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Citizen Science Book Resources

by Linda Silka

The interest in citizen science is taking off, and the result is a variety of new books filled with useful ideas for citizen science initiatives. In this piece, I offer a few suggestions about books likely to be of particular interest to policymakers, citizen scientists, teachers, or scientists. These books are great resources for building on *MPR's* exploration of Maine's approaches to citizen science.

If you are a policymaker, you might look at *The Rightful Place of Science: Citizen Science*. Published in 2016, this short but informative book, edited by Darlene Cavalier and Eric B. Kennedy, includes chapters such as "When Citizen Science Meets Science Policy."

Cavalier's chapter, for example, highlights some of the barriers that have stood in the way of citizens influencing policy decisions built on science data:

> Scientists and other experts seemed to fear that the lay public, largely lacking formal science education, could not grasp technical concepts as they relate to policy. By and large, they concluded that unless people possessed credentialed scientific expertise, they should be excluded from any discussion of how research into such topics as, say, synthetic biology, biomedicine, alternative energy, or climate change should be funded or applied. (p. 11)

Cavalier's chapter also shares strategies for introducing citizen science at various stages in the public policy process so that these barriers are overcome.

Policymakers will also likely find Kennedy's chapter in *The Rightful Place of Science: Citizen Science* informative, as it points to the important role that citizen science can play in a democratic society in opening up the science process:

> According to many, citizen science—put simply, public engagement in scientific research and decision making—represents a radically new way forward: a path that engages every kind of person in research and decision making, democratizes science for all, and offers a new distribution of power and influence in universities and beyond. The term conjures visions of a more inclusive world of science a more engaged public and citizenry, and rich treasure troves of data for addressing important problems. (p. 21)

If you are a citizen scientist or hope to become one, you will also likely be interested in many chapters of *The Rightful Place of Science: Citizen Science*. You will discover many chapters about who is becoming involved in citizen science and some unusual paths they have taken to get there and become leaders. Cavalier's chapter "An Unlikely Journey into Citizen Science" is a great place to start. Cavalier describes her life as a professional cheerleader for the Philadelphia 76ers and explains how she founded the Science Cheerleaders in which hundreds of current and former professional cheerleaders from sports leagues such as the NFL and NBA have become leaders in citizen science. The chapter describes the ways that cheerleaders have become involved and points out how others can also do so.

And if you are a teacher, there are chapters in *The Rightful Place of Science: Citizen Science* that will be of interest to you. Robert Dunn and Holly Menninger's chapter "Teaching Students How to Discover the Unknown" resonates with the projects described in the articles throughout this *MPR* issue. As the authors note, citizen science offers important teaching opportunities. The authors use a discussion of their project "Students Discover: Improving Middle School STEM Outcomes through Scaling Citizen Science Projects" to reflect on citizen science and education. The chapter examines where we learn from each other and where there might be opportunities to bring our knowledge together:

> The act of co-creation is time-consuming, labor-intensive, and messy, much like the process of science itself. Yet we think the payoffs, if we can achieve them—deep changes in teacher knowledge and instructional practice, increased student engagement in science learning, and improved science achievement—will be totally

> worth it. We will not stop working until real science—investigations where the answers are neither known nor predetermined—become the norm in the middle school classroom. (p. 69)

Regardless of your role, you might be looking for guidance in how to start and carry out a citizen science project. If you are looking for a how-to manual, consider *Citizen Science for All: A Guide for Citizen Science Practitioners*. This short translated guide, which was first published in German, describes the steps being taken in Europe to build robust citizen science programs. The manual includes information on "What Is Citizen Science?" "Why Citizen Science? What Are the Advantages? What Are the Challenges?" "Initiating a Citizen Science Project: Choosing Partners, Methods, and Participants," "Data: Important Issues for Citizen Science Data," "Communication and Feedback," "Evaluating Citizen Science Projects," and "Funding." In its "Citizen Science Landscape" section, the book includes many illustrative examples that may help people get started on their own citizen science projects. These examples include "Citizen Science in Nature Conservation," "Citizen Science and Education," "Digital Citizen Science," "Citizen Science in the Social Sciences," "Citizen Science in Health Research," "Citizen Science in the Arts and Humanities." The book also highlights many international examples of citizen science and is replete with stories as well follow-up resources.

If you are a scientist, you will likely find the book *Citizen Science: How Ordinary People Are Changing the Face of Discovery* especially instructive about areas of science that might be amenable to citizen science approaches. The book, written by Caren Cooper who now serves on the governing board of the national Citizen Science Association, covers science topics that are being investigated by citizen scientists. The diversity of these topics is eye opening: meteorology, ornithology, entomology, astronomy, biochemistry, microbiology, conservation, marine biology, geography, and public health. The organization of the book's chapters under the overarching themes of "Hobbies of Discovery," "The Necessity of Leisure," and "A World Where Everybody Counts" provides a sense of the diverse roles of citizen scientists. Cooper describes, for example, how large number of people who play games online in their leisure are being tapped as important resources for producing the enormous amount of protein-folding data need for research in biochemistry.

If your hope is to become a citizen scientist, there is likely no better place to see the process in depth than by reading Mary Ellen Hannibal's book *Citizen Scientist: Searching for Heroes and Hope in an Age of Extinction*. With the goal of learning about citizen science, Hannibal concluded that the best way to do so was to immerse herself in the process of becoming a citizen scientist. The result is this highly informative, first-person account in which Hannibal describes how transformative this process was as she participated in and observed the important work being done by citizen scientists to address challenging and difficult environmental problems.

PAYING ATTENTION TO HISTORY

As you seek citizen science resources, you might assume that searching under the phrase *citizen science* will call up most of the resources out there. But this will lead you to miss descriptions from the past when these actions were commonplace but had yet to be labeled as citizen science. Indeed, Hannibal and Cooper both take readers through an instructive history of science, helping readers understand that citizen science is not so much a new approach as it is a way of returning to original methods of science. As Cooper notes, science is a fairly new occupation. Most early scientists were citizen scientists rather than professionally trained scientists. And Maine was a leader in this early systematic and *amateur* approach to science. In other words, we are not starting from scratch. Two resources are helpful in understanding this history.

The book *Lewis & Clark: Pioneering Naturalists*, by Paul R. Cutright, is an example of a resource that might be missed if one only looks under the term *citizen science*. The book describes in detail the extensive data collected by the Corps of Discovery Expedition, which took place from 1804 through 1806: where the data were collected and how the data continue to be key resources.

There are other resources that provide a sense of important science from the past that may not be labeled citizen science, but are important to our search for methods and understanding. The book *Braiding Sweetgrass*, for example, by Robin Wall Kimmerer

describes indigenous approaches to science and considers how they are important for understanding nature. This book reflects citizen science, but will not be found by looking under that phrase.

CONCLUSION

Any of these books can be a great starting point for becoming acquainted with citizen science. Cooper's concluding chapter, "Call to Action," is informative for anyone interested in contributing to science:

> If you were inspired by the stories in this book, then I hope you are wondering: 'What's next?'. There are many ways to get involved in citizen science, or more deeply involved than you already are. Citizen science is rapidly growing. That's great news—but it can also be confusing and overwhelming. (p. 277)

And, as Cooper notes, things are changing quickly:

> This book is static, but projects of citizen science are dynamic—it is an ever-changing landscape. Rather than compile a list of projects and resources that would soon be out-of-date, I want to point you to a one-stop-shop, the Amazon of citizen science. It's called SciStarter.

And this brings us back to the Darlene Cavalier, who coedited *The Rightful Place of Science: Citizen Science*. Cavalier is a leader of SciStarter.com, which houses over 1,500 citizen science projects, making it the largest repository of citizen science projects in the world. This is a great place to find citizen science opportunities that might be of interest to you—as citizen scientist, researcher, scientist, or policymaker.

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