Supporting communities of practice as a strategy to accelerate uptake of environmental science for climate action: TV weathercasters as a case study

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Keywords: climate change, communities of practice, broadcast meteorologists, case study

Abstract
Advantageous new ideas and practices have a vexing track record of taking root slowly, if at all. Identifying or creating, and then supporting, communities of practice is a promising approach to enhancing the likelihood that science-based environmental science knowledge will be applied to solve societal problems. A community of practice, simply put, is a group of individuals who have shared interests and problems related to a specific topic. This article provides a brief overview of what communities of practice are, and how they might be embraced as a strategy to accelerate the development of climate change solutions. The approach is illustrated with a brief case study of Climate Matters, a highly successful program designed to support TV weathercasters as local climate change educators. It concludes with a heuristic to guide future efforts at supporting communities of practice.

Advantageous new ideas and practices have a vexing track record of taking root slowly, if at all. Donald Berwick (2003)—a former Administrator of the U.S. Centers for Medicare and Medicaid Services and a leading expert on health care quality improvement—illustrated this tendency with a historical account from the British Navy. For centuries, scurvy was a major cause of death of global seafarers. In 1601, a scientifically-minded British Naval Captain, James Lancaster, proved that scurvy could be prevented by giving sailors lemon juice. During an extended voyage, he gave sailors on one ship a tablespoon of lemon juice each day, while withholding the supplement from sailors on the three accompanying ships; 40% of the untreated sailors perished while all of the treated sailors survived. Curiously, the breakthrough was not embraced by Britain's Navy. Nearly 150 years later, the experiment was successfully replicated by James Lind, a British Naval physician. Yet it still took 48 more years before the British Navy implemented a policy requiring citrus fruit in the diet on all Naval vessels, and 70 additional years before the British Board of Trade mandated the practice for merchant marine vessels. Thus, the lag time between the life-saving discovery and full application was 264 years.

This anecdote cuts to the core of Jane Lubchenco's landmark paper calling on the environmental science community to become more ‘useful’ to society (Lubchenco 1998). Producing environmental science knowledge is a legitimate end unto itself, but the pressing and arguably existential environmental challenges of the Anthropocene era necessitates a redoubled effort by the environmental science community to be as useful as possible, as soon as possible. Lubchenco specifically called for ‘new fundamental research, faster and more effective transmission of new and existing knowledge to policy and decision-makers, and better communication of this knowledge to the public’.

A considerable body of scientific knowledge has emerged that sheds light on the diffusion and uptake of science-based knowledge and practices in society. While a review of this literature goes beyond the purposes of this paper, the factors known to influence diffusion and uptake of science-based knowledge include the dynamics of information flow through social systems (Dearing and Cox 2018), path dependencies (i.e. the enduring influence of past decisions and actions on current conditions; Djelic and Quack 2007), social influences (e.g. descriptive and injunctive norms, opinion
leadership, social modelling; Cialdini and Griskevicius 2010), economic and political competition and opposition (Brulle 2013), public policies (Farley and Cohen 2005), and the tendency of complex dynamic systems—like society—to resist change (Resnicow and Page 2008).

1. Supporting communities of practice as an uptake acceleration strategy

A concept that has emerged over the past few decades, known as ‘communities of practice’, offers an especially promising perspective on how to enhance application of science-based knowledge to solve societal problems. A community of practice, simply put, is a group of individuals who have shared interests and problems related to a specific topic (Hoadley 2012). Communities of practice are advantageous from a learning perspective because the learning occurs on a peer-to-peer basis (known as ‘social learning’) in the context of the problems being addressed (known as ‘situated learning’), and because the interactions among members of the community often leads to innovation, elaboration and discovery (known as ‘knowledge building’).

Communities of practice can occur naturally—and they can be purposefully created—around occupations (e.g. surgeons), situations (e.g. parenting special needs children) and avocations (e.g. bird watching). Communities of practice tend to take on characteristics that make the group relatively cohesive and rich in social capital including shared tools and practices, shared terminology and stories, and a shared sense of identity (Roberts 2006). Communities of practice offer a potentially promising point of entry for experts from one domain (e.g. climate science) to engage, share knowledge, and build knowledge with interested people in another relevant domain (e.g. TV weathercasters—as is addressed below). Because communities of practice are often organized on large geographic scales—states, regions, nations, and sometimes even globally—newly developed knowledge and innovative practices have considerable potential for rapid diffusion and uptake. The COVID-19 pandemic is currently providing a compelling example of how rapidly knowledge is being shared and co-created in the infectious disease epidemiology community worldwide. Thus, engaging with communities of practice can offer the environmental science community great efficiencies in their efforts to find ways of being more useful.

Indeed, the promise and potential of communities of practice to accelerate the uptake of insights from climate science has been gaining recognition over much of the past decade. Raymond and Robinson (2012) studied the climate change adaptation practices of rural landholders in South Australia—where farm system groups, which are essentially communities of practice, have long been in place—and concluded that these occupationally-defined communities of practice are already playing an important role in helping farmers adapt to the problems being created by their changing climate. Iyalohme et al (2013) suggested the need to create geographically-defined climate change adaptation communities of practice—bringing together experts, practitioners and decision-makers from multiple disciplines and sectors in a community or region to focus on developing adaptations solutions to their climate change problems.

Moser and Pike (2015) made a case for building and supporting a community of practice of professionals who specialize in communicating climate change risks and solutions—noting that such professionals can help build community awareness of demand for the application of climate science and related expertise to increasingly pressing adaptation challenges. Similarly, given the importance of the water-energy-food nexus to human survival, Mohtar and Lawford (2016) called for a developing a global community of practice of people working at this nexus, and proposed developing data and tools that will enable these people to work effectively with governments, businesses and civil society to improve climate mitigation and adaptation planning and decision-making.

Orsato et al (2019) studied a purposefully created community of practice in which nine South American businesses focused on anticipatory climate change adaptation. They concluded that participating in a community of practice was an ‘ideal’ approach to fostering anticipatory adaptation to climate change impacts by businesses ‘because it exposes organizations to a vast set of experiences, strategies, and insights that they would not have accessed if working alone,’ and because ‘social learning (enabled by the community of practice) is an important asset for helping organizations embed emerging and challenging sustainability issues into practices, strategies and structures.’ The experience of the Climate Collaborative—a climate solutions community of practice purposefully developed in 2017 by organizations in the natural products industry—reinforces this view. Their ‘manifesto’ states: ‘We are a community of businesses joining forces to create pathways to action, connecting companies to resources and working together to create solutions. We shine a light on success stories and recognize companies for their great climate work which in turn inspires more companies to act.’ The size of their community of practice has grown rapidly from 17 companies initially to 674 companies as of August 2020.

After studying managers of small water systems in the Upper Colorado River basin, Page and Dilling (2019) concluded that ‘boundary organizations and other usable science efforts would benefit
from capitalizing on the communities of practice that bind water managers together. Specifically, strategic engagement with larger, well-respected water systems as early adopters, supporting dissemination of successes and experiences with new information products among a broader community of water managers, and increasing well-respected water systems’ capacity to engage directly with rural systems may all serve as useful strategies to promote widespread distribution, access, and adoption of information.’

These examples suggest that engaging with and/or creating relevant communities of practice is a strategy that holds considerable potential both to accelerate the uptake of knowledge from climate science for the benefit of society, and to build new knowledge that is specifically oriented toward problem-solving and application. In the remainder of this article I present another example of a community of practice that was identified, and systematically supported, with the explicit aim of accelerating the use of climate science knowledge to increase community understanding of climate change as a locally relevant problem across the United States.

**2. Television weathercasters as a case study**

Most Americans trust climate scientists as a source of information about climate change (Maibach 2019), although few are able to name a single living scientist of any type—much less a climate scientist (Research America 2017). Moreover, few climate scientists have direct access to members of the public beyond their families, neighbors, friends, and the people in their faith congregation or other community organizations to which they belong.

Similarly, most Americans also trust TV weathercasters as a source of information about climate change (Maibach 2019). Unlike climate scientists, however, weathercasters have considerable and sustained access to the public—with a broad viewership that includes segments of the community that are often considered to be ‘hard to reach’ with informal science education (Demuth et al 2011). Weathercasters are also highly trained and experienced science communicators; indeed, they are typically the only scientist in their newsroom. Weathercasters, therefore, appear well-positioned to play a role in Lubchenco’s (1998) call for ‘better communication of (climate science) knowledge to the public.’ From a social amplification of risk perspective, weathercasters are well-positioned to serve as ‘amplification stations,’ picking up the risk signals from climate science and amplifying and localizing them for their audiences (Kasperson et al 1988).

Since 2009, with funding from the National Science Foundation (and eventually other philanthropic foundations), colleagues from George Mason University, Climate Central and I have been exploring and developing the potential of TV weathercasters as a community of practice of local climate educators. When the project started, most members of the American public accepted the reality of climate change, but saw it as a distant threat—in time (not yet), in space (not here), and in species (not ours; Leiserowitz et al 2009). Extant research at that time strongly suggested that efforts to help people understand the personally-relevant realities of climate change—i.e. that its effects are already happening (now), in our community (here), and in a variety ways that are harmful to people (us)—could enhance not only public understanding of climate change, but also support for and involvement in climate action (Leiserowitz 2006, Marx et al 2007, Weber 2010).

From the outset of the project, it was clear that America’s approximately 2200 TV weathercasters were a cohesive occupational community of practice: they do the same job; share the same tools and practices; have a shared set of stories, linguistic shortcuts and jargon related to their work; and have a strong shared sense of identity (Henson 2010). It also quickly became clear, however, that they did not share a common view about climate change. A survey conducted in 2010 revealed that TV weathercasters held a startlingly wide range of views about climate change, and on the whole, they were somewhat less accepting of human-caused climate change than was the American population (Maibach et al 2010). We also learned, however, that among weathercasters who did accept the realities of human-caused climate change—which was approximately half of their community—nearly all expressed an interest in educating their viewers about the local implications of climate change. Thus, our initial research supported the premise that many weathercasters were indeed willing to become local climate educators—although it is important to note that none were currently doing so on-air, where their potential to reach members of their community is greatest.

It is widely understood that people’s attitudes and intentions are not always consistent with their actions. Social scientists have come to learn that the disconnect between attitudes and behaviors is often due to barriers that make the behaviors difficult to perform. These barriers can include a lack of knowledge about how to perform the behavior, psychological factors such a lack of self-efficacy in one’s ability to perform the behavior, social factors such as unsupportive social norms, and resource constraints such as lack of time or money—if the new behavior requires time or financial outlays (Mckenzie-mohr 2011). In the 2010 survey, we sought to identify specific barriers that were creating obstacles for interested TV weathercasters to report about the local impacts of climate change on-air (Maibach et al 2010). The most commonly reported barriers were: lack of time in the newscast; lack of time for field reporting; uncertainty about climate change; lack of news management support; lack of access to appropriate visuals/graphics;
lack of general management or owner support; lack of viewer support; lack of sufficient knowledge in the subject; and lack of access to trusted scientific information. We focused our subsequent efforts on reducing these barriers to the extent possible—beginning with reducing the time required for field reporting, producing localized visualizations and graphics, and enhancing access to trusted scientific information.

To test the feasibility and impact of supporting interested TV weathercasters, we partnered with Jim Gandy, the Chief Meteorologist at the CBS news station in Columbia, South Carolina (WLTX). We selected Gandy (versus with other weathercasters who had also volunteered) to develop and pilot-test the approach with us—which soon became known as Climate Matters—for several reasons: he was an influential (i.e. opinion-leading) member of the weathercaster community; his news director and general manager were supportive of his involvement in the project; and his station’s viewers reside in a politically conservative community—meaning they were a difficult audience to interest in climate change education (as compared to viewers in a politically liberal media market). Our goal was to develop an approach that successfully supports weathercasters in any US media market—regardless of their audience’s pre-existing sensitivities—therefore we decided to develop and test the approach in a difficult media market.

To design our approach, we built an interdisciplinary team based on Fischhoff’s (2007) recommendations on how to improve the effectiveness of climate communication. Team members included climate scientists (who best understood the facts we wished to share with weathercasters and their viewers), social scientists (who best understood how people process risk information), and communication professionals (who best understood how to make the information simple and feasible for use, on-air and elsewhere).

In winter/spring 2010, we worked closely with Gandy to identify 12 story topics that were relevant to his viewers—based on the climate impacts that were already manifest in Columbia—and that were likely to be timely at some point over the next year (based on anticipated weather conditions) so that the stories would have a weather-related ‘news hook.’ Each story package included local data showing how weather and related conditions have been changing in Columbia over the past 50–100 years and/or how they were projected to change over the next 50–100 years, one or more broadcast-quality graphics that visualize the data, and a set of facts that Gandy could use in real time to produce a Climate Matters story when the weather conditions were relevant. In summer 2010, and over the next 12 months, Gandy aired 13 Climate Matters stories during his weather segments—each averaging approximately 2 min. The impact evaluation of the year-long pilot-test demonstrated that, compared to viewers of other stations, WLTX viewers became more certain of the reality of climate change, more likely to see it as harmful, and more concerned about it (Zhao et al 2014).

The next step in our scale-up process was to see if we could sustain the model while supporting multiple weathercasters in multiple media markets (Maibach et al. 2016). To that end, in 2012 we invited ten additional opinion-leading weathercasters from a diverse set of media markets nationwide to participate in Climate Matters—with the goal of delivering each of them a story package, localized when possible, every week. Early in 2013, we also invited all 47 weathercasters in Virginia to participate in the program; 20 accepted the invitation (a 42% participation rate—which was a hopeful indicator of strong participation if we were to make the program available to all interested weathercasters nationwide). Later that year, we quietly began enrolling any weathercaster who requested permission to participate, regardless of their location—which necessitated customizing our materials for a rapidly expanding set of media markets nationwide. Concurrently, we began offering Climate Matters materials in Spanish as well as English. During this period, the American Meteorology Society (AMS), NASA and NOAA—organizations whose climate information is highly trusted by most TV weathercasters (Maibach et al 2010)—joined the project to help us scale it up nationwide.

By the end of 2013, >100 weathercasters were participating in the program, and the number of participating weathercasters has grown rapidly since. As of 31 October 2020, there were 968 participating weathercasters (55 of whom broadcast in Spanish), who work in 483 local TV stations, with at least one in 92% of all US media markets—including 99 of the top 100 media markets.

In 2014, participating weathercasters aired 69 Climate Matters stories; in 2019 they aired 3535 stories—a >50-fold increase over 6 years. Most importantly, two recent impact evaluations have shown that both locally (Feygina et al 2020) and nationally (Myers et al 2020), viewers who are exposed to this climate education become more likely to understand that climate change is a ‘here, now, us’ problem.

Concurrent with the growth of the Climate Matters program, there has been a dramatic shift in how members of the broadcast meteorology community themselves view climate change, such that their views are now much more closely aligned with those of climate scientists (Maibach et al 2017, Perkins et al 2020). This was an important development, and one we sought to encourage, because the prior diversity of views about climate change—and the overt conflict in the meteorology community about those views—was itself a barrier to weathercasters reporting on climate change (Stenhouse et al 2016). To proactively address and neutralize that conflict, in 2013 we engaged the services of a conflict mediator who worked with several small groups of opinion-leading weathercasters to surface and work through the entrenched conflicts...
about climate change in the community of practice; this conflict mediation process appeared to have been helpful in moving the community beyond conflict and toward cooperation on the issue of climate communication (Schweizer et al. 2014).

Additional elements of our approach include education and training of interested weathercasters. Each year since 2013, we have presented conference papers at the AMS annual broadcast meeting and the National Weather Association (NWA) annual meeting, both to educate weathercasters and raise their awareness of our program. We have also hosted 22 intensive, daylong, climate reporting workshops, often in association with the AMS and NWA annual meetings, and 6–10 h long webinars each year since 2014. Video recordings of these webinars, and all of the Climate Matters program materials produced to date, organized by topic and media market, can be seen and downloaded from the Climate Matters online media library: https://medialibrary.climatecentral.org/

3. Supporting the community of practice

Our approach to supporting weathercasters was guided by a simple, evidence-based, heuristic: make the behaviors we were promoting easy, fun, and popular (Maibach 2019). Making behaviors easy—or at least easier—involves identifying the barriers that make them difficult, and using programmatic resources and other forms of influence to reduce those barriers. Behaviors can also be made easier through social learning, by having members of the community systematically demonstrate (i.e. model) the behavior—breaking it down into its component parts, if necessary—so that other members of the community learn how to implement the behaviors, and develop a stronger sense of self-efficacy that they are capable of doing so (Bandura 1986).

In this heuristic, ‘fun’ is not meant in the literal sense, although making support activities fun, literally, is a good idea—if practical. To that end, our weathercaster workshops are designed to be fast-paced, interactive, and fun; we have found that when weathercasters practice their new skills in front of a roomful of their peers, laughter and social support ensues. At a deeper level, however, ‘fun’ is meant to express the importance of delivering benefits that members of the community value. This involves taking steps to understand what benefits are important to them, and doing everything possible to deliver those benefits. In the case of weathercasters, peer recognition (e.g. awards), news media attention (e.g. positive news stories), audience praise, and ultimately professional advancement are highly valued benefits; we use every means possible to deliver these benefits to participants in Climate Matters program.

Lastly, the whole purpose of the Climate Matters enterprise is to make local climate reporting on-air popular among TV weathercasters. Initially, no one in the community of practice was performing the behavior, so we found a willing volunteer (Jim Gandy) and made every effort to ensure it went well for him. We then shone a light on him so his peers noticed his role modelling. As more weathercasters joined in, we did our best to shine a light on them too, so their role modelling would also be noticed. Early on, we intentionally sought out opinion-leading weathercasters and encouraged and enabled them to embrace the behavior; ultimately, they were the influencers who created a new norm in their community. Lastly, as climate reporting became increasingly normative, we made every effort to ensure that everyone in the community knew the behaviors were gaining in popularity; this information exerts a subtle but powerful influence that encourages others in the community to consider and try the behavior.

4. Critical reflection

As illustrated by the Climate Matters experience, identifying existing communities of practice, and supporting them to adjust their professional practices to accommodate the realities of our changing climate can be an effective way of accelerating the uptake of climate science for the benefit of society. Examples of other occupationally-defined communities of practice that may benefit from this type of support include water managers, fire chiefs, architects, city planners, HVAC professionals, physicians, and local health department officials—to name just a few.

Although the concept of communities of practice as a strategic knowledge management tool has been developing for several decades, it is important to acknowledge that the concept is still evolving, and that its limitations and boundary conditions are not yet well understood. Roberts (2006) identified three conditions that appear to impede the effectiveness of communities of practice: power differentials among members the community (e.g. managers and workers from the same organization); lack of trust among group members; and predispositions against embracing changes in their practices—possibly because doing so is seen as a threat to their identity. Roberts also suggested that competitive environments (societies and organizations) may be less conducive than cooperative environments to successful communities of practice.

Conversely, situations and professions focused primarily on public benefit may be more amenable to effective communities of practice than situations and professions focused primary on private benefit. While TV weathercasters work in the highly competitive news industry, as professionals they tend to see themselves working in the public’s interest—helping
to ensure public safety (Schweizer et al 2014). This professional identity held by weathercasters may help to explain the success of the Climate Matters program.

It is not yet clear if certain professions or types of organizations will be more or less amenable than others to working in a community of practice aimed at improving their climate change-related knowledge, skills and practices. It is possible that public service-oriented professions (e.g. fire chiefs) and organizations (e.g. public health departments) may be more promising candidates to work toward climate-readiness in a community of practice. Conversely, two of the cases mentioned in the literature review above—the nine South American businesses that formed a climate change adaptation collaboration (Orsato et al 2019) and the hundreds of small- to mid-sized U.S. businesses in the Climate Collaborative—as well as the Climate Matters experience suggests that climate-readiness collaboration is possible among competitively-oriented organizations and professionals. Exploring these boundary conditions—including what can be done to extend the boundaries of effective climate-focused communities of practice—should be a high priority for further research.

5. Conclusion

Climate Matters is an effective climate communication initiative created in the spirit of Jane Lubchenco’s call for ‘better communication of (climate science) knowledge to the public’. Early in the development process, our Climate Matters team came to recognize TV weathercasters as a community of practice, and we aimed to support their community as a strategy accelerating the use of localized climate science information, and enhancing public understanding. The program’s rapid growth from a successful pilot-test in one media market to adoption in >90% of media markets nationwide provides evidence of the potential of a community of practice approach.

Identifying and supporting communities of practice cannot be the only strategy for accelerating the uptake of environmental science for climate action, but it does appear to be a promising strategy.

Data availability statement

All data that support the findings of this study are included within the article (and any supplementary information files).

Acknowledgments

This work was supported by NSF Award No. DRL-1713450. I wish to thank my collaborators at Climate Central, George Mason University, Yale Project on Climate Change Communication, American Meteorological Society, NASA, NOAA, Climate Communication and literally hundreds of TV weathercasters for their invaluable contributions to the Climate Matters program.

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