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Cutting-Edge Citizen Science in the Desert and at a Museum

by Linda Silka

This special issue of *Maine Policy Review* has focused on citizen science initiatives in Maine, but much can also be learned from innovative projects being crafted in other states. In this column, I examine two that are particularly intriguing and have the potential to take citizen science in new directions: the University of Arizona's Project Harvest, led by Mónica Ramirez-Andreotta, and the Denver Museum of Nature & Science's Genetics of Taste Lab led by Nicole Garneau. It has been my good fortune to serve on the external advisory boards for both programs, so I hope to bring back to Maine what I'm learning. These two citizen science programs are quite different from each other, yet both are important models. Both are far from being off-the-shelf citizen science programs and explore multiple boundaries. Both programs embed citizen science in the community, yet they do so in different ways. And, finally, both are working to overcome the challenges that are still to be addressed in this new and developing form of science. So, let's take a look.

PROJECT HARVEST

Project Harvest, funded by the National Science Foundation, takes place in a desert and tackles the question of how to build a citizen science program that has a strong science base, finds solutions to local problems, enhances community control, and improves health through making

healthy food more affordable and available. This citizen science program is built around recognition of the importance of community gardening where fresh food is expensive and often not readily available. But although a community gardening project might sound easy, in a desert climate, it is not.

Consider the challenges. Although people may want to garden, it rains infrequently in the desert, so every bit of water that falls needs to be captured for successful gardening. But how do we know if the harvested water is safe? Some of the towns involved in Project Harvest are located near hazardous waste sites and mine tailings, which leads to the potential for pollutants contaminating the rainwater. As the program leaders note, these are not isolated problems: one in four Americans lives within three miles of one of the more than 355,000 hazardous waste sites in the United States. In addition, more than 550,000 abandoned mine sites in the country generate 4.5 billion tons of waste, and there are many communities located near these abandoned mines.

Project Harvest builds on the experiences of low-income, minority neighborhoods, many of which are linguistically isolated. The project focuses on water harvesting and gardening where the water may be contaminated, so it needs to be tested. Instead of hiring professionals to test each household's water, the project trains community members, thereby involving the community in the process and creating opportunities to actually learn

the science. A central focus is on putting tools in the hands of people, so the program has created DIY kits to be used by community members to test rainwater. The results are then compared to tests done by scientists.

Project Harvest also illustrates the importance of bringing many disciplines together to solve problems. Soil scientists, chemists, microbiologists, environmental health experts, and water specialists join community members in working on the issues. The community members themselves have many kinds of expertise crucial to the success of the program: neighborhood leaders, gardeners, longtime residents, and parents who know what children will like to eat. Teachers and school personnel and policymakers are also part of the mix. The program does not give mere lip service to the need to work together.

It is also important to use a variety of ways to share information between participants. Scientists often fall back on graphs and other technical ways of communicating data. But graphs may not always be the most compelling way to share information. Project Harvest thoughtfully considers diverse communication strategies for sharing information between participants. For example, how can art be used to convey crucial information? By involving people from the community art world in the program, we undoubtedly can expect some creative ideas for data sharing to come out of Project Harvest.

And Project Harvest reminds us that language is central to the success of

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a program. People who speak a language other than English are often excluded or left on the fringes of citizen science projects. Project Harvest is working to change that model by ensuring there are Spanish-speaking communicators who are well-respected community leaders and by developing all materials in both Spanish and English.

Although Maine's climate and context are significantly different from Arizona's, there are lessons here for us to learn. It is increasingly important in citizen science to identify the languages of community members and work to ensure that those languages and the perspectives they represent are incorporated into citizen science projects. The essence of Project Harvest is good science done well. The goal is bringing together good science, good community, good education, all to make a difference that can be sustained.

GENETICS OF TASTE LAB

The Denver Museum of Nature & Science is highly innovative in its citizen science initiatives. At first glance, a museum might seem an unusual place to locate a citizen science project, yet people often come to the museum to learn about science. The Denver Museum of Nature & Science is home to the Genetics of Taste Lab, a state-of-the-art lab using citizen science to study the role of genetics in taste perception. With recent funding from a National Institute of Health Science Education Partnership Award (SEPA), they have expanded beyond the scientific research to study the model of citizen science itself and how it involves the community. The move in this direction, however, has brought considerable challenges that they are working inventively to overcome:

finding new ways to encourage diverse neighbors to come to a museum that has not been a regular part of their lives, involving youth who demographically have been least involved in, and attracted to, citizen science, and ensuring that the best kind of science is done.

The lab has conducted many studies on the genetics of taste over its eight-year tenure. Some of this citizen science work takes the form of crowdsourcing, where thousands of museum visitors have the opportunity to provide samples to research projects on the genetics of taste. Other projects are citizen science, with the lab involving citizens in many of the elements of research: identifying issues; designing studies; collecting, analyzing, and interpreting data; and writing up the results. Participants are not mere observers; they are encouraged to be true collaborators. Participants get excited, learn about themselves, and learn about science. They see real science taking place.

The originators of the program have been active in building a community presence. In the Denver area, 35 percent of the population speaks Spanish, and the composition of the lab's community advisory board reflects this. The highly involved board includes leaders from multicultural organizations, advocates for educational rights for Latinos, representatives of sports organizations, science teachers, and representatives of health organizations. The board is suggesting creative strategies for engaging the many communities that have much to offer to citizen science. Program leaders and board members recognize that the museum—despite its convenient location—has yet to be fully recognized as a nexus where diverse youth and their families might spend time and contribute to advancing science.

The program leaders realized that they needed to think about inclusivity and diversity in the lab in new ways. As they looked at what was not working in terms of recruiting citizen scientists, they recognized that they were assuming that everyone comes to citizen science for the same reason and were using one-size-fits-all methods for recruiting participants. The program leaders have started thinking about the different kinds of potential collaborators: early to mid-career participants who may be looking for targeted career paths; late-career or retiree participants who are looking for interesting volunteer opportunities; and young men of color, the most underrepresented group. What works for one group does not necessarily work for the others. Supported by the SEPA funding, the Genetics of Taste Lab has begun to diversify approaches: understanding, for example, what kinds of activities get the younger generation excited and what kinds of language should be used throughout the lab, the exhibits, and the events to capture the attention of those who otherwise might conclude that citizen science does not include them.

I have been pointing to the importance of language. Consider the phrase *citizen science*. The Genetics of Taste Lab is moving away from the use of that term. The leaders were finding, and others have reported this as well, that the use of *citizen scientist* often led listeners to assume that one was not allowed to participate unless one an official citizen of the country where the project was taking place. In other words, listeners were distinguishing between citizen and noncitizens rather than between professional and nonprofessional scientists. To address this, the Genetics of Taste team has begun using the term *community science*, which they find fits better with

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what they are trying to do. Community science not only avoids citizenship issues, but it also signals that people are working together and doing science that is intended to assist the community.

NEXT STEPS AND LEARNING MORE

In a desert and in a museum, we find citizen science moving ahead. These two examples describe very different projects, but both are bringing science to the people. In these programs, we see inventiveness; we see the programs combining strategies in interesting ways; we see the ways that science is not owned by, or exclusive to, scientists. The science is not hidden.¹

These types of programs need committed funding in order to continue. Nicole Garneau describes the issue as one of “in betweenness”; citizen science is neither one thing nor another. There is funding dedicated to education programs and there is funding specifically for research programs, but what are citizen science programs? A funder might look at a proposed citizen science initiative and conclude that this is an education program and not a research initiative. Alternatively, a funder might look at a citizen science program and assume that it is a research study rather than an education program. Yet, what is unique about these programs is the extent they cross these boundaries and can effectively integrate research and education. If citizen science and programs such as these are to continue to develop, then we must find ways around this challenge. We need to help people understand that these programs have the potential to bring together the best of research and education. 🐟

ENDNOTE

1. To learn more about Project Harvest, go to the website <https://projectharvest.arizona.edu>. To learn more about the Genetics of Taste Lab and its diversity research, visit <https://www.dmns.org/genetics> and <https://nihsepa.org/project/more-than-just-a-taste-of-citizen-science/>. Next time you travel to Denver or Tucson, take the opportunity to visit these great citizen science initiatives!



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