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### Citizen Science and Traditional Ecological Knowledge—Values of Inclusion in the Wabanaki Youth Science Program

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## COMMENTARY

## Citizen Science and Traditional Ecological Knowledge—Values of Inclusion in the Wabanaki Youth Science Program

by tish carr and Darren Ranco

As a category of knowledge, citizen science has been growing in scale and the topics it represents for some time. That said, it has been a challenge for practitioners of citizen science to reach communities that are more diverse. In 2012, Rajul Pandya suggested that those engaged in citizen science studies work harder at aligning research questions and community priorities through more participatory approaches in the design of citizen science. Similarly, in 2015, Monica Peters asked to what extent approaches to citizen science and traditional ecological knowledge (TEK) might align in mutually beneficial ways, so that one form of knowledge might not subsume the other.<sup>1</sup> We are also concerned that citizen science projects can often overemphasize large-scale problems and are less likely to incorporate non-Western science traditions when they emphasize quality assurance and replicability.

Traditional ecological knowledge, as does Western science, values classification, empirical observation, and facts. Of course, unlike Western science traditions, TEK also places value on bodily, emotional, and spiritual forms of knowing and being, as well as a set of values around the well-being of knowledge and animate beings. In our experience, there are productive ways for these different scientific traditions to work together, as long as the engagement that Pandya (2012) suggests is followed in a deliberate way.

The Wabanaki Youth Science Program (WaYS) brings together inspiring cultural knowledge keepers to share TEK and Western scientists to explore a vast array of environmental science situations. WaYS started as a slow-burning idea that began to take shape in 2013. Realizing that the environmental leadership in the Penobscot, Passamaquoddy, Micmac, and Maliseet Tribal Nations (collectively known as the Wabanaki—or people of the dawn) would be retiring in the coming years, and few Native youth attend postsecondary education to become future environmental leaders for their tribes, a grassroots initiative took root.

Community driven and community supported, WaYS started with a one-week earth camp for Native youth to engage in TEK and Western science. Subsequently, Native American students from each of the tribal nations would be linked in with natural resource staff from their tribe to work on environmental issues important not only to the student but to the tribe. These internships were developed to be a long-term commitment between the student and the tribe. The goal is for the student to learn not only the Western science component but also TEK, a key and integral part of science for Native youth.

Over the past four years, WaYS has expanded to meet the desires and needs of the students. Keeping with the grassroots, place-based learning preferences,

WaYS has incorporated seasonal mini camps into the program and TEK after-school programs to reach middle school-aged students. This provides an opportunity for older students to mentor younger students and introduces younger students to WaYS.

One of the key successes for WaYS has been the ability for Native American science students to work multiple years with their internships. These opportunities allow students to understand more of the why and how of a project, rather than smaller parts, which is often times the case with summer or short-term internships.

A number of Native American students have benefited from this long-term approach. One student, Alexis, started work at the School of Biology and Ecology, University of Maine, her first year in high school. Initially, Alexis started finding and counting bugs that were collected from stream samples, and she was supervised by faculty and graduate students. Each year she was provided more field and learning opportunities. By the end of her senior year in high school, Alexis was the person doing the training for the new students and was seen as a mentor for undergraduate students though she was still in high school. Alexis is continuing this fall at the University of Maine in the environmental field.

Shantel, who started with WaYS as a sophomore in high school, also had long-term internships that provided a greater

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learning experience for her. WaYS received a two-year grant from the National Fish and Wildlife Foundation and Wells Fargo. The grant gave Wabanaki youth a chance to assess their own interests and prospects for a career in conservation science and habitat management. The desired outcome was to develop a next generation of environmental and conservation scientists among Native American youth. The grant followed the WaYS pedagogy by combining TEK and Western science, with mentoring from experts in various related fields. In summers of 2015 and 2016, students worked as field technicians at the Penobscot Experimental Forest (PEF) in Bradley, Maine, in a collaboration between the Penobscot Nation, US Forest Service, and University of Maine Wabanaki Center. Practical aspects of invasive plant control were the focus of activities. Project outcomes included skill sets for the students in plant and pollinator identification, forest measurements, implementation of an experiment to find the most effective methods of invasive plant control, and creation of an interpretive trail. Students took what they learned about protecting a vernal pool and old-field habitat and developed recommendations for restoration specific to sites in the PEF. One of their products is a technical report that can be used at the PEF to prevent impacts by invasive plants upon silvicultural research ongoing since the early 1950s. The students also gained public-speaking skills through their interest statements to the experts and their responsibilities in hosting a tour of the interpretive trail.

Shantel expressed the following from her experience on the PEF,

NFWF has provided me two summers of hands-on education through the Penobscot

Experimental Forest (PEF). We got the chance to work with professors, traditional knowledge keepers, and Western science educators. While at the same time, we learned how to work in a group, sharing knowledge amongst one another. Our focus started at just identifying plants and blossomed into much more beyond that. We had the opportunity to work with many researchers who look at stuff outside of invasive plants. But everything ties in with everything when it comes to our environment, so nothing we did over those two summers didn't relate to our work at the PEF.

Kahlan, the youngest student who worked both years with this project, had this to say,

Working for the PEF has provided me with invaluable experience. While there, I learned so many new skills and had the opportunity to participate in many interesting projects thanks to the PEF and the WaYS Program. One of my favorite experiences during my two summers interning at the PEF was learning the different plants that grew in the forest, especially ones with medicinal uses! Although forestry is not a field I see myself in in the future, my time at the PEF has made me very interested in environmental sciences. It has also encouraged me to take a plant biology class at my high school, as well as seriously pursue the idea of some sort of environmental science major once I get to college.

When WaYS started, the focus was and continues to be on connecting Native youth with TEK and Western science. WaYS strives to create an environment for learning that propels learners from all ages and disciplines to be open to shared ideas. What has resulted from this shared learning has been a more-diverse learning platform. Not only are the students learning from the adults, the adults are learning from the students. This has been seen before from other models. The unanticipated learning platform has been with the Western science professionals learning from the cultural knowledge keepers.

Two examples showcase this. Erik Blomberg, assistant professor with the UMaine Department of Wildlife, Fisheries, and Conservation Biology, worked with WaYS students for two summers through the National Fish and Wildlife Foundation/Wells Fargo grants at the Penobscot Experimental Forest. Erik's role was to share his current work on bats. Additionally, there would be a few study sites established that the students would be monitoring for the season. Participating with Erik was Roger Paul, cultural knowledge keeper and community elder from Passamaquoddy Tribe from Indian Township and Maliseet at Tobique First Nation in New Brunswick, Canada. Many benefits were derived from this subproject and coteaching:

- Students were excited to see the connection the bats had to the forests.
- The site provided additional exciting information for the bat study, so it was extended to the second year for monitoring.
- In Erik's words "I really enjoyed working with the students, and for me being there with

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the knowledge keeper was an enriching experience. He was able to relay the Wabanaki origin story for bats, which as I recall involved an eagle and a game of lacrosse. What I appreciated most was the opportunity for students to gain both perspectives on the modern scientific practices I was showing them and to stay grounded in their heritage and gain knowledge of their culture.”

Another example has been a long-time connection the WaYS Program has had with Bill Livingston, associate professor at UMaine School of Forest Resources. Bill has been working with the WaYS students since the first earth camp in 2013. Bill has been involved with the mini camps as well, so some students have gained familiarity with Bill as a result. Bill has shared,

The atmosphere in the WaYS camp differs from what the students experience in traditional science camps—the emphasis on the Wabanaki culture in WaYS does help Wabanaki students be more accepting of approaches used by Western science. Wabanaki students will listen and learn from what I have to say much better if they see my willingness to accept Wabanaki knowledge as an important part of their education.

This willingness on the part of Western science practitioners such as Bill Livingston to work in multicultural scientific contexts is a critical ingredient to the success of WaYS and our students. Of course, this context would not have been created without the grassroots movement in the tribal

communities and cultural knowledge keepers committed to the success of Native American youth within the Wabanaki Tribal Nations. WaYS demonstrates a path to bring multiple knowledge traditions together, and we hope it will influence the practice of a more-inclusive citizen science in the twenty-first century. 🐾

## ENDNOTE

1. Monica Peters, “Citizen Science and Traditional Ecological Knowledge: Distant Cousins or Siblings?” *Monicalogues*, July 5, 2015, <https://monicalogues.com/2015/07/05/citizen-science-and-traditional-ecological-knowledge-distant-cousins-or-siblings/>

## REFERENCE

- Pandya, Rajul. 2012. “A Framework for Engaging Diverse Communities in Citizen Science in the United States.” *Frontiers in Ecology and the Environment* 10(6): 314–317.

**tish carr** has worked the last 25 years as a licensed forester and licensed arborist for the public, private, and nonprofit sector. Part of her work has focused on working with underrepresented groups and encouraging their participation in the environmental field. The last five years, carr has been involved with the WaYS program at the University of Maine. She is currently the WaYS program manager.

**Darren Ranco** has a joint appointment in the Department of Anthropology, the George J. Mitchell Center for Environmental and Watershed Research, and the Native American Programs at the University of Maine. He serves as chair of Native American Programs and coordinator of Native American Research. Ranco’s research focuses on the ways in which indigenous communities in the United States resist environmental destruction. He is a member of the Penobscot Indian Nation and is particularly interested in how better research relationships can be made between universities, Native and non-Native researchers, and indigenous communities.