices—from planning, executing, and publishing—through a process of co-construction of knowledges (*7*). Otherwise, these groups will continue to be dispossessed, and their rights to consent and benefit sharing will continue to be violated (*8–11*).

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OUTSIDE THE TOWER

Voting for ecological protection

As I got in line to check out at the supermarket across from the high school where I teach biology, I overheard the customer ahead of me telling the cashier that she thought the land in Belize was more important to protect than the one in Ecuador. "But the upper tropical cloud forest is an ecological corridor!" replied the cashier. The school community was about to vote to protect one of three biodiversity hotspots, and the cashier agreed with the students advocating for an area in Ecuador.

As a teacher, my goal is to inspire students to cooperate, think globally, and take an active role in addressing challenges such as climate change and species extinctions. I find that positive educational experiences, rather than scaremongering, motivate students to lead change. So when I discovered This is My Earth (TiME), a program that gives everyone, from students to billionaires, an equal voice in environmental protection decisions (*1*), I knew I had to incorporate it into my classes. Every year, TiME tasks a committee of ecologists with identifying sites in three biodiversity hotspots. These lands, if protected, would be under international supervision but owned by locals. TiME members, who donate as little as US$1 a year, then vote for the site they would like TiME to protect with the money it has raised. Each member gets one vote, regardless of donation amount.

Call for submissions
Outside the Tower is an occasional feature highlighting scientists' advocacy experiences. Submit your advocacy story at http://cts.sciencemag.org.

TiME's democratic system places the responsibility for protecting the most biodiverse lands on all of us. The school sponsored a membership for each 11th grader. To make an educated decision, the students studied TiME's three candidate sites and the threats each one faces. They then tested their knowledge by partnering with 11th-grade biology students in San Diego, California and creating, exchanging, and solving riddles related to the content. Locally, we organized a debate, presenting the three sites to the school community and our neighbors, including the supermarket cashier. Students tried to persuade each other, and any community members willing to donate to TiME, to support their chosen site. The meeting was so powerful that local newspapers took note, and students were invited to the Knesset (Israel's parliament) to lead a panel on "Education for saving the Earth." I hope the sense of empowerment the project gave these students will stay with them as their generation enters adulthood and takes a greater role in decisions that affect our planet.

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PHOTO: URI SHANAS

The author's class researched three sites, including Ecuador's cloud forest, which is threatened by deforestation.

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Response

Levis *et al*. raise concerns about the traceability of plant-use data and consequent lack of recognition of knowledge holders from Indigenous Peoples and local communities. We agree that Western science must enhance collaboration, representation, recognition, and support for Indigenous knowledge systems, but challenges associated with global plant-use data will need to be addressed to achieve these goals.

Plant-use information originates from a wide range of contemporary and historical sources. Our assessment relies on a published checklist of plant species used by humans (*1*), which was compiled from 13 published datasets, many of which collated data from other published resources. Modern ethnobotanical surveys usually report and acknowledge collaboration with Indigenous Peoples and local communities (*2*–*4*), but other sources (such as pharmacopoeias, agricultural censuses, historical surveys, and artifact collections) may not provide such information.

Knowledge about plant uses is dynamic and heterogeneous across space and time. For instance, medicinal plant knowledge is not always shared between communities of the same ethnic group, between the same ethnic groups in different countries, or between individuals of a community (*3*). Moreover, the species used can represent footprints of past human migrations, with many plant species now used widely outside of their first-use locality, sometimes outside of their native ranges and across multiple continents (*4*). Retroactively recognizing knowledge holders is feasible for a few well-studied systems (*5*) but nearly impossible for tens of thousands of others.

Biodiversity and its associated contributions to people are declining worldwide (*6*, *7*). Centuries of documentation of plant uses have captured essential information for the development of evidence-based policies and practices to halt this biocultural crisis. Data recorded in the past, although not always traceable to the origin of each species-use combination, could help prevent and repair harms, ultimately benefiting biodiversity and humankind, particularly the descendants of those who supplied this knowledge.

An ethical framework for the integration of species-use data across taxonomic, sociological, geographic, and temporal scales should be established. This framework would align with principles from the 2010 Nagoya Protocol on Access and Benefit-sharing, the Kunming-Montreal Global Biodiversity Framework, the CARE Principles for Indigenous Data Governance (*8*), and more recent advances from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (*9*). It could also account for specificities and limitations of historical data that preceded these international initiatives.

Our study was only possible because of those who compiled plant data before us, including many Indigenous Peoples and local communities. Naming those contributors and crediting current and past knowledge holders in a fair and equitable way is a major challenge—and the duty of modern scientists.

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