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Abstract

University scientists are frequently challenged to embrace stakeholder engagement in a way that departs from traditional contract-oriented relationships; this is occurring within water management across the American West. However, few studies specifically address how university scientists engage nonprofit organizations as stakeholders in collaborative water management research. This manuscript reports on an examination of a key set of stakeholders—nonprofit environmental organizations—with a goal to better understand how such organizations conceptualized, created, and implemented scientific data in water management decision making. The study provides insights into why interactions between university scientists and nonprofits are infrequent and under-developed. The project identifies how nonprofit organizations strategically use scientific information across a variety of contexts and for diverse purposes. These practices may sometimes be at odds with how university scientists conceive of or practice science, making stakeholder engagement challenging. The study also provides suggestions for how universities might address some of these challenges.

Keywords: advocacy, collaborative resource management, nonprofits, stakeholders, social science, watershed management

Introduction

In the United States, universities have long partnered with federal agencies and the for-profit sector in research endeavors (Atkinson and Blanpied 2008). Such activities have—especially since the Cold War—been largely normalized or justified as essential to economic development, national security and even foreign policy (Bush 1944; Sarewitz 1996). However, many academic scientists employed by universities in the United States (U.S.)—which we refer to here as "university scientists"—are increasingly interested in working with communities in a way that departs from traditional contract-oriented relationships and, instead requires different kinds of partnerships, skills, and scientific activity (Posner, McKenzie, and Ricketts 2016; Watts, George, and Levey 2015; Reed 2008). Such activities have largely fallen under the umbrella term of "stakeholder engagement," a term used to describe the process of scientists and engineers actively engaging with others who have a stake in the design of scientific research, how the research is conducted, and the communication and application of its outcomes. These stakeholders may not have historically been engaged in scientific research before because they lacked access to or were excluded from decision-making processes (Depoe, Delicath, and Elsenbeer 2004; Reed 2008).

Stakeholder engagement is not a foreign idea to most university scientists, though how it is conceptualized and implemented is undoubtedly diverse and uneven (Talley, Schneider, and Lindquist 2016). A great deal of work exists on how best to conduct stakeholder analysis and engagement according to democratic and inclusive principles (e.g., Kong et al. 2015; Luyet et al. 2012; Prell, Hubacek, and Reed 2009), and scientists engaged in natural resource management work—which is of special concern to us in this paper—frequently engage stakeholders to varying degrees (e.g., Bohnet 2015; Horangic, Berry, and Wall 2016; Vugteveen et al. 2010). However, in the U.S. context at least, one type of stakeholder relationship—that between university scientists and nonprofit organizations—is both underdeveloped and undertheorized, particularly in water management. Scholars working in water management have very recently called on their fellow researchers to address this gap (Heikkila 2017; Skinner 2017).

This paper contributes to this narrow piece of the stakeholder engagement literature by focusing not just on how U.S. universities might reach out to nonprofit organizations, but on how nonprofits perceive partnerships with such universities. The study below analyzes the results of thirteen semi-structured interviews with environmental nonprofit organizations engaged in water management. We sought to understand the following: how do nonprofits view their relationship to science, scientists, and scientific data? What collaborations do nonprofits seek out or agree to in regard to scientific or technical partnerships? What facilitates or impedes such collaborations, especially with university scientists?

Though our study is preliminary and small in scale, our hope is that the findings below may begin to answer some of the questions above, and prompt reflection and further research. In the sections that follow, we describe the study, situate our concern with nonprofits within the larger literature on stakeholder engagement in water management contexts, and then theorize some possible explanations for why university scientists and nonprofit organizations are not working together more frequently and effectively in the U.S. context. We use a framework from Yearley (1996) and Pielke, Jr., (2007) to analyze the data we collected, and provide some possible suggestions for those who wish to further promote university-nonprofit scientific collaborations.

Literature Review: Stakeholder Engagement, Water Management, and the Use of Science

Scholars such as Reed (Reed 2008; Reed et al. 2009) have traced the rise of "stakeholder engagement" as it emerged from a variety of disciplines beginning in the 1960s, and then later came to be applied to natural resource management. This emergence of stakeholder engagement into decision-making was born out of early entreaties for researchers, "experts," and managers to engage stakeholders so that they could have more of a voice in decision-making and planning processes (see Arnstein 1969). Engaging stakeholders in this way departs from top down policymaking, where policymakers and managers would "decide, announce, and defend" their decisions to unsuspecting, uninformed, and/or unwilling publics without any meaningful input (Hendry 2004; Senecah 2004). For university scientists, stakeholder engagement became a particularly salient concept when the National Science Foundation, and similar international funding agencies, began to require that all proposals articulate the "Broader Impacts" (BI) of proposed research projects (Colwell 2002). Stakeholder engagement came to be seen as one possible way to meet BI criteria (Sacco 2015).

Stakeholder engagement is now a well-recognized concept in natural resource management contexts. This was driven by the fates of projects that encountered significant citizen resistance and therefore "failed" (Sachs 1992), demands for more inclusive decision-making processes from scholars and activists (Corburn 2005; Depoe, Delicath, and Elsenbeer 2004; Koontz and Johnson 2004; Ottinger 2010) and evidence that stakeholder involvement led to more informed, effective, and lasting decisions (Beierle 2002; Dunn et al. 2017). Additionally, some evidence points to stakeholder involvement improving the use of common language, enhancing mutual understanding, and promoting learning among participants (Hartley and Robertson 2008).

In water management, two influential conceptual frameworks—collaborative water governance (Heikkila 2017; Nikolic and Koontz 2008; Sabatier et al. 2005) and adaptive management (Brunner et al. 2005; Pahl-Wostl 2007) have been and continue to be informed by calls to increase stakeholder engagement. Most recently, scholars have called for water management practices to be significantly more participatory and inclusive, encouraging collaboration among practitioners (Yarnal et al. 2006; Heikkila 2017; Skinner 2017). Other research has documented some of the failures--such as unsatisfactory, overly-managed inclusion, imbalance between legitimacy and shared learning, and inability to reach long-term agreed upon solutions--of collaborative water resource management and stakeholder engagement with nonprofit groups (Few, Brown, and Tompkins 2007; Kallis, Kiparsky, and Norgaard 2009; Leach 2006; Margerum and Robinson 2015).

Little of the work above has focused on the opportunities and barriers that exist for stakeholder engagement in water management from the nonprofit organization's perspective, particularly in the U.S. context. Therefore we borrow a framework from Yearley (1996), who provides a clarifying conceptual framework for understanding nonprofit uses of science in environmental contexts broadly construed. In his essay "Nature's advocates: Putting science to work in environmental organizations," Yearly argues that nonprofit environmental and conservation organizations use science in complex and sometimes contradictory ways. On one hand, argues Yearley, environmental organizations often position themselves as critical of scientific and technological enterprises, saying that "many of our leading ecological problems can be seen as the *result* of our technological civilization" (1996, 174). On the other hand, environmental organizations use scientific and technological expertise strategically, especially to buttress their own positions on the environment. In short, Yearley concludes, ". . . there is no single, simple way of harnessing scientific expertise to the public interest; groups need to strike a pragmatic balance between accepting and denying the overriding validity of science" (1996, 187).

Yearley (1996) goes on to describe three ways in which environmental organizations invoke science or create scientific information. These uses of science can be described as sometimes overlapping, sometimes contradictory:

> **Science as power.** Science/technology has been used as a tool to promote greed, consumption, and inequality, which has also led to the despoliation of the environment. (176)
>
> **Science as standing.** Science can be used to construct "standing," providing legitimacy and authority to environmental groups that might otherwise be accused of bias or politicking. (178)
>
> **Science as market.** Scientific expertise in environmental organizations can be used to garner contracts to perform work for larger organizations or agencies, which may also provide access to additional resources, information and standing. (179-180)

Building off of Yearley's (1986) framework, we also analyze our results using Pielke, Jr. (2007), who provides a typology of roles that scientists can play in a democracy. The five types Pielke, Jr., identifies are 1) pure scientist, 2) science arbiter, 3) issue advocate, 4) stealth issue advocate, and 5) honest broker. This typology provides another way of analyzing some of the competing roles science and scientists may play, across a variety of contexts (Pielke, Jr. 2007):

> **Pure scientist**. A scientist who insulates himself or herself from politics and policymaking altogether. (1)
>
> **Science arbiter**. An unbiased, apolitical advisor, providing policy-relevant information but not engaging in politics or policymaking per se. (2)
>
> **Issue advocate**. Use of science as a tool to advocate for particular interests and preferred policy options. (2)
>
> **Stealth issue advocate**. Similar to the issue advocate, but without divulging one's preferred interests when presenting the science. (3)
>
> **Honest broker**. Facilitating the negotiation between diffuse interests, but without siding with a particular party. (2-3)

Tracing how nonprofit organizations use or construct science and scientific information reveals how they negotiate their relationships with other organizations, agencies, elected officials, the media, and the public. They are always responding to political and scientific contexts—scientific approaches become a powerful tool for claiming legitimacy in one context, but may weaken one's position in another. This study aims to make a modest contribution in understanding how these organizations think about these roles, and how that might impact stakeholder engagement exercises with university scientists.

Methods

This study grew out of a project (MILES) that focuses on the effects of climate change and rapid population growth in a mid-sized city in the American west—Boise, Idaho (https://www.idahoecosystems.org). The project aimed to promote interdisciplinary study of the Boise River Basin as both a biophysical and social system. Major goals of the project included 1) stakeholder characterization efforts; 2) stakeholder engagement, from inception to

implementation; and 3) the development of decision-support products that stakeholders would find useful. As part of those efforts, we focused on a number of stakeholder groups; this paper reports on one type of group, namely nonprofit organizations working in water management.

For this study, we conducted 13 semi-structured, in-depth interviews with leaders in nonprofit organizations that strive to protect and enhance ecosystem services in the region—namely, environmental conservation organizations. We identified interview participants (participants or interviewees) by first referencing a large database of hundreds of water management stakeholders compiled for a related project. We then refined the list by focusing on those nonprofit organizations that had offices in the Boise River Basin with full-time, paid staff located in the area and who defined themselves as operating in water management and conservation in the basin. We relied on our personal knowledge of the region, snowball sampling from colleagues and participants, and a review of potential participants' websites to finalize our sample. Interviewees included executive directors, a board member, program directors, research directors, and staff attorneys.

Two teams of trained interviewers conducted the interviews, which lasted approximately 45-90 minutes each. Our protocol was focused on how participants viewed, used, created, or challenged science and scientific data, as well as on the kinds of scientific relationships and collaborations these organizations sought out, fostered, or avoided. The research team used an iterative, or abductive, coding method to analyze the transcripts, both applying sensitizing concepts from the literature and allowing themes to emerge (Timmermans and Tavory 2012; Tracy 2013). We used NVivo software to identify patterns in the interviews. Results from the interviews are described below.

Results

We discovered that the interactions between university scientists and the nonprofit sector in the Boise River Basin are often under-developed, when they exist at all, and that there are complex practical and political reasons for this result. We found only three examples of active collaborations between university scientists and nonprofit organizations involved in water management in the Boise River Basin, even though people from both groups have anecdotally expressed interest in working together. Members of both groups actively collaborate with government agencies and the private sector, but why not with each other? As was mentioned previously, our interview protocol inquired about how nonprofits are viewing, using, creating and challenging scientific data. We discovered that nonprofit organizations do not always handle science and scientific data in the same way, and this is a factor shaping stakeholder engagement between university scientists and nonprofit organizations. We use Yearley's (1996) and Pielke, Jr.'s (2007) frameworks to present our findings.

Science as Power

A few of the organizations that we interviewed perceived science primarily as a "tool"—a means to an end. For these organizations, scientific information and data can be used to challenge policy positions advocated by other agencies or organizations, and can be both constructed and deconstructed. Nonprofits can hire their own scientific experts in order to testify or provide data in public meetings or in litigation. Participants spoke about the ways in which they and others politicized scientific data. In their role as "issue advocates" (Pielke, Jr. 2007), these organizations use science as a tool to advocate for what they believe is in their best interests, and for their preferred policy options for water management in the Boise River Basin.

Participants were keenly aware of how scientific data could be deployed to support or challenge particular policy decisions at the state and federal level. One participant noted, "We are oftentimes in adversarial positions with the state and federal agencies as well, and it's very case-by-case because sometimes we will push back on the science that they have provided" (Participant 8). Another participant noted that agencies sometimes ignored scientific data, making "a decision that doesn't really match what the science shows" (Participant 11). This could lead to organizations finding themselves in litigation with agencies where challenging scientific conduct or data becomes a key strategy (Participant 11).

Other participants exhibited a nuanced view of the role scientific information plays in decision-making, understanding that, as Pielke, Jr., puts it, "science does not compel action" (2007, 35). In particular, one participant noted that even though their organization had collected, "relevant and pertinent data," the data "was just too outside the box for [local government officials]; they didn't want to know it. You can't convince people to change just through data" (Participant 7). Another participant noted that scientific data was readily ignored by policymakers if it

didn't comport with outcomes they already supported: "The most influential people on that committee . . . didn't like the conclusions of that particular . . . study. [As a result] . . . the conclusions of that study did not become the conclusions of that plan" (Participant 9). Nonprofits understand and expect that decision-makers may make choices seemingly at odds with what data might suggest, particularly in cases where interests and values may be diverse.

A few participants noted that regulatory science was open to influence from political interests, including private ones. "Well, I mean science . . . who pays for it? That is usually a political decision . . . A lot of the private science is developed and used to influence political [players]" (Participant 9). This sentiment was echoed by another participant: "Essentially there are ecosystem connectivity maps and things like that . . . we will use that information to help us prioritize; but that's just one part of the calculus of what our priorities are. It's also overlaid with politics" (Participant 5). Or, as yet another participant put it, "There is a lot of conflict with scientific info in our legal work. Science is not as clear as it might seem" (Participant 11). Such uses of science may seem unsavory but are not necessarily inappropriate; in fact, they are typical of the issue advocate. Interest group science is about intervening effectively to shape issues, and policymaker and public opinion of those issues. This is what using "science as power" means.

Science as Standing

Not all nonprofits imagine themselves to be issue advocates, however. Some hew closer to what Pielke, Jr. (2007) calls the "issue arbiter" role, meaning they see themselves as merely providing data to inform public policy, not guide it in one direction or another. Adopting the mantle of objectivity is an important element of being an issue arbiter, and organizations may use this to increase their standing in decision-making contexts. Senecah (2004) argues that meaningful stakeholder participation in environmental decision-making must consist of three elements—access, standing, and voice. For Senecah (2004), standing implies that one is respected, has the authority to participate, and is invited to collaborate, among other things (see also Endres 2009; Ottinger 2010; Alm 2000).

In the case of nonprofit groups in the Boise River Basin, our findings suggest that these organizations construct or seek standing not only to create legitimacy and respect, but also to bolster perceptions that they are unbiased or apolitical so as to sustain a flow of resources and opportunities, particularly from federal agencies. Partnerships with these federal agencies also transferred legitimacy to the participating nonprofits. In return, nonprofit agencies may play the role of pressuring these state and federal agencies to use the "best available evidence" in their decision-making, thus reinforcing the sense that both parties are objective issue arbiters. We examine each of these moves briefly here: the claim to objectivity; cooperation as the transfer of legitimacy; and the strategic construction of evidence to establish or reinforce standing.

Two of our participants insisted that they had no political or advocacy mission, but rather were strictly dedicated to "education and outreach." These organizations used the education and outreach mission to construct their use of science and evidence as potentially informing political processes but not intending to sway them. As one participant told us, "We definitely work to present the evidence; wherever that leads. We don't want to sway one way or the other. But, if we see [species] are declining, we are going to tell people about it" (Participant 3). That same participant continued, "So, we are not involved in, 'what does this mean? What do we do with it?' We present the data" (Participant 3). Another participant saw the mission of their organization to be almost exclusively education-focused, and would not even answer questions about other forms of influence (Participant 6).

Nearly all of the organizations we spoke with articulated how they constructed standing through strategic cooperation and collaboration with state and federal agencies, other nonprofit organizations, and, on rare occasion, universities. The nonprofit organizations we studied mostly seek out the expertise of federal and state agencies in order to bolster their own arguments about what should be done in particular instances, and several saw themselves as "facilitating" the flow of information between various stakeholders. They frequently spoke of "bringing in" outside experts to provide assistance and evidence, though seldom did interviewees speak of working with academic scientists. When they did, however, they spoke favorably of the partnership: "We are working with some folks over at [a university lab], and they've done studies [on a species of fish] that have demonstrated exactly what we are talking about" (Participant 1). These organizations wanted to be perceived as soliciting and using well-vetted data and evidence in support of their positions (Participant 4), and to be seen as having the imprimatur of researchers in agencies or universities. Organizations also worked to pressure agencies to "use the best available science . . . in decision making" (Participant 8). Another interviewee told us they felt an urgent need to get "scientifically grounded" information to decision makers, and that "we can't make this happen fast enough" (Participant 1). Clearly

these organizations supported, at least in theory, the notion of the science arbiter as ideal for informing decision-making. Given this, it is even more surprising that they do not more frequently partner with university science arbiters.

It is possible that the various strategies organizations use to construct standing through evidence may lead to what Pielke, Jr., calls "stealth issue advocacy," wherein advocates claim to be arbiters—unbiased or apolitical (without a policy agenda)—but in fact have already chosen a policy position and are primarily seeking evidence to narrow policy options to their preferred option (issue advocates). Stealth issue advocacy can be problematic because it politicizes science in unhealthy ways and, as Senecah warns, can lead to eroding opportunities for cooperation, influence, and establishing trust (2004, 25). Both Pielke, Jr. (2007), and Senecah (2004) argue for more transparency and meaningful engagement mechanisms as correctives.

Science as Market

In this category, we think of scientific data functioning as a sort of currency: trading, contracting for, or producing scientific data allows nonprofit organizations to collaborate. In particular, a few of the nonprofit organizations we spoke to construct their scientific identities strategically to negotiate access to resources beyond standing (i.e., financial support, media attention, etc.) and to get contracts, especially with federal agencies. These contracts fund the nonprofit organizations to conduct scientific research, or may supplement more informal "partnerships" wherein scientific work is done collaboratively. The bulk of the interviews suggest that in the Boise River Basin nonprofit network, operations resemble a cooperative marketplace.

The small size of the Boise River Basin, relative to other urban areas in the West, means that conservation organizations each fill a "niche," which may explain why cooperation, albeit strategic, is more prominent than competition among these interest groups; as one participant noted, "We all play these different roles and so we need each other" (Participant 8). This approach can lead to contracting out work to others within the nonprofit network. As one interviewee put it, "If there's on-the-ground expertise that can do this work, then they probably know the ecosystems better than we do in many cases. So we are happy to have them do the work" (Participant 4). In this case, the nonprofit participants approached the project from a very pragmatic perspective, acknowledging that local partners might be more effective at completing parts of the project than the nonprofit itself, and that cooperation can be more effective than competition or antagonism.

Furthermore, in the Boise River Basin, environmental organizations tend to be small—particularly when compared with national environmental groups—and have limited resources. One participant told us that this explained why cooperation is so important: "We have limited resources in what we can do. That's why facilitating and leveraging is big" (Participant 6). In fact, at the conclusion of each interview, we asked interviewees to list other groups we should talk to, or with whom they frequently worked, and we reached saturation fairly quickly, meaning the same group of organizations and agencies was almost always listed.

Interviewees also indicated that scientific information seemed to flow fairly freely within the local network of organizations and agencies. One participant indicated "[Federal agencies have] always been willing to share information with me. I've never had anyone there not offer to provide me with the information" (Participant 8). A few participants noted that they also frequently drafted off of larger, national environmental organizations, who had resources and set policy agendas: "I could not do my work if [the larger national environmental] groups weren't getting money and doing research and opining about stuff" (Participant 9).

This is not to say that everything functions perfectly in the marketplace of scientific data, or that there are no antagonistic relationships between groups. As previous sections illustrated, nonprofit organizations were sometimes critical of what they viewed as the "politicization" of state and federal agency science, or of particular policy positions. Furthermore, having limited resources and thus being reliant on the generosity of others for scientific data sometimes posed problems: "The biggest problem is that we don't have the funding to do the science. So, we are reliant on other people doing the science and you just can't always get what you want" (Participant 9).

Cooperation could fail for both interpersonal and social reasons as well. One participant reluctantly noted that ". . . certain personalities are more inclined to collaborate, or kind of empower, or ask rather than tell" (Participant 13). Other participants provided glimpses into additional challenges to cooperation, beyond personality. One interviewee told us that some environments tended to be male-dominated, and others very politicized, which can create

exclusionary effects for some who wish to participate in decision-making processes or to collaborate (Participant 8). When the interviewees did specifically address conflicts among the nonprofits it was generally regarding different priorities for the river (e.g., public access versus rookery protection).

Additional Findings: Barriers to Collaboration

As we noted above, only three organizations we interviewed mentioned one-time collaborations with university scientists. Several participants indicated that they wanted to collaborate more with academic scientists, often because they had the vague sense that universities had expertise they could benefit from. But the organizations identified practical challenges facing the development of such partnerships. These challenges include bureaucratic barriers at universities that make partnerships difficult and communication challenges.

First, put simply, some nonprofits view trying to partner with universities to be a hassle. For example, an "initial barrier to entry" exists for nonprofits interested in engaging with university scientists and academic research in that they tend not to know how to approach the university for assistance or even identify existing research that may be of interest. As one interviewee indicated, ". . . the biggest challenge is [that] I don't think the conservation community is very closely tied with research and information that probably exists right here at Boise State, or at some of the universities in Idaho" (Participant 1). When asked about collaborating with university scientists, some of our participants welcomed the idea, but with trepidation, "Yeah, definitely. In fact, I would like to find more ways of collaborating [but] sometimes it can be a convoluted journey, not always quick and simple," (Participant 13) referencing the red tape sometimes associated with university partnerships. This fear of "convoluted journeys" seems to inhibit collaboration on both sides.

In fact, participants identified a number of specific bureaucratic processes that served as barriers to engaging with universities. First, some noted the speed with which nonprofit organizations often need to respond to political exigencies. According to one participant, "Universities are usually on a far lengthier time frame than advocacy. If we have decided to advocate for an [issue], it's because we've seen some sort of opportunity that we need to take advantage of and the speed of that makes the science chase the policy development" (Participant 2). As another participant put it, "Using science in planning is important, but opportunities sometimes come that are outside of our control. Where science and opportunity mesh…that is the sweet spot" (Participant 13). Timing, for nonprofits, is everything. University science, by contrast, rarely chases policy developments, and certainly not on the short time-scales that nonprofits do. As an example, the timeline for university scientists to access traditional funding (i.e., via the National Science Foundation or the National Institutes of Health) for academic research is generally six months or more, depending on the funding agency (Minkler 2005; Slaughter and Leslie 1997).

Other bureaucratic barriers to engaging in research partnerships with university scientists include the challenges of securing Institutional Review Board (IRB) approval for research involving human subjects, and university facility and administration fees facilitated through a university's Office of Sponsored Programs (OSP). Securing IRB approval can prove an unknown and cumbersome process for nonprofits accustomed to responding to opportunities in an agile manner, and can slow university responses further. Universities also frequently charge "overhead" to external funding, meaning that they take part of the grant monies to cover operating and other costs. One interviewee called attention to this, noting, "If we just handed the money to [the university] 20% evaporates" (Participant 13). This functions as a significant disincentive for nonprofits who have secured funding on their own to partner with university scientists or research groups.

Second, participants suggested that nonprofits and university scientists may not collaborate more frequently because of their divergent communication styles. One interviewee implied that academics simply don't speak the same language as practitioners, thus making communication challenging. This participant used the stereotypical academically-trained "engineer" to make the point, ". . . engineers . . . they can't get the 'engineer' out of their head. They are talking about it like an engineer and explaining all the minutia [and] they've lost everyone in the audience" (Participant 7). The same interviewee suggested that scientists needed more training for talking to people who were not also experts: ". . . maybe [they] aren't naturally good at communicating, but that doesn't mean they can't learn how to be communicators" (Participant 7).

These reflections do not necessarily have to do specifically with the roles science plays in nonprofit organizations, but they do point to some of the practical ways that collaboration is made difficult by the differences between nonprofit science culture and university science culture.

Discussion

This study has focused primarily on how nonprofits view their relationship to science, scientists, and scientific data, as well as opportunities and barriers to working more frequently and meaningfully with university scientists. Future work could address how university scientists view their relationships with nonprofits. Absent that, we must make some generalizations about why these relationships do not happen more frequently, at least in the U.S. context. Although we recognize the limitations in the scope of our research, in that it focused on the experiences in one river basin in the U.S., we suspect that some of these dynamics may also be applicable to other contexts. Here, we reflect further on the dynamics previously mentioned in order to point to some ways collaboration could be encouraged and carried out more successfully.

First, it seems possible that some scientists—though growing increasingly aware of the complexity of their own roles in natural resource decision-making contexts—nonetheless continue to think of themselves primarily as "issue arbiters," as "objectively" contributing data to policymakers and others. Collaborating with nonprofit groups who move more fluidly from issue arbiter to issue advocate and back again may pose challenges to university scientists' who are uncomfortable with contexts where objectivity is not always a shared value. As one of our nonprofit participants put it, "People can use science just like an attorney can use facts, on both sides of the arguments" (Participant 13). This conceptualization of science is typical of science in politicized environments (Pielke, Jr. 2007; Sarewitz 2000), but may cause some unease among university scientists (particularly those who lack the protection of tenure) and hinder them connecting with stakeholders outside of the academic environment.

University scientists will need to continue to come to terms with the types of roles they are comfortable playing in collaborative research with non-academic partners, and discuss that in advance of entering into partnerships. Professors and administrators should consider the following questions: Can university scientists effectively maintain a "science arbiter" role when partnering with nonprofit organizations whose conceptualizations of science are more fluid and strategic? Can university scientists provide more support to communities by serving in an "honest broker" role by engaging with nonprofits with divergent interests? How can one preserve the integrity of scientific reputation, data, and processes in politicized environments? What kinds of relationships must be built, maintained, and negotiated? These are the types of social, philosophical, and ethical questions that university scientists and nonprofits both will need to take up in the face of calls for further collaboration.

Second, university scientists may not have received formal training in the public communication of science, or in science studies (the study of science and society) generally, whereas nonprofits may be primarily focused on how science can be used in political contexts. In addition, there are varying dynamics between academic disciplines that may impact consistent and clear communication with those both within and outside of academia. Indeed, some of our participants felt they couldn't develop a shared understanding with university scientists. Few nonprofits reflected on ways they may contribute to this communication challenge, but we posit difficulties lie on both sides. This language barrier can thus be viewed as a cultural barrier through which science itself is interpreted (Hoffman 2015a). Adding team members to science partnerships who are used to doing cross-disciplinary or cross-sector translation and communication can assist with these efforts.

Finally, universities will need to think about how they will motivate and support those scientists who wish to do this kind of work by institutionalizing it in incentive structures. It does not need to be compulsory, just supported. Traditionally, university scientists disseminate their research through academic conferences and in peer-reviewed journals, and they may teach or advise students and seek funding for their research. Grants, publications, and presentations thus function as the coin of the realm for university scientists seeking to secure tenure, promotion, and external funding. In this system, developing meaningful partnerships with nonprofit organizations (and other stakeholders) can seem like a distraction. Universities may want to consider revising their promotion and tenure criteria to better value and encourage such collaborations. In other words, it is not enough to say that universities value such collaborations; they must institutionalize that support as well.

Similarly, universities can focus on streamlining business processes in order to facilitate such collaborations, enable dissemination of collaborative projects, and adequately protect research participants. It does not make sense for offices of sponsored projects to treat small-scale grants with nonprofit organizations the same as large grants from federal agencies, for example. New types of financial and contractual processes and ethical review should be devised to handle smaller-scale work so that it can be managed with more speed and agility. Offices of sponsored projects must also make certain the university retains control of the intellectual property (i.e., research findings)

resulting from the collaboration in order to enable dissemination of findings. In addition, university scientists crossing into the realm of collaboration must be able to discern when a project does not require IRB review because it does not constitute research - for instance, when a scientist's collaboration is in the form of technical assistance. Similarly, a researcher must also be aware when the sensitive nature of a collaborative project requires even greater IRB scrutiny. This may require application for full IRB review and even suggest submission of a certificate of confidentiality for protection of identifiable research information from forced or compelled disclosure. Universities across the U.S. are now empowering research centers that employ research faculty, practitioners, and students who can respond quickly and effectively to requests for partnership.

Nonetheless, we do not mean to imply that barriers to university-nonprofit partnerships are merely procedural, nor that they are easily resolved. Working with non-profit organizations on collaborative projects can pose a number of social and ethical challenges for scientists that must be carefully considered and negotiated. For example, scientists should make clear when entering into a partnership whether they have expectations about who "owns" the data or results produced; whether that data can be used in publications resulting from the partnership, and if so, what authorship agreements might look like; and what kinds of public or political participation scientists will feel comfortable with. Questions scientists might ask themselves include the following: Will scientists speak to the media about the project? How will scientists characterize their partnership with the nonprofit if the project is politicized or framed as controversial? Are they comfortable having their name associated with a project, and under what conditions? At what point will scientists no longer want to be partners on a project? What obligations do scientists have toward the communities who might be affected by the collection and dissemination of data? Such questions can rarely be decided in the abstract, and often require careful consideration of context. We wager that the more university scientists interact with non-profit organizations with these questions in mind and with expectations made explicit, the more comfortable they will become with delineating the boundaries and procedures that work well for them.

Conclusion

The challenges articulated above point to a dilemma facing many universities, particularly those acting as anchor institutions in urban environments (Birch, Perry, and Louis Taylor, Jr. 2013; Perry, Wiewel, and Meneddez 2009). Universities ideally function as integrating mechanisms in their communities, making research and knowledge more accessible, particularly in ways that benefit the surrounding community. However, today's universities, and particularly STEM disciplines, may privilege "knowledge transfer" in the form of knowledge commercialization—the ability to turn research into marketable products or processes. But a narrow focus on commercialization, as much as it may benefit the reputation of the university, also primarily focuses on economic development and less on the more workaday needs of the local community (Geuna and Muscio 2009). The inability of universities to truly serve in and communicate with the communities in which they resign has been critiqued by academics themselves: ". . . academic scholars have a duty to both recognize the impact of their work on society and communicate that impact to those who must live with the consequences" (Hoffman 2015b).

This study aims to ease the way toward more effectively working with nonprofit organizations, who are undoubtedly important, key members of these local communities. We encourage scientists and administrators who work for universities to think about community stakeholders not just as recipients of scientific data or products, but also as partners. This means that sometimes university scientists and universities are themselves stakeholders for projects initiated by nonprofits, and not just the other way around. Reflecting on how to make themselves more available, what kinds of roles they are most comfortable with playing, and how to make university processes more flexible are important first steps.

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