Storytelling: A Natural Tool to Weave the Threads of Science and Community Together

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Humans have been telling stories nearly since we became *Homo sapiens*, sharing them orally before the invention of writing. Storytelling may even be an evolutionary mechanism, embedded in our very DNA, which helped keep our ancestors alive (Smith et al. 2017). A narrative develops from both data and emotions, which is significantly more effective in engaging a listener than data alone (Dahlstrom 2014). Additionally, sharing stories connects us to one another. When we convey both information and our personal experiences through storytelling, our listeners begin to connect what they hear to their own lives (Downs 2014). Through this process, rapport is built, along with credibility and trust. In short, humans are hard wired for storytelling (Pickering and Garrod 2004, Stephens et al. 2010). And, anyone can tell a story, making it an incredibly empowering and effective form of communication for multiple scenarios.

Weaving connections through story

Storytelling can serve as an effective tool for community engagement, particularly with regard to environmental issues. Effective sharing of conservation success stories has been critical in providing useful information to design similar interventions to improve ecosystem and human health (Leslie et al. 2013, Gross et al. 2018). Local community members frequently have place-based stories to share about their environments, especially those who observe it every day (Polfus et al. 2016). Stories range from anecdotal incidents to narratives that document and explain annual ecological patterns within the ecosystems that surround and support human communities (Ban et al. 2017, Robbins 2018). Sharing these stories empowers community members by demonstrating not only their knowledge, but also their care and value of the environment they live in every day. The local knowledge communities hold about their surrounding ecosystems can illuminate the past and dictate its future (Plieninger et al. 2014).

The value of science to humanity is almost immeasurable. Science has extended human lives, transformed the way we understand and see the world, and changed our daily existence. And yet, today, the pursuit of discovery and the scientists who conduct the work are often disconnected from society. By partnering with communities, scientists have an opportunity to improve access to and understanding of technical and scientific information (Leslie et al. 2013). In this way, scientists can better support the inclusion of communities in important decision-making processes (Varga et al. 2016). Likewise, community members have deep knowledge and experience that can benefit the pursuit of scientific knowledge (Ban et al. 2017, Jardine 2019). Scientist–community partnerships are vital to addressing pressing environmental concerns, natural resource management challenges, and community well-being, but barriers can complicate effective collaborations and partnership development.

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Actively listening to stories means respecting the perspective of the teller, and this makes a difference in building strong, lasting relationships (Weger et al. 2014). This does not mean giving up the perspective as a scientist, but rather, demonstrates a way to develop trusting relationships and collaborative, community partnerships. When community members are heard by scientists, they feel valued not only for their information, but for their emotional stake in their environment (Varga et al. 2016). Local communities can provide important and meaningful long-term insight to drive ecological research on effective paths for the benefit of both the community and the ecosystem.

Braiding collaboration between fishermen and scientists

An example of this kind of collaboration is the Midcoast Maine Collaborative Scallop Project, based at the Hurricane Island Foundation in Rockland, Maine (more information about the project *available online*).[1] While lobster was and remains the number-one fishery in Maine, scallops have been an extraordinarily lucrative winter fishery for Maine fishermen since the 1980s (Maine Department of Marine Resources 2018). However, in the late 1990s through the early 2000s, there was a steady decline in scallop catch and value. The offshore federal scallop fishery had gone through a similar decline in the early 1990s, and fishing closures were implemented in 1994. Five years later, offshore scallop population size had increased at least an order of magnitude. This result was heralded as a fisheries management and conservation success story by policymakers and scientists alike; fishing closures worked! Scientists and policymakers at the Maine Department of Marine Resources (DMR) shared this story with fishermen in meetings all over the state, saying if it worked for the federal fishery, why not here in Maine? There were views from all sides including voices that did not want to enact closures at all. DMR and stakeholder organizations held many scores of meetings to listen to fishermen's knowledge and desires. Ultimately, in 2009, DMR decided to administer varying closure regimes in each management zone as an attempt to reflect the opinions of the fishery (information on the management plan *available online*).[2] After three years of selective closures, fishermen in each zone along the coast of Maine developed their own management plans. Some regions saw the benefits of the closed areas and those developed into rotational closures. Others observed only limited success of the closures, and resulting management focused on reducing access to fishing areas rather than developing rotational closures.

One year later, in 2013, when DMR was deciding which areas would remain closed while others would be opened, a fisherman approached policymakers at DMR and the Island Institute with an idea for a collaborative research project between fishermen and scientists (the Island Institute was the original institution for this project; institute description *available online*).[3] Tad Miller, the fisherman, had noticed the success of long-term (three or more years) rotational closures, and proposed a scallop fishing closure in a small area for three (now six) years within a zone without rotational closures. He, along with other fishermen in the area, was most interested in studying the impact such a closure would have on scallop population abundance and density in a scallop bed that had historically supported an abundant population.

The non-profit Island Institute, a coastal community development organization, recognized the importance of fishermen developing a research question, and backed the project for its first year. From their perspective, a research project driven by the interest of fishermen to test the impact of a small-scale closure on sea scallops was unprecedented. As a first step, Island Institute, DMR, benthic ecologists (including S. Bayer), and local fishermen convened a meeting. Charts were laid out and fishermen told stories for hours about how a particular area within one zone between underwater cables once flourished with scallops, but no longer did. They thought that because of the cables, it would be an easy spot to close; it was too difficult to drag fishing gear in certain parts of the area. The scientists proposed what parameters of scallop biology and ecology could be studied using SCUBA and field surveys.[4] These methods include SCUBA dives that collected scallops for sex ratios, shell size frequency, and population density. Additionally, researcher Caitlin Cleaver and her team employed the Stokesbury Lab from UMass Dartmouth to conduct video surveys (Bethoney and Stokesbury 2018). Finally, spat bags were deployed to collect information on larval settlement. The fishermen carefully explained the required logistics to the scientists who would need to use their boats, their knowledge, and their time to conduct surveys each year. The scientists and fishermen developed camaraderie and a deep bond of trust through this project.

At the center of the project was Caitlin Cleaver, the researcher who would coordinate the fishermen and the scientists, and write the grants for research funds to conduct scallop surveys every year. In sociology terms, she was a boundary spanner or central actor, communicating among all stakeholders involved (Sandmann et al. 2014). It was a big job, and with the help of a few dedicated scientists and fishermen, the project was pulled off for five years while Cleaver was the Science Director at Hurricane Island Foundation. Dedicated fishermen were also critical. Tad and Dan Miller, brothers, were two of the most dedicated fishermen on the project. Tad had a dragger, a net of metal rings that towed the seafloor for adult-sized scallops, and Dan had a fishing license. Together, they could fish scallops (and have for several decades). They admired Cleaver's involvement as a scientist and coordinator. "Cait's the engine driving the train there," said Dan in an interview conducted by Bayer to evaluate perspectives from the project participants after five years. He emphasized, "This project, and there's nothing like it in Maine, couldn't be done without her." (D. Miller, *personal communication*).

Likewise, a research project like this cannot be done without fishermen like Tad and Dan who understand the importance of building relationships with scientists. "I'm a believer in cooperative research; it's a no brainer," said Tad in an interview (T. Miller, *personal communication*). He thinks that applying the combined knowledge of fishermen and scientists is the only way to improve the scallop industry. "Once you understand [how a system works], it changes how you look at it," Tad has said about why it's important. He thinks that collaborative research with scientists should be part of a fisherman apprenticeship program. The most important result from this kind of work, says Tad, is not whether the data from this experimental fishing closure show an impact on scallops. Instead, Tad believes that when "you gain that relationship [with scientists], that's invaluable.… that's the type of relationships that can talk shop, they comprehend what you're saying and vice versa" (T. Miller, *personal communication*). Indeed, these relationships are the most valuable in developing successful long-term ecological and environmental research projects (Bodin 2017), and it all starts with sharing stories and truly listening to one another. However, for these projects to flourish, time is needed for the relationships to take root in communities. It is not enough to get funding for the "seeds" of a project, as it is the "soil" that is required to grow strong, long-lasting partnerships (Schwarz et al. 2019). This is an important consideration when engaging in community-based projects; if the dedication to a community-based project is only short term, it is not reasonable to assume the community will be dedicated to the science.

Know your material: How to tell stories effectively

Storytelling is the water of human communication; we all need it to understand one another and it is the most natural and easy way to share and comprehend information. When scientists share stories about their own lives and experiences, they become relatable to audiences beyond traditional academia (Schinske et al. 2016). Scientists can leverage this communication tool while working with communities to better understand and conserve our environments. And, there are a few ways to do this most effectively.

The late Stanford University Professor of Environmental Biology and Global Change, Dr. Stephen Schneider, offered three guiding principles for scientists preparing to share their work broadly: "Know thy audience! Know thyself! Know thy stuff!" (Hermansson 2010). His principles are fundamental to effective science communication and storytelling. At first, these rules for effective communication can seem simple and straightforward, but each has nuances that are important to consider. To apply these principles effectively, there is some personal work required.

Starting from the top, what does it really mean to know thy audience? What is important to know and keep in mind while engaging? The first question to explore is "Who is the target audience?" In this article, we have primarily discussed scientists engaging with communities, but we can think more broadly about different types of audiences too. Are they policymakers? non-scientists? journalists? citizen-science groups? landowners? community groups? children? Secondly, each group has a particular set of values, perspectives, needs, and goals. As an effective communicator and storyteller, it is important to identify what those are for each individual audience. We can do this by being open and curious about our audiences, and willing to ask questions, listen, and respect their perspectives (Martinez-Conde and Macknik 2017).

Next, an effective communicator and storyteller is asked to know thyself. Think about your personal goals and values, your *why* for communicating. Next, consider how you might share a piece of your own personal story with the audience. Part of being human is sharing stories. And, in doing so, connections and perhaps even trust can be built (Fiske and Dupree 2014).

How might this look? In the story above, both the scientists and fishermen care about their future livelihoods and the livelihoods of others within the community; they share the same community, and therefore, some of the same values already. Cleaver, for example, has family members that lobster for a living, and she wants both them and the fisheries of Maine to have a future. While she had never worked on a fishing boat prior to the cooperative scallop project, sharing her personal connection to fishing through family was something that bonded her to collaborators like Tad and Dan Miller. Through interviews, it became clear that fishing was not the only value that scientists and fishermen connected over. The central shared value was family, one of the most fundamental for all humans.

Finally, know thy stuff. This is the piece that probably comes most naturally to scientists, but again, there is some nuance here. Scientists have the tendency to want to tell everything, all at once. Not only can this be boring for an audience, but it is also an ineffective way to share information. Most people can only hold up to five ideas in their minds at one time (Rouder et al. 2008). Don't let the audience choose what to take away! Instead, share only the handful of main ideas most important to remember. And, share this information without the use of scientific jargon. Test out the message on a friend that is not an expert on the topic, and have them help identify words that may be confusing. Then, find new and creative ways to talk about the subject without using these words.

Fashioning a strong thread: effective story structure

There are many structures a story can take (Green et al. 2018). The shape is less important than making sure each element of good storytelling is considered. Effective stories share common traits (Downs 2014, Green et al. 2018):

1. A clear purpose—a reason why you're telling this story, to this audience, at this time
2. A personal/emotional connection to the story
3. Detailed characters and imagery—visual descriptions the evoke the five senses
4. A climax—Relatable conflict, vulnerability, or achievement
5. A clear beginning, climax/conflict, ending, and transition back to the main topic

Conclusion: Stories form the patchwork quilt of humanity

Stories make us who we are. They are central to human existence: our most instinctive and universal means of communicating. Stories help us build relationships with one another through exchanging perspectives between teller and listener. To deepen our impact as scientists, we need to share stories that show our values. That connection, a passion for the topic and why we care about it, is evidence of our humanity. Equally important is valuing the stories of others, like community members with knowledge of and connections to the systems we study. Storytelling can entwine scientists with communities who will ultimately benefit one another through the practice.

Notes

[1] http://www.hurricaneisland.net/whatwedo/
[2] https://www.maine.gov/dmr/science-research/species/scallops/index.html
[3] http://www.islandinstitute.org/
[4] These methods include SCUBA dives that collected scallops for sex ratios, shell size frequency, and population density. Additionally, Cleaver and her team employed the Stokesbury Lab from UMass Dartmouth to conduct video surveys (see Bethoney and Stokesbury 2018). Finally, spat bags were deployed to collect information on larval settlement.

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