Editorial

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Kate Lajtha and her fellow editors kicked off the year of editorials in *Biogeochemistry* with this fact: Only 39% of Americans have “a lot” of trust in information from climate scientists, which they point out suggests that knowledge generated by scientists may not be easily accepted by the American public (Pew Research Center 2015; Lajtha et al. 2017). They go on to suggest that perhaps readers—and writers—of *Biogeochemistry* can address this problem of scientific credibility by working to ensure that science informs policy, by accepting invitations to speak to non-peer audiences, and by helping students understand the process of science, including the scientific meanings of uncertainty and error. Other editorials in this series have promoted the importance of taking political actions, including marching to make our voices heard, calling congress people, and promoting science in lay publications. These actions are all important in an age when science is under attack, underused, and even undermined in some parts of national government.

I want to add to this list another useful—if slower—action that some of us might consider: involving local citizens in our science projects directly, through

citizen science, or through what is sometimes called “knowledge to action” science, in which the intention is to work with communities to develop useful knowledge that links to actions to pursue sustainable development (Matson et al. 2016). I have been working with the local community in the Montérégie, a region outside Montréal, for nearly a decade on a project that was essentially co-designed by scientists and local community members to improve decision-making about land use.

Not that long ago, it was considered at the edge of scientific acceptability—or possibly beyond it—to bring results directly to the community in addition to publishing in a traditional scientific journal. In fact, as a graduate student in the 1990s, I was often told that I risked my credibility as a scientist, and the credibility of my results, by sharing my results with decision-makers because it showed that I was partisan rather than neutral, as science was “supposed to be”. Now, through long experience, I have come to believe that deeper community involvement does exactly the opposite—it makes my science *more* credible, increasing local community trust in the information generated, and their willingness to act on it.

Much of my own learning comes from conversations I have with others when I am stuck, from mistakes I make and then fix, models I build that don’t work. What if others in the community learn this way as well? If that’s the case, then it isn’t all that useful to come to a community with “the answer”. It might be

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more useful to involve the community in the process of science, to allow them the opportunity to build mental models of the world, some of which will turn out to be wrong, to provide chances for people to get stuck and have revelatory conversations with one another, and with us scientists. So rather than informing our local community of the “right” answer, I set out to involve them in the process of scientific discovery to help increase their understanding of, and trust in, the results.

A local organization, the Centre de la Nature Mont Saint Hilaire, showed me that we needed to back up yet further. They explained that it was important to also allow the community to help shape the very questions we were asking. Otherwise, how could we know we were even asking questions that anyone was interested in? That’s how I found myself spending nearly a year holding small workshops and discussions with various stakeholders around the region—land use planners, mayors, the Nature Center, farmers unions, the Chamber of Commerce—to ensure that we heard from multiple voices about their concerns about land use and land use decision-making. Eventually, we developed a few questions that were ones we thought would make a good proposal and good training ground for graduate students, and in which the community was interested.

Doing this kind of listening took a lot more time than it would have taken to write a more typical scientific proposal. But it has been worth it. The questions we developed in the proposal were ones the community was truly interested in, which meant they continued to attend and contribute to project workshops for the next four years. Local land owners were willing to allow us to use their private property as research sites, and some of them even came into the field with us to help out with field sampling, learn how to core a tree, or show us the diversity of their forest plots or the unique way they managed a riparian buffer. Over time, this snowballed into greater and

greater interest in our work, and anticipation of the results. Our final presentation was well-attended by land use planners, local mayors, farmers, business people, and more, who wanted to think about—and talk to each other about—the implications of our results for local development.

As I listened, I came to understand their world a little better. I learned about the factors that influenced business leader decision-making; how difficult the economic situation was for farmers, and how much that influenced their ability to put some environmental management practices in place. Being involved in the project also strengthened citizens’ understanding of science, the scientific process, and the life of an academic scientist. I found myself having conversations with farmers who shared that they did not realize how important scientific publication was to our careers, or with business owners who told me that they were surprised about how long it takes to develop a question, do fieldwork to address it, analyze results, and come to an answer.

Not all science has to engage with communities in this way. But in a time when environmental science, and perhaps science more generally, is under attack, we can increase our credibility as scientists and the credibility of the information we can bring to the decision-making process by allowing citizens to join us in the process of scientific discovery.

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