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Native Knowledge: What Ecologists Are Learning from Indigenous People

*From Alaska to Australia, scientists are turning to the knowledge of traditional people for a deeper understanding of the natural world. What they are learning is helping them discover more about everything from melting Arctic ice, to protecting fish stocks, to controlling wildfires.*

BY [JIM ROBBINS](https://e360.yale.edu/authors/jim-robbins) **•** APRIL 26, 2018

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While he was interviewing Inuit elders in Alaska to find out more about their knowledge of beluga whales and how the mammals might respond to the changing Arctic, researcher Henry Huntington lost track of the conversation as the hunters suddenly switched from the subject of belugas to beavers.

It turned out though, that the hunters were still really talking about whales. There had been an increase in beaver populations, they explained, which had reduced spawning habitat for salmon and other fish, which meant less prey for the belugas and so fewer whales.

“It was a more holistic view of the ecosystem,” said Huntington. And an important tip for whale researchers. “It would be pretty rare for someone studying belugas to be thinking about freshwater ecology.”

Around the globe, researchers are turning to what is known as [Traditional Ecological Knowledge](https://www.nps.gov/subjects/tek/index.htm) (TEK) to fill out an understanding of the natural world. TEK is deep knowledge of a place that has been painstakingly discovered by those who have adapted to it over thousands of years. “People have relied on this detailed knowledge for their survival,” Huntington and a colleague wrote in [an article on the subject](https://naturalhistory.si.edu/arctic/html/tek.html). “They have literally staked their lives on its accuracy and repeatability.”

Tapping into this traditional wisdom is playing an outsized role in the Arctic, where change is happening rapidly.

This realm has long been studied by disciplines under headings such as ethno-biology, ethno-ornithology, and biocultural diversity. But it has gotten more attention from mainstream scientists lately because of efforts to better understand the world in the face of climate change and the accelerating loss of biodiversity.

Anthropologist Wade Davis, now at the University of British Columbia, refers to the constellation of the world’s cultures as the “[ethnosphere](https://www.ted.com/talks/wade_davis_on_endangered_cultures?language=en),” or “the sum total of all thoughts and dreams, myths, ideas, inspirations, intuitions, brought into being by human imagination since the dawn of consciousness. It’s a symbol of all that we are, and all that we can be, as an astonishingly inquisitive species.”

One estimate says that while native peoples only comprise some 4 or 5 percent of the world’s population, they use almost a quarter of the world’s land surface and manage [11 percent of its forests](https://siteresources.worldbank.org/INTBIODIVERSITY/Resources/RoleofIndigenousPeoplesinBiodiversityConservation.pdf). “In doing so, they maintain 80 percent of the planet’s biodiversity in, or adjacent to, 85 percent of the world’s protected areas,” writes Gleb Raygorodetsky, a researcher with the POLIS Project on Ecological Governance at the University of Victoria and the author of [*The Archipelago of Hope: Wisdom and Resilience from the Edge of Climate Change*](http://archipelagohope.com/).

Tapping into this wisdom is playing an outsized role in sparsely settled places such as the Arctic, where change is happening rapidly – warming is occurring twice as fast as other parts of the world. Tero Mustonen, a Finnish researcher and chief of his village of Selkie, is pioneering the blending of TEK and mainstream science as the director of a project called the [Snowchange Cooperative](http://www.snowchange.org/). “Remote sensing can detect changes,” he says. “But what happens as a result, what does it mean?” That’s where traditional knowledge can come into play as native people who make a living on the landscape as hunters and fishers note the dramatic changes taking place in remote locales – everything from thawing permafrost to change in reindeer migration and other types of biodiversity redistribution.



The Skolt Sami people of Finland have documented a local decline in Atlantic salmon and are collaborating with scientists on a project to restore them.  GLEB RAYGORODETSKY

The Skolt Sami people of Finland, for example, [participated in a study](http://science.sciencemag.org/content/355/6332/eaai9214.full) that was published in the journal *Science* last year, which adopted indicators of environmental changes based on TEK. The Sami have seen and documented a decline in salmon in the Näätämö River, for instance. Now, based on their knowledge, they are adapting – reducing the number of seine nets they use to catch fish, restoring spawning sites, and also taking more pike, which prey on young salmon, as part of their catch. The project is part of a co-management process between the Sami and the government of Finland.



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The project has also gathered information from the Sami about insects, which are temperature dependent and provide an important indicator of a changing Arctic. The Sami have witnessed dramatic changes in the range of insects that are making their way north. The scarbaeid beetle, for example, was documented by Sami people as the invader arrived in the forests of Finland and Norway, far north of its customary range. It has also become part of the Sami oral history.

It’s not only in the Arctic. Around the world there are efforts to make use of traditional wisdom to gain a better and deeper understanding of the planet – and there is sometimes a lot at stake.

Record brush fires burned across Australia in 2009, killing 173 people and injuring more than 400. The day the number of fires peaked – February 7 – is known as Black Saturday. It led to a great deal of soul searching in Australia, especially as climate warming has exacerbated fire seasons there.

Land managers in Australia have adopted many of the fire-control practices of the aborigines and have partnered with native people.

Bill Gammage is an academic historian and fellow at the Humanities Research Center of the Australian National University, and his book, *The Biggest Estate on Earth: How the Aborigines Made Australia,*looks at the complex and adept way that aborigines, prior to colonization in 1789, managed the landscape with “fire and no fire” – something called “fire stick farming.”

They used “cool” fires to control everything from biodiversity to water supply to the abundance of wildlife and edible plants. Gammage noted five stages of the indigenous use of fire – first was to control wildfire fuel; second, to maintain diversity; third, to balance species; fourth, to ensure abundance; and five, to locate resources conveniently and predictably. The current regime, he says, is still struggling with number one.

“Controlled fire averted uncontrolled fire,” Gammage says, “and fire or no-fire distributed plants with the precision of a flame edge. In turn, this attracted or deterred grazing animals and located them in habitats each preferred, making them abundant, convenient, and predictable. All was where fire or no-fire put it. Australia was not natural in 1788, but made.”

While the skill of aborigines with fire had been noted before the giant brushfires – early settlers remarked on the “park-like” nature of the landscape – and studied before, it’s taken on new urgency. That’s why Australian land managers have adopted many of the ideas and partnered with native people as co-managers. The fire practices of the aborigines are also being taught and used in other countries.

Scientists have looked to Australian natives for other insights into the natural world. A team of researchers collaborated with natives based on their observations of kites and falcons that fly with flaming branches from a forest fire to start other fires. It’s well known that birds will hunt mice and lizards as they flee the flames of a wildfire. But stories among indigenous people in northern Australia held that some birds actually started fires by dropping a burning branch in unburned places. Based on this TEK, researchers watched and documented this behavior.



Aboriginal Australians were the first to observe that kites hunt their prey by dropping burning branches to start new brush fires.  BOB GOSFORD

“It’s a feeding frenzy, because out of these grasslands comes small birds, lizards, insects, everything fleeing in front of the fire,” said Bob Gosford, an indigenous rights lawyer and ornithologist, who worked on the [research](http://www.bioone.org/doi/abs/10.2993/0278-0771-37.4.700), in an interview with the Australian Broadcasting Corporation in 2016.

Another [recent study](http://rspb.royalsocietypublishing.org/content/280/1772/20132297) down under found that an ancient practice of using fire to clear land to improve hunting also creates a more diverse mosaic of re-growth that increases the number of the primate prey species: monitor lizards and kangaroos.

“Westerners  have done little but isolate ourselves from nature,” said Mark Bonta, an assistant professor at Penn State Altoona who was on a co-author on the paper on fire and raptors. “Yet those who make a point of connecting with our earth in some form have enormous knowledge because they interact with a species. When you get into conservation, [that knowledge] is even more important.” Aboriginal people “don’t see themselves as superior to or separated from animals. They are walking storehouses of knowledge,” he said.

The Maya people of Mesoamerica have much to teach us about farming, experts say. Researchers have found that they preserve an astonishing amount of biodiversity in their forest gardens, in harmony with the surrounding forest. “The active gardens found around Maya forest villagers’ houses shows that it’s the most diverse domestic system in the world,” integrated into the forest ecosystem, writes Anabel Ford, who is head of the MesoAmerican Research Center at the University of California at Santa Barbara. “These forest gardeners are heroes, yet their skill and sophistication have too long been set aside and devalued.”

Some native people have the ability to adopt the “perspective of many creatures and objects – rocks, water, clouds,” a researcher says.

Valuing these life ways is an important part of the process. For the Skolt Sami, [writes Mustonen](http://bulletin.ids.ac.uk/idsbo/article/view/2830/ONLINE%20ARTICLE), “seeing their language and culture valued led to an increase in self-esteem and power over their resources.”

It may not just be facts about the natural world that are important in these exchanges, but different ways of being and perceiving. In fact, there are researchers looking into the relationship between some indigenous people and the very different ways they see the world.

Felice Wyndham is an ecological anthropologist and ethnobiologist who has noted that people she has worked with can intimately sense the world beyond their body. “It’s a form of enhanced mindfulness,” she says. “It’s quite common, you see it in most hunter-gatherer groups. It’s an extremely developed skill base of cognitive agility, of being able to put yourself into a viewpoint and perspective of many creatures or objects – rocks, water, clouds.



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“We, as humans, have a remarkable sensitivity, imagination, and ability to be cognitively agile,” Wyndham says. “If we are open to it and train ourselves to learn how to drop all of the distractions to our sensory capacity, we’re able to do so much more biologically than we use in contemporary industrial society.”

Among the most important messages from traditional people is their equanimity and optimism. There “is no sense of doom and gloom,” says Raygorodetsky. “Despite dire circumstances, they maintain hope for the future.”

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