The catching of a fish doesn’t normally make headlines in the New York Times. But that’s just what happened when an angler from Sparks, NV landed a 20-lb Lahontan cutthroat trout in Nevada’s Pyramid Lake in 2012.

As the newspaper pointed out, the trout wasn’t just a trophy, but the first confirmed catch of a fish that disappeared from Pyramid Lake—its ancestral home—in the 1940s and was once presumed extinct. Government agencies, sportspeople, Native Americans, and biologists who’d been working for decades to bring the trout back to Pyramid Lake all rejoiced over its revival. Perhaps no group was more heartened by the news, though, than the Pyramid Lake Paiute Tribe.

Today, Pyramid Lake lies within the borders of the tribe’s reservation in western Nevada, which was created in 1859. But for thousands of years before that, the Pyramid Lake Paiute have looked to the lake for sustenance both material and spiritual. The Paiute origin story centers on the lake and its striking tufa rock formation, the Stone Mother. The tribe has also always relied on two of Pyramid Lake’s native fish: the Lahontan cutthroat and the cui-ui (pronounced “kwee wee”) sucker fish, from which the group’s Paiute name, Kooyooee Tukadu, or cui-ui eaters, comes.

For much of the last century, however, the tribe was helpless to protect its most cherished resource. Between 1918 and 1970, 50% of the total flow of Pyramid Lake’s water source, the Truckee River, was diverted for irrigation and energy generation. And with virtually no rights to that water, tribal members could only watch as lake levels fell by 80 ft, cutting off the trout and cui-ui from their spawning habitat and causing their populations to plummet.

Circumstances started shifting with the passage of the U.S. Endangered Species Act in 1973. When the cui-ui was listed as endangered and the Lahontan cutthroat as threatened, the tribe began taking control: using legislation to assert its water rights, crafting careful environmental management plans, and teaming with government agencies and universities to ensure those plans stayed on the cutting edge. Now, not only has the Lahontan cutthroat undergone its remarkable resurrection, but the cui-ui—although still endangered—is also recovering. The Pyramid Lake Paiute, meanwhile, have demonstrated their grit and resilience.
They’re going to need more of the same resolve. Their latest concern is how climate change will potentially affect these same resources and what they can do to prepare and adapt.

“They want to know what’s going to happen to their lake, and they want to know what’s going to happen to their trout,” says Dr. William J. Smith, a University of Nevada–Las Vegas anthropology professor—but not for the reason most people might think. “[The fish] isn’t just a source of protein” or tourism dollars, he says. “It means everything to them.”

Indigenous Communities Disproportionately Hurt by Climate Change

Indigenous communities do depend more on local natural resources than the United States population as a whole, which is why scientists are now concluding they’ll be disproportionately hurt by climate change. Their socioeconomic status also tends to be lower, making it harder for them to prepare for disasters like floods and droughts or to recover from them afterward. But perhaps the biggest reason they’re vulnerable is what Smith alludes to: They have unique cultural ties to the natural world.

“The connection to the environment is part of the core being of the native, tribal member,” explains Dr. Karletta Chief, a University of Arizona soil scientist and member of Arizona’s Navajo Nation—meaning that if part of the environment disappears, Native Americans also lose a piece of themselves. Certain losses, such as extinction of the cui-ui, may in fact be so great that they weaken the tribe’s will to survive, she adds. Yet, while the stakes are high, investigations of the impacts of climate change on indigenous cultures are still rare.

Chief is now working to remedy that. Her formal training is in vadose zone hydrology, and like many of her colleagues, she studies basic problems such as unsaturated flow in arid soils. But because of her background, she says, “I’ve always had a desire to do research that was immediately applicable to people, particularly to tribes.” So several years ago, she began discussing her interests with other researchers, including Smith, who was already working with indigenous groups in Micronesia and Nevada on climate change issues. At the same time, Chief reached out to five tribes throughout Nevada about the possibility of doing joint research. The Pyramid Lake Paiute Tribe soon agreed to collaborate.

In the meantime, Pyramid Lake sits at very end of the Truckee River, whose headwaters lie in the Sierra Nevada Mountains at Lake Tahoe. The river then winds for 120 miles through acres and acres of irrigated farmland and the cities of Reno and Sparks—all of which take their carefully apportioned share of its water. How climate change will affect these already strained water resources remains to be seen, but decades of effort to protect Pyramid Lake and its fish could be undone, and the tribe is clearly in a precarious spot. “They are directly affected by all the upstream activities,” Chief says, “whether it’s water use or contamination that affects water quality.”

The tribe’s concerns about climate change are centered on water. According to the latest National Climate Assessment report, the years 2000–2010 in the Southwest were nearly 2°F warmer than the historical average. The region could also see another 2°F of warming by 2040 to 2070. And as average temperatures climb, researchers expect mountain snowpack and spring runoff into streams to drop while severe droughts and wildfires increase.

As Chief and Smith reported in the journal *Climatic Change* in 2013, however, these biophysical realities aren’t the only factors that put the tribe at risk or affect its capacity to adapt. Like many Native Americans, the Pyramid Lake Paiute rely on the U.S. government for basic infrastructure such as healthcare and roads, and the tribe’s ability to mitigate climate change impacts may hinge largely on federal support, say the researchers.
The tribe is also resource poor, and its environmental managers and other tribal personnel are already stretched thin.

On the other hand, 34% of its members hold two- or four-year college degrees—close to the national average of 38%—and 72% vote in tribal elections, according to a household survey conducted by Smith and Chief. But their biggest strength, Chief says, “is that they’re able to leverage opportunities and partnerships off the reservation to help them address the environmental challenges they face.”

For example, in the decades since the Endangered Species Act was passed, the tribe has repeatedly taken advantage of new funding and regulations under the Clean Water, Clean Air, and National Environmental Policy Acts to protect its resources. A significant, recent development came in 2007—the year the U.S. Environmental Protection Agency (EPA) granted the Pyramid Lake Paiute the same rights as a U.S. state to establish water quality standards for Pyramid Lake, the lower Truckee River, and other water resources on its lands. Then, in 2008, the EPA followed that decision by approving a formal water quality plan developed by the tribe over seven years. It was one of the first such tribal–EPA plans in the country, says Autumn Bryson, the tribe’s environmental manager.

As it looks now to build on successes like these in preparing for climate change, the tribe has something else in its favor. In Smith and Chief’s survey of Pyramid Lake Paiute members, 73% of respondents said they believed that climate change is happening (see sidebar) and 73% also responded that humans play a role. (In contrast, 60% of surveyed ranchers and farmers in Nevada reported that they believed in climate change, while just 29% thought it was caused by people).

In September 2013, the Pyramid Lake Paiute tribal council took matters a step further. After consulting with tribal members, it approved a formal Climate Change Adaptation resolution, acknowledging the phenomenon and calling for new planning.

Planning for Change Amid Great Uncertainty

Wanting to prepare for climate change is one thing, however; being able to plan amid great uncertainty is quite another. A majority of Pyramid Lake Paiute members say, for instance, that they’re already witnessing reduced spring runoff in streams and rivers. But,
asks Smith, “What is climate change and what are natural patterns? Or how is climate change interacting with natural patterns?” And, then, if changes are due to the shifting climate, what will the exact magnitude of the changes be? Smith realizes these questions are difficult for anyone to answer right now. But this is the kind of information Native Americans are hungry for, and he hopes more soil scientists, hydrologists, and climate scientists will get involved in helping them acquire it.

“They’d like to detect or predict changes in the resources and the geographic spaces that are important to them,” he says. “They need data and models that cover their corner of the world.”

In the meantime, Chief is working with a team of hydrologists and ecologists to address some of those questions for the Pyramid Lake Paiute. With funding from the U.S. Geological Survey Southwest Climate Science Center, for instance, her team is trying to pinpoint threshold values in water quantity and water quality that will have major impacts on the cui-ui and trout in Pyramid Lake. Much of the data already exist, she says, but they haven’t been summarized in a way that the tribe can use in a climate change adaptation plan.

Chief is also doing what she can to raise awareness of the plight of all indigenous communities in facing climate change. She thinks the special issue in Climatic Change last year (including hers and Smith’s paper) was an important step. And her small network of collaborators is now planning to assemble a larger group at the World Parks Congress this fall (www.worldparkscongress.org) to share ideas, experiences, and practices.

As the scope of her research expands, though, Chief isn’t forgetting the Pyramid Lake Paiute. Indeed, she can’t imagine where things would be without them.

“I think [our success] is really attributed to the Pyramid Lake Paiute Tribe being an engaged partner and an equal partner in the research effort,” she says. “I don’t think we could have gone this far without their active participation.”