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Groundwater loss threatens the coral-like formations of stromatolites in the Cuatro Ciénegas basin.

CONSERVATION

Gene pool offers way to save Mexican oasis

Commercializing genetic wealth will test biodiversity treaty.

BY NICOLA JONES

In the desert of northern Mexico, researchers are fighting to preserve an oasis of ancient life before it dries it up for good.

The 40-kilometre-long Cuatro Ciénegas basin (see map) is rich in springs, streams and pools, some of which have existed for tens of thousands of years. These host unique organisms, including living stromatolites — cyanobacterial colonies similar to some of the earliest life on Earth — and more than 70 endemic aquatic species, from snails to the world's only aquatic box turtle (*Terrapene coahuila*).

The Mexican government has designated almost 850 square kilometres of the area as a reserve, which prevents fishing but does not stop the extraction of groundwater or prevent some other forms of human activity. "Local people are still collecting firewood or plants for wax; there are horses mucking about in the ponds," says James Elser, a limnologist from Arizona State University in Tempe, who works in the region. "It hasn't been carefully managed."

Valeria Souza, a molecular biologist at the National Autonomous University of Mexico in Mexico City, is trying a new approach. In June, she wrangled a permit from the federal government allowing her to commercialize useful genes she finds in the region. Sharing profits from patents with the local communities will, she hopes, encourage them to keep the water where it is, rather than extracting it for ranching and dairy farming.

In doing so, Souza is effectively testing how Mexico will operate under the Nagoya Protocol — a deal signed at the Convention on Biological Diversity summit in Nagoya, Japan, last October, that aims to regulate scientific access to genetic resources and the equitable distribution of profits made from such research to local peoples. The protocol spells out how signatories should take national legislative or policy measures to ensure that commercial work is done on 'mutually agreed terms' with local populations. To date, 41 governments have signed on, including Mexico and the European Union, but not the United States or China.

Although the protocol won't come into force until 90 days after the 50th nation signs up, countries such as Mexico are starting to explore how the agreement will play out. Souza is grateful for the treaty. "Without it, I could not guarantee that money would return to Cuatro Ciénegas on anything other than the good faith of researchers coming to the region," she says.

Among the more promising genes Souza has found so far are some that allow the breakdown of complex organic compounds, which could be useful for bioremediation, and some that enable the use of forms of phosphorus that are normally unavailable to life, which could be used to create plants that thrive without fertilizers. The latter, says Souza, is likely to result in the first patent from the region.

Groundwater is being extracted from Cuatro Ciénegas and from nearby valleys, mostly to grow alfalfa to feed dairy cows, lowering the local water table. That, combined with drought and natural variability, has dried out many ponds, says Elser, including one of the largest, which when full is more than a kilometre across and a metre deep. "It was actually gone this summer," Elser says. Souza estimates that her main study site won't last another 5 years at the current rate of water depletion.

Over the past year, Souza has visited eight *ejidos* — communal land divisions — in the Cuatro Ciénegas area, explaining her intentions. Six have agreed to let her sample microbial life in their areas in exchange for a promise of future financial restitution; the other two wanted cash upfront, says Souza, which she is unwilling to provide. The percentage of profits that will be channelled back to communities is yet to be decided. Those communities will determine how funds are spent — Souza hopes on schools or on greenhouses that help to preserve water.

Getting a permit from the Mexican government wasn't easy, says Souza. Sonia Peña Moreno, a senior policy officer for biodiversity at the International Union for Conservation of Nature in Gland, Switzerland, who was involved with establishing the protocol, says that many researchers have hit brick walls when trying to navigate national laws on genetic resources. "That's very frustrating," she says, adding that many researchers are wary of additional bureaucratic complexity from the Nagoya Protocol.

It is unclear whether the vague promise of possible future funds will prove sufficient motivation to stop excessive groundwater extraction. Mexico's plans for wetland restoration are finally slowly getting under way, says Souza. In the meantime, she hopes her "biotechnology revolution for the people" will add to the cause. ■