



*Chris Sabine
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The science of this project:

I work on detecting and monitoring ocean acidification. I use moorings to make measurements, and I also conduct research cruises to document changes in carbon levels and ocean acidification at sea.

The Broader Impacts component of this project:

I have two types of BIs. First, I make my data available in real-time to both scientists and non-scientists. Second, I educate the public about ocean acidification and why they should care. I've worked with audiences ranging from grade schoolers to high schoolers to university students. I've even given public lectures at the Art Institute at Seattle and testified before Congress about ocean acidification.

AUDIENCE:

What are the benefits of working with this audience?

Ocean acidification is an issue that's important for society to understand. So I want to educate the world on what's going on in our oceans. The more people know and understand, the more likely it is that they'll ask their congressperson for more research. It's a way of ensuring that we continue to get funding.

And the challenges?

There are many challenges. The biggest one is that it can be difficult to explain what I do and why I do it in a way that's both understandable to a general audience and remains correct. When we take shortcuts and simplify our findings, we have to make sure we don't compromise the accuracy of what we're saying. It's hard to find the middle ground.

Does deconstructing your science to reach non-expert audiences come naturally to you?

That's exactly why I first got involved with COSEE NOW and agreed to an interview for the Ocean Gazing podcast about my research. I was intrigued with how my story was told in an interesting and understandable way. That's why I asked to be part of the COSEE NOW storytelling webinar – to learn how to speak to the general public and how to connect with people outside of my science.

How do you go about deconstructing your science now?

I try to consider my science from the listener's perspective. If someone doesn't know anything about my topic, does what I'm saying make sense? Is it interesting? Secondly, I ask for feedback from friends, relatives, or even strangers on the street. That helps me improve my message and see what they're taking out of it, which is not necessarily what I'd intended.

What have you learned about your audience from doing your BI project?

The audience isn't necessarily who you think it is. We designed our website and data release for scientists who could use our raw, real-time measurements. But I've found that many non-scientists are using our data in ways I never anticipated. For example, I've installed a real-time CO₂ sensor on top of the Space Needle in Seattle that relays its data to the web. I was contacted by someone who installs air conditioners in buildings downtown, and he was using my CO₂ data for his work. That's a BI that I didn't even know I was providing.

PARTNERSHIPS:**Who were the members of your support team?**

The Pacific Marine Environmental Laboratory has a graphics team and an IT team who have helped us engage the public through video production and technical support. In addition, COSEE NOW has given me new ideas on how to get my science into the public sphere.

How do you balance your research with your BI activities?

That's really changed over the last 20 years during my time as a researcher. When I first started, a BI wasn't necessarily an afterthought, but more like a side benefit. It was never the main focus. Today, things are very different. As budgets get tighter and as the issues that I'm addressing become more relevant to society and policy, BIs have become much more important. I think about them from the start: if this is the science project that I want to do, how do I design it such that it will have a more effective BI than a traditional study?

EVALUATION:**Did you use a project evaluator or gather evidence on your own?**

I've mostly gathered evidence on my own. I've also started working with some local museums including the Pacific Science Center and the Seattle Aquarium. They are very engaged in public feedback and evaluation in their work, which has fed into my research as well.

What metrics have you used to do the evaluation?

We look at hard metrics like the amount of real-time data people are downloading, the number of hits on our website, and how often our videos are being watched. I can easily include those in my proposals to justify what we're doing. Our soft metrics include written feedback and comments.

BUDGET:**In your budget planning process, how much did you allocate for your BI activities and why?**

At least 10% of my budget goes to direct BI tools and staffing. But the real-time nature of my data, which is at the heart of my research program now, is also geared towards engaging the public and attracting a more general audience.

FINAL THOUGHTS:**What are some overall lessons that you've learned from your BI activities?**

The biggest lesson for me is that the effort we've put into our BIs gets paid back 100-fold. The work we've done to educate the public and make our data available has benefited us in countless ways. For instance, we've been working with the shellfish industry in Puget Sound to help them understand what's going on with their fishery. For the past 7 years, the industry has been in a state of collapse with zero recruitment of new oysters. We thought it might be related to the upwelling of acidified waters up onto the shelf where the hatcheries operate. By working with them to alter their procedures slightly, they told us we helped save them 35 million dollars and elevate oyster survival rates from 20% to 80%. In exchange, they've offered to mount some of our instruments onto their systems, which has expanded our array. They're also lobbying Congress for more research because they see the benefit of what we do. So they've become some of our strongest advocates. It's really helped to spread our message, improve the science, and make life a little bit better for everyone.

ABOUT ME:**What is your research interest?**

I'm interested in understanding ocean acidification – how the ocean takes up carbon dioxide (CO₂) and how that impacts marine ecosystems.