

How climate change impacts indigenous communities

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Members of the Pyramid Lake Paiute Tribe living in the Pyramid Lake region in Nevada depend strongly on the health of this freshwater ecosystem. Credit: Karletta Chief

Two University of Arizona researchers have contributed to a special issue of the journal *Climatic Change* that centers on the impacts of climate change on tribal natural and cultural resources.

The issue, released online on Sept. 15, represents the first time a peer-

reviewed scientific journal has devoted an entire edition exclusively to climate change and its impacts on [indigenous communities](#) across the United States.

Benedict J. Colombi, an associate professor in the School of Natural Resources and the Environment, co-edited the issue, and Karletta Chief, assistant professor in the Department of Soil, Water and Environmental Science, co-authored two papers in the issue on impacts on water resources and socioeconomic vulnerability. Colombi and Chief both have appointments in the UA's American Indian Studies program.

Fifty authors from tribal communities, academia, government agencies and non-governmental organizations contributed to the issue, which explores climate-related issues in indigenous communities in the U.S., including loss of traditional knowledge, forests and ecosystems; food security and traditional foods; water issues; Arctic sea ice loss; permafrost thaw and relocation. The issue also highlights how tribal communities and programs are responding to the changing environments.

"Indigenous communities are in a unique situation because they have a very deep connection to environment, not only because of their history and culture, but also because they have a greater dependency on natural resources for food, shelter and ceremonial life than the average American," Chief said.

Colombi said: "Climate change has been a concern for tribes for a number of years, and this special issue is important because it is published in an interdisciplinary, high-impact and open-access journal. Indigenous groups worldwide are looking to the U.S. for indigenous leadership, and many implications apply to tribal communities across the world."

According to Chief, key threats native communities are facing in terms of water-related issues include water scarcity, lack of access to quality water, land subsidence and erosion – with floods and droughts amplifying these problems, as well as damage to homes and infrastructure like water treatment systems or wells.

"In many places, existing infrastructure is taxed over capacity, but with the added impact from climate change, the damages to infrastructure are likely to be huge," Chief said. "Already, we are seeing water-borne diseases in some areas, algae blooms impacting water treatments and changes in the migration cycles of wildlife and plants on which native people depend. All those pose threats to health, and that is going to be another big impact on tribes."

One of the two papers co-authored by Chief takes the bird's-eye look at how climate change is going to impact the water resources of tribes across the U.S. Of the 566 federally recognized tribes in the U.S. 227 live in Alaska and 170 in the Southwest.

"We broke the country down into regions, and under each region we had specific experts working with tribes in those areas to identify what kinds of impacts were likely to affect water resources important to them," Chief said. "We also looked at the vulnerability factors – including political, spiritual, cultural, ecological aspects as well as land use, infrastructure and socioeconomic conditions."

"One of the motivations for having an article like this is now tribes can see what is out there because it provides an overview of what is going on in terms of climate change impacts to water resources, and addressing specific needs, all in one paper," Chief said. "We hope this could be a great tool to any tribe in the U.S."

Chief and Colombi said one of the general themes emerging from the

combined effort is that indigenous communities are keenly aware of a rapidly changing climate and recognize the human drivers behind it.

In the introduction to the special issue, Daniel Wildcat, a professor at Haskell Indian Nations University, wrote: "Unlike most citizens who form opinions based on [representation in the media,] native awareness of climate change is the result of practical lifeway experiences and sensitivity to the rhythms of seasons."

The results of a survey Chief's group conducted with the Pyramid Lake Paiute Tribe living in the Pyramid Lake region in Nevada support this notion.

"We found that 80 percent of tribe members were aware of climate change and environmental changes that they saw on a daily basis," Chief said. "Seventy-three percent ascribed it to human impact, and 93 percent expressed their concern for making climate change action a priority at the national level."

While indigenous communities face unique vulnerabilities to environmental changes, they also have unique strengths to mitigate their impacts and adapt, the authors emphasize.

With a long history and deep connection to the Earth's resources, [indigenous peoples](#) have an intimate understanding and ability to observe the long-term impacts from climate change. Traditional ecological knowledge and tribal experience plays a key role in developing future scientific solutions to adapt to the impacts.

"The experience of understanding change in the past is how indigenous peoples can develop future solutions to the impact of climate change," Colombi said. "There is tremendous value in traditional ecological knowledge, in that it offers perhaps a useful model for future

adaptations to change."

With climate change likely to impact northern latitudes particularly drastically, Colombi said the future of tribes living in those areas would strongly depend on stewardship of natural resources.

"Salmon are regarded as a cultural keystone species, and they are already gone more or less from the North Atlantic due to habitat alteration and industrial overfishing. It is important to learn from those experiences and take into account the expected added impact from a changing climate if we want to avoid the same fate in the North Pacific."

Colombi, who has done extensive research on the co-dependency of salmon and native peoples, co-edited a book exploring those connections. Since its publication a year ago, the book, "[Keystone Nations: Indigenous Peoples and Salmon across the North Pacific](#)," has already seen its first reprint, and former Supreme Court Justice Sandra Day O'Connor requested her own personal copy.

In addition, traditional ecological knowledge can help corroborate existing records to complement scientific data, as evidenced by the ELOKA Project, which stands for Exchange for Local Observations and Knowledge of the Arctic, based out of the National Snow and Ice Data Center.

"Similar to the Southwest, Alaska is in the bulls-eye of [climate change](#), and the tribes there are experiencing the consequences," Chief explained. "Many villages are being destroyed by erosion, hunting opportunities have been impacted, along with almost all the other things they do. This particular data center is using the indigenous knowledge of the Alaskan people to combine it with the science data they already have so they can develop solutions."

The authors point out that one especially powerful strategy of adapting comes through the forging of strategic partnerships with government agencies, non-governmental organizations, academic institutions, stakeholders and [natural resource](#) managers.

More information: link.springer.com/journal/10584/120/3/page/1

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