Indigenous peoples adapt to climate change

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Paleoindians migrated into North America during the Pleistocene Epoch Ice Age. Broad-scale changes in climate, vegetation, and the types of animals occurred at the close of the Pleistocene throughout North America. Credit: U.S. Army Fort Bragg Cultural Resources Program

The climate in the Northeastern United States changed drastically more than five times before the first Europeans arrived. A new study suggests that the indigenous people in the area were able to adapt their culture and agriculture accordingly each time one of these changes occurred.

It adds credence to the argument that human ingenuity can trump climate change when the circumstances are right. But for native populations now living in Alaska and the Yukon, who face a similar situation, adaptation may not be so easy.

Most previous studies of the effects of climate change on human life

have centered on situations in which human vulnerability was the greatest, such as the drought that probably drove the Anasazi out of their pueblos in the Southeast United States around the year 1300. The new study, published Dec. 6 in the Proceedings of the National Academy of Sciences, is one of the first to measure the transformation in a temperate climate and on a broader scope.

Samuel Munoz, now a doctoral student at the University of Wisconsin-Madison, and geologist Konrad Gajewski at the University of Ottawa looked at samples of sedimentary pollen and charcoal collected between Maine and Pennsylvania. This gave them a historical record of temperatures, vegetation patterns and fire history in the area. They matched that with data on the cultures of people inhabiting this area from the Canadian Archaeological Radiocarbon Database, a repository of more than 35,000 archeological and paleontological radiocarbon dates. The period they measured ranged from the time humans first settled the region 13,500 years ago to the first European-settled colonies 500 years ago.

Gajewski, Munoz and their colleague Matthew Peros compared the known changes in climate to the cultural time periods anthropologists define as Paleoindian, Archaic and Woodland. Every change in the climate, they discovered, occurred at the same time as a change in the culture. The tools the natives used, the crops they grew, the animals they hunted all changed with the circumstances.

Even the subgroups within the periods lined up with environmental changes, Gajewski said.

Some of the changes were abrupt, some more gradual, but largely "every cultural transition corresponds to a major transition in the climate and vegetation of the region," the researchers wrote. When climate change altered food resources for preagricultural American Indians, they shifted

strategy, and sometimes population size.

Similar changes are now happening in Alaska and the Yukon, where the Inuits and American Indians live. Summers are getting drier and lightning-caused forest fires are getting more intense. The boreal forest, mostly spruce, is on the verge of a major transformation.

"Lodgepole pines are at the Canadian border ready to move in," said Teresa Hollingworth, an ecological researcher at the U.S. Forest Service in Fairbanks, Alaska. Behind them, she said, will be deciduous trees such as aspen, birch and willow.

Besides changing the look of the forest, the transition will be good news for moose, which find lots to eat in deciduous forests, and bad news for caribou now living the area, which do not.

"People who are dependent on caribou will have to change," said Gajewski, who also researches the Yukon. "This is the kind of thing that would have happened in the past."

But they will find adaptation more difficult than the Indians of the prehistoric Northeast, according to Craig Gerlach of the Center for Cross Cultural Studies at the University of Alaska Fairbanks.

Modern indigenous people can no longer pick up and move or change their "country food" as easily.

"Five hundred years, a thousand years ago people would have been able to respond to changes in distribution and abundance whether driven by natural cycles or by changes in the climate or weather," said Gerlach. "People are no longer as flexible because they live in permanent villages, so they can’t respond appropriately."

River rights, government regulations and changes in fishing and hunting seasons all constrain them.

"There are other constraints and barriers," said Gerlach. "Who owns the land? Many of the villages are surrounded by parks and refuges so their access is limited."

Human ingenuity being what it is, they may, of course, prevail without losing their culture, although it may not be easy.

"For the last 40 years, geographers have known that the relationship between humans and their environment is a two-way street," said Munoz. "In the past, people did not give enough credit to human agency."

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