

Author: Michelle Sullivan Govani

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Case Study: Climate Change Adaptation and Public Participation in Yuma, AZ¹

One day during her morning twitter-scroll, Callie Evans, a professor of anthropology at Arizona State University (ASU) in Tempe, Arizona, observes a tweet from the Arizona Science Center calling for Phoenix-area residents to participate in a citizen's forum regarding climate change resilience in the city. The forum, hosted by the Science Center, initiated by the ASU researchers, and funded by the National Oceanic and Atmospheric Administration (NOAA), aims to engage the citizens of Phoenix in a deliberation around adaptation to and mitigation of extreme heat and drought. Phoenix is expected to experience a growing number of days during which the temperature exceeds 100 degrees F, as well as less predictable rainfall that could result in prolonged periods of drought (Yardley 2017).

Callie is curious to explore the possible impacts of climate change on infrastructure, ecosystems, and social and cultural networks in Phoenix, as well as to deliberate on potential strategies to address those challenges. Her interest stems from her experience in her hometown of Yuma, Arizona; she's been tracking the impacts of climate change there since she was young and growing up on her family's broccoli farm. The forum in Phoenix could shed light on strategies for the similar scenario in Yuma. Callie applies, and three weeks later she learns that she has been selected to participate.

On the day of the forum, almost 70 people from around the Phoenix metropolitan area convene under the leadership of the ASU researchers to design and debate different strategies for adaptation and mitigation. Participants use game-boards, role-play, and visualizations from NOAA's satellite system to learn about the potential impacts of extreme heat and drought, as well as to explore the perspectives of various hypothetical stakeholders including politicians, business owners, environmentalists, and farmers. After the exploratory first stage, participants then share their own perspectives, in private journals as well as in discussion with their group, and they collaborate to make recommendations for supporting the resilience of Phoenix to climate change. Callie excitedly notes the presence of Phoenix city officials, who have attended to learn about the concerns, preferences, and ideas of their constituents.

Although she does not yet know what impact the citizen forum will have on Phoenix's decision-makers in the coming weeks and months, Callie feels empowered: Her participation broadened her knowledge base, challenged her to understand divergent perspectives, and led her to better articulate her own point of view in deliberation with others to reach compromise. Thus, Callie feels there is potential for a similar forum to initiate productive dialogue among the conflicting communities facing climate change challenges in Yuma.

With an average of 350 sunny days per year, Yuma is an agricultural oasis engineered amid its desert surroundings through irrigation. Farmers in the area produce around 90% of the United States' winter supply of lettuce and other leafy vegetables (Satran 2017). The city and county of the same name lie at the southwestern corner of Arizona, bordering California Mexico, and are home to almost 95,000 people and more than 200,000 acres of crop-land (US Census Bureau 2017; USDA 2012).

Both county and city rely on the contested waters of the Colorado River, which meanders along the county's western edge and north of the city before crossing the border into Mexico and flowing toward the Gulf of California. Political conflict has long been part of the story of the Colorado River. To this day there are conflicts over water rights among local stakeholders, US states, and nations. Layered on top of the complex legal and environmental history, climate change, in the form of prolonged drought and extreme heat in the river's Upper Basin, has contributed to looming shortages for many who rely on the river's waters, including Las Vegas, Phoenix, Yuma, and Denver, the Hoover Dam power plant, and adjacent ranching and agricultural lands (Udall and Overpeck 2017; Harvey 2017; DOI 2018).

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There are also direct, local impacts of climate change on the city of Yuma and the surrounding agricultural landscape. For example, the increasing number of days reaching temperatures of more than 100 degrees F will lead to a shorter growing season for many crops which could damage the winter vegetable market that drives most of the Yuma county economy (Dewey 2017; Charles 2017; Yuma County Chamber of Commerce 2018). More days above 100 degrees F may also lead to increased heat-caused illness and death, as well as greater air conditioning and peak-hour energy demands (Wehner, Castillo, and Stone 2017; Luber and McGeehin 2008). In addition, increased temperatures can cause wear and tear on infrastructure for transport and energy (CCSP 2008, p ES-5). Unpredictable rainfall and prolonged drought may lead Yuma to compete for water rights with the agricultural sector which currently holds priority when water is scarce (National Drought Mitigation Center 2018; Yardley 2015). And though the daily average of rainfall is expected to decrease, monsoons may become more intense, driving more pronounced dust storms and storm damage to infrastructure during the monsoon season (Luong et al. 2017).

Callie wonders how the city and the surrounding county will address the impacts of climate change. Thus, she sets out to organize a Yuma citizen's forum, but she needs some help with a few questions first: What options exist? Who will decide? Will the urban and agricultural communities reach an understanding? ...

Abbreviated Version:

During her morning twitter-scroll, Callie Evans, a professor of anthropology at Arizona State University, observes a tweet calling for participation in a citizen's forum aiming to engage citizens of Phoenix in deliberating on strategies for climate change. Phoenix is expected to experience more days exceeding 100 degrees Fahrenheit, as well as less predictable rainfall that could result in prolonged periods of drought. Callie is curious to explore the possible impacts of climate change due to her experience in her hometown, Yuma, Arizona; she's been tracking the impacts of climate change there since she was young and growing up on her family's farm. The Phoenix forum could shed light on strategies for Yuma. Callie applies and is accepted.

On the day of the forum, participants use game-boards, role-play, and visualizations to learn about the impacts of extreme heat and drought and to explore the perspectives of various hypothetical stakeholders. Next, participants share their own perspectives and collaborate to make recommendations. Callie notes the presence of Phoenix city officials, who have attended to learn from their constituents. Although she does not know what impact the forum will have on those decision-makers, Callie feels empowered: Her participation broadened her knowledge, exposed her to divergent perspectives, and challenged her to find compromises. Thus, Callie feels there is potential for a forum to initiate productive dialogue among the conflicting communities facing climate change challenges in Yuma.

Yuma is an engineered agricultural oasis. Farmers in the area produce around 90% of the United States' winter supply of leafy vegetables. Yuma and the surrounding agricultural lands rely on the waters of the Colorado River, but historical legal conflicts, prolonged drought, and extreme heat in the river's Upper Basin have led to looming water shortages. There are also direct, local impacts of climate change on the city of Yuma and the surrounding agricultural landscape. For example, the increasing number of days reaching temperatures of more than 100 degrees F will lead to a shorter growing season, which could impact the winter vegetable market that drives most of Yuma's economy. Such heat will also necessitate increased reliance on air conditioning systems contributing to higher energy costs, as well as to wear and tear on infrastructure for transport and energy. Further, the city will compete for water rights with the agricultural sector which currently holds priority when water is scarce.

Callie wonders how the city and the surrounding county will address the impacts of climate change. Thus, she sets out to organize a Yuma citizen's forum, but she needs some help with a few ethical first: What options exist? Who will decide? Will the urban and agricultural communities reach an understanding? ...

Discussion Questions:

Organizing:

- (1) Who should Callie cooperate with to initiate the forum? What are the pros and cons of organizing the forum with: City officials? A citizens' activist group? ASU researchers? An agricultural company or farmer's group? Others? Assess her options in comparison with how the Phoenix forum was organized.
- (2) Who should fund the forum? Compare Callie's options to the organizers and funders of the Phoenix forum.
- (3) How should Callie and her team recruit participants? What does proper representation look like? How can she work to ensure proper representation of the diverse communities in the city and the broader county?

- (4) Given proximity to the national and state borders, should representatives from California and Mexico be present at the Yuma forum? Why or why not?

Framing:

- (5) How might content framing differ depending on the sponsoring and the hosting group(s)?
 (6) How should the Yuma forum discuss the sensitive issue of water rights? Who is responsible for the diminishing waters of the Colorado? Who is responsible for adaptation strategies and funding?
 (7) How should scientific ideas be communicated to the participants?

Outcomes:

- (8) How should the results of the forum be used and by whom? Why?
 (9) Should city officials be present at the Yuma forum, like they were in Phoenix? What if decisions from the citizen forum differ from the preferences of the city and county officials? Whose opinion has more weight?
 (10) What if city officials choose not to use the results of the forum? Is the benefit to individual participants, described by Callie, enough to justify the costs of hosting the forum?
 (11) Is a forum the proper format for deliberating on these issues? Could the diverse values of participants result in gridlock around adaptive strategies? What other issues might arise?
 (12) Phoenix and Yuma face similar climate change challenges, but how and why might the process and outcomes of the forum in Yuma be different from those Callie experienced in Phoenix?
 (13) What might be the benefit of a local perspective relative to a global perspective regarding adapting to and mitigating climate change, which is often framed as a global issue?

Content Commentary:

The ethical issues at stake regarding climate change include, but are not limited to, questions of risk and uncertainty, allocation of responsibility for emissions and their impacts (i.e., equity), and deliberation on policy options including mitigation, adaptation, and inaction (Gardiner 2004; Grubb 1995). Because climate change causes and impacts are distributed around the planet (though unevenly), many such discussions and questions are framed in terms of global and generational scales of space and time. For example, responsibility for the causes and effects of climate change could be discussed in terms of justice or equity among nations. Certain countries, including the United States, have been responsible for a disproportionate share of emissions, and yet the impacts of climate change will be distributed globally, and often felt by nations where emissions are relatively low or even absent (Grubb 1995). Should the US be considered responsible for assisting in adaptation and mitigation efforts in other countries given the disproportionate share of historic emissions driving climate change? What is the basis for deciding? Who decides? Which countries should or should not be favored in such discussions? Who mitigates and how much? Who adapts and how much? With what funds? And how should impact, adaptation, and mitigation be defined? (Paavola 2008). Regarding time-scales, responsibility allocation could be discussed in terms of the impact on present vs. future humans (and nonhumans). How can the interests of future generations be accounted for in decision making? (Paavola 2008; Grubb 1995).

Though these are worthwhile questions and conversations to explore on the global scale, this case study frames such questions at the local scale in Phoenix and Yuma, AZ. As mentioned in the case, climate change impacts in those places include extreme heat, prolonged drought, and diminished water supply from the CO River. Who is responsible for causing and responding to these challenges? And Callie wonders, what are the options for response, and who decides among them? Will competing communities in Yuma city and county reach an understanding? One issue that emerges is whether the urban population benefits more than they realize from the agricultural uses of water; do they acknowledge that they may benefit from the agricultural uses of water in an indirect way (i.e., food supply) even as they focus on more direct uses of water (e.g., for showering, watering lawns, washing cars, etc.)? The answers to these and other ethical questions are context specific, depending on a locality's unique physical features, demographic distribution, politics, and leadership (Rosenzweig 2011). For example, the climate challenges faced in Yuma (drought, extreme heat) are quite different from those faced in Boston, MA, (e.g., sea level change), as are the demographics, politics, and economics. What limits or determines climate change responses in one city may not be limiting or determining in another, due to the different ethical perspectives, scientific evidence, and risk perceptions, as well as the differing relative value of each in deliberation (Adger et al. 2008). This is why even places facing similar climate change challenges, like Phoenix and Yuma, will still arrive at different responses (or perhaps, at the same response, but through a different process) unique to each city's infrastructure, cultures, history, etc.

In addition to the context-specific nature of climate change challenges, there is also a lack of locally based scientific information, including climate change models. But beyond calls for more climate science grounded in local contexts (e.g., Rosenzweig 2010), Callie has clued into the need for reflection on how best to address the *ethical dimensions* of climate change challenges. Regardless of the scientific findings, decisions regarding adaptation, mitigation, or other responses depend on the interests of *who* is involved in the goal-setting and decision-making processes (Adger et al. 2008).

In this case, Callie decides that a citizen forum will provide an opportunity to deliberate on the goals of a climate change response for Yuma, as well as to delineate and understand the various perspectives at play, a dynamic she has experienced first-hand throughout her upbringing in the agricultural community and adult-life in the city. But first, she must decide how and with whom to organize the forum. To achieve an equitable representation at the forum, Callie should balance perspectives from the city, the agricultural community, Native American communities, and perhaps different important industries in Yuma, such as tourism and healthcare. Even within those communities there will be diverse and divergent perspectives. For example, the residents of Yuma city represent myriad economic, demographic, and political characteristics. Further, the agricultural community consists of large-scale industrial farms as well as small-scale, family-owned farms. To address the diversity among and within interest groups, Callie might consider organizing the forum with members of the local governing bodies in the area, including the Yuma City Council and Chamber of Commerce, as well as representatives from adjacent Native American communities.

Though the myriad perspectives may seem to present an obstacle for building consensus, varied values held by diverse stakeholders promote thoughtful deliberation to ensure equitable action (Adger et al. 2008). Deliberation may also serve to reveal hidden or under-represented interests and to generate new ideas. I've had the opportunity to act as a facilitator in such a forum, and despite comments on the arduous process of reaching consensus, participants believed that the process demonstrated the robustness of their resulting goals and decisions. Although some parties disagreed with the outcome, all parties were heard. There was also a noticeable effort by participants to frame their opinions in terms of the moral values of participants who disagreed with them, or at the very least to notice that differences of opinion were—beyond being “right” or “wrong”—rooted in different values. Given that context plays a central role in goal setting for climate change response, localities that are aware of and open to a diversity of perspectives may end up being more adaptable (Adger et al. 2008).

Finally, it is worth noting there are several programs and institutions that recognize the unique needs and challenges for climate adaptation in local contexts and thus provide resources for local deliberation, goal-setting, and response. For example, calling attention to the role of cities in responding to climate change impacts, there are a few organizations that unite mayors across the world, including C40 Cities Climate Leadership Group, the World Mayors Council on Climate Change, and the Global Covenant of Mayors for Climate and Energy. (Rosenzweig 2011; Rosenzweig et al. 2010). Understanding that these citizen forums are experimental and evolving, Callie could use any one of these resources to guide her planning process. This would ensure that her Yuma forum is ethical, context specific, and properly representative of the community, as well as to manage her expectations about forum outcomes and relevance to decision making.

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Links:

Global Covenant of Mayors for Climate and Energy: <https://www.globalcovenantofmayors.org/>

C40 Cities Climate Leadership Group: <http://www.c40.org/>

World Mayors Council on Climate Change: <http://www.worldmayorscouncil.org/>

Arizona State University Public Forums Project: <https://cspo.org/research/science-center-public-forums-community-engagement-for-environmental-literacy-improved-resilience-and-decision-making/>