

Connecting Climate Adaptation and Hazard Mitigation Planning in Climate Discourse- Sensitive Regions: A Cross-RISA Collaborative Project

2022 Project Report

Rachel Riley and Darrian Bertrand, Southern Climate Impacts Planning Program,
University of Oklahoma
Seth Arens, Western Water Assessment, University of Colorado



Suggested Citation:

Riley, R., D. Bertrand, and S. Arens, 2022: Connecting Climate Adaptation and Hazard Mitigation Planning in Climate Discourse-Sensitive Regions: A Cross-RISA Collaborative Project. Southern Climate Impacts Planning Program and Western Water Assessment, 22 pp,

www.southernclimate.org/documents/CAHMPCrossRISA.pdf.

Introduction

The states of Oklahoma and Utah are prone to experiencing impacts from a variety of hazards. Long-term climate stressors are also prominent across their landscapes. One way to address climate-related challenges is through hazard mitigation and climate adaptation planning and implementation. Hazard mitigation planning is a relatively common activity in which communities across the United States partake. A primary driver of this activity is so that communities can be eligible for certain types of Federal Emergency Management Agency (FEMA) funding. Hazard mitigation can be a wise financial investment when considering long-term planning timescales (Multi-hazard Mitigation Council 2019). Even considering financial benefits, state and local agencies face challenges in conducting hazard mitigation planning, integrating hazard and climate planning efforts, and transitioning from planning to action. Prior SCIPP, WWA, and other studies have identified four key challenges with respect to this topic, including:

1. Limited capacity to develop hazard mitigation plans (HMPs) and to understand hazard mitigation benefits.
2. Limited impact of HMPs.
3. Difficulty in progressing from limited climate inclusion in HMPs to in-depth climate adaptation planning.
4. Transitioning from hazard mitigation planning to climate-informed actions.

Given SCIPP and WWA's research and engagement experience in this area, we aimed to build the capacity of state and local hazard mitigation efforts to incorporate climate into their natural hazards planning efforts, and to use those planning efforts to support actionable climate adaptation. The work for the overall project was completed in two phases. In Phase 1, SCIPP's [Simple Planning Tool](#) was translated into a Utah context. Phase 2 activities supported a planning initiative and investigated the strategies that can be used to move from planning to action at multiple scales in both the SCIPP and WWA regions. Thus, this cross-RISA collaboration both transferred a tested tool across RISA regions and advanced the understanding of climate-informed hazard planning.

Phase 1 Summary: Development of a Utah Hazard Planning Tool (Seth Arens)

Development of the Utah Hazard Planning (UHP) Tool began with a key Utah stakeholder's need for more information about how climate change will impact natural hazards in Utah. WWA worked with the Utah Division of Emergency Management (DEM) to provide climate change information for the 2019 Utah Hazard Mitigation Plan (HMP) but was not engaged until the very end of the process. Consequently, the information that WWA provided about climate change impacts to Utah natural hazards was brief and superficial. After completion of the 2019 Utah HMP, Utah DEM reached out to WWA and expressed a high level of interest in obtaining more detailed

information about climate change impacts to Utah natural hazards. The development of the UHP Tool was a direct response to the needs of Utah DEM.

Before the work began on adapting SCIPP's Simple Planning Tool to meet the needs of Utah hazard planners, new relationships with organizations involved in Utah hazard planning needed to be built. WWA understood from state-level hazard planners that more information about climate change impacts to hazards was needed but did not have a direct understanding of the climate information needs of other Utah hazard planners. Hazard planning in Utah occurs at the state and county, or multiple-county levels; WWA reached out to new stakeholders working either for county or multi-county (Associations of County Governments or AOGs) hazard planning groups. WWA learned from these stakeholders that a centralized resource that pulls together multiple sources of hazard information would be very useful for planning.

Armed with some initial information for and positive feedback about the UHP Tool, the SCIPP Simple Planning Tool was used as a template to develop the UHP Tool. First, the UHP Tool needed to address the natural hazards that are specific to Utah. All *natural* hazards or geological hazards influenced by climate that are considered in the 2019 Utah Hazard Mitigation Plan were included in the UHP Tool: avalanche, dam failure, drought, flood, geologic hazards, severe weather, and wildfire. Several of these hazards were separated to provide more detailed information. The final list of hazards included in the UHP Tool were: avalanche, cold temperature extremes, dam or levee failure, debris flow, drought, extreme heat, flooding and heavy rainfall, landslides, wildfire, wind event, and winter storms. A section providing general hazard information was also included. Two to six climate information resources were included for each hazard based on WWA's extensive knowledge of regional climate information resources, exhaustive research, and stakeholder input. In cases where many information sources exist for a hazard, qualitative decisions were made to include the resources that would be most useable for hazard planners.

A key feature of the UHP Tool, and difference from the SCIPP Simple Planning Tool, was the inclusion of more extensive information about climate change impacts to hazards. Climate change information was provided in three ways. One, a brief summary of climate change impacts, similar to the Simple Planning Tool, was provided at the end of each hazard section. This summary includes clear and direct language that provides a qualitative assessment of how risk would change in the future and the relative level of certainty regarding the change in hazard risk. The goal in providing direct language about the certainty of future hazard risk is to provide hazard planners with clear information to aid in hazard mitigation planning. Where available, specific climate information resources were included that provide projections of future hazard risk or climatic conditions that lead to that risk. Projections of future hazard conditions are available for only a subset of hazards in the UHP Tool (cold temperature extremes, extreme heat, flooding/heavy rainfall, and wildfire). Because there are no tools to project future risk of many hazards, a third method to convey climate change impacts to natural hazards was employed: the *Climate Change Impacts to Natural Hazards Appendix*. While tools to project every hazard do not exist, extensive scientific research exists on

how climate change will impact most hazards. *The Climate Change impacts to Natural Hazards Appendix* is essentially a review of all recent and relevant literature pertaining to how climate change will impact each hazard in Utah. The document is written for hazard planners rather than in a style meant to be published in a peer-reviewed journal.

In March 2021, WWA convened a stakeholder meeting with hazard planners in Utah. The goal of the meeting was to introduce a draft version of the UHP Tool, solicit input on the tool from stakeholders, provide information about climate change impacts to hazard and facilitate conversations amongst planners about building resiliency to hazards and climate change. Meeting participants worked at various levels of hazard planning from 22 organizations representing federal, state, county, and local entities; 40 stakeholders participated in the online meeting. Approximately half the meeting was devoted to providing information to stakeholders through presentations by WWA and a planner from the Bear River Association of County Governments. The other half of the meeting was devoted to small-group discussions designed to obtain feedback on the UHP Tool and foster discussions about challenges to hazard planning in Utah. WWA worked with a graduate-level class at the University of Utah (Global Changes in Society) to help design and conduct the stakeholder meeting. Students in the class served as small-group facilitators or notetakers during the meeting and provided a summary report of the meeting. Input provided by stakeholders during the March 2021 meeting was incorporated into the final UHP Tool which is published on WWA's website (<https://wwa.colorado.edu/utah-hazard-planning-tool>).

The final component of Phase 1, an addition to the original grant proposal, was building the UHP Tool into an online dashboard-style tool similar to WWA's Intermountain West Climate Dashboard. In addition to the report, the UHP Tool will be available on WWA's website as an interactive, dashboard-style tool modeled after the Intermountain West Climate Dashboard in summer 2022 (<https://wwa.colorado.edu/resources/utah-hazard-planning-dashboard>).

Phase 2 Summary: Planning to Action (Rachel Riley, Darrian Bertrand, Seth Arens)

Phase 2 of the project included helping a community incorporate climate data into a planning process and engaging key decision makers about the factors that make hazard mitigation and climate adaptation more likely. This is also known as an adaptation enabling environment (Dilling et al. 2017). Both components were included to better understand how planning can be moved to action.

(a) Help a community incorporate climate data into a planning process

For the first component of Phase 2, the Oklahoma Department of Emergency Management and Homeland Security (ODEMHS) helped SCIPP identify a small- to

medium-sized community in Oklahoma that had an expired HMP and would benefit from assistance with incorporating climate data into their planning process. Pawnee County, Oklahoma, was suggested, as their long-expired HMP was written in 2004. Pawnee County (Figure 1) is a rural county in north central Oklahoma with limited staff and resources to support planning efforts. Support for hazard mitigation and climate adaptation from the broader community and jurisdictional leaders is also lacking. The current county emergency manager was eager to update and implement the plan so his county would be eligible for certain federal funding in the future. SCIPP supported the county by updating their Hazard Identification and Risk Assessment portion of the HMP. ODEMHS and Pawnee County would then work to complete other portions of the HMP later.

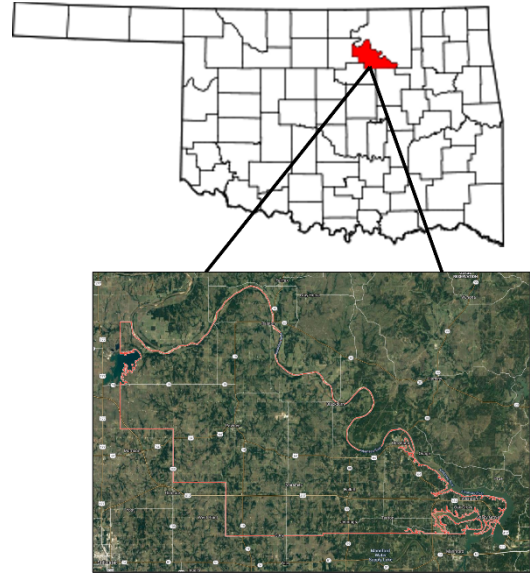


Figure 1. Location of Pawnee County, OK

To carry out the collaboration, SCIPP, Pawnee County, and ODEMHS met virtually on a monthly basis for about five months. A few additional phone calls and emails were exchanged to discuss progress, risks, and challenges from Pawnee County's perspective, and learn about the details of the HMP process from ODEMHS. ODEMHS provided feedback on SCIPP's work during each meeting, ensuring FEMA requirements were being met. Sustained conversations throughout the process allowed SCIPP to build relationships with the two stakeholders, meet the needs of Pawnee County, and learn about the challenges of hazard mitigation in a rural context.

SCIPP followed the FEMA Local Mitigation Review Guide when completing the Hazard Identification and Risk Assessment to ensure all requirements were fulfilled. The assessment included the description of each hazard, location, extent (or measurement scale), previous occurrences, probability of future events, whether and how climate change is affecting the hazard if known, and vulnerability and impacts for each hazard. As of this report writing, climate change information is not required for local FEMA hazard mitigation plans. It is a requirement for state plans, though. Hazard data and information were primarily gathered through utilizing SCIPP's [Simple Planning Tool for Oklahoma Climate Hazards](#). For more local knowledge, SCIPP requested information from the Pawnee County Emergency Manager and engaged in conversations about hazard impacts to the county. ODEMHS provided insight into FEMA requirements and provided feedback on the assessment throughout the process.

There were several outcomes from this work. First, SCIPP contributed an important component of the forthcoming Pawnee County HMP. The emergency manager stated that the updated assessment is not comparable to the previous one because SCIPP provided much more information and graphics. He also mentioned that it was easy to

comprehend and will make a big impact on their plan moving forward. He believed that the updated assessment would motivate the county to begin thinking about impacts and potential mitigation actions. Second, SCIPP established a relationship with the county emergency manager and built upon a prior relationship with ODEMHS. Both stakeholders participated in the virtual workshops that are described in the next section.

An additional outcome was that SCIPP learned more deeply about the FEMA HMP process and the challenges that small and rural communities face as they try to meet the plan requirements, let alone garnering support for implementing projects. These communities have limited planning and financial resources and receive less support from government leaders and community members than their larger counterparts. For example, county commissioners are a large barrier to implementing hazard mitigation measures in Pawnee County. They hold the decision-making power and are responsible for signing off on the plan, implementing it, and initiating actions. However, many county commissioners are solely focused on road repairs instead of local government duties such as the HMP. SCIPP learned that county commissioners do not understand the importance or benefits of an HMP. One reason may be due to a misconception about how FEMA funding is obtained for the county. The current emergency manager is motivated to bring funding to the county for mitigation and improvement projects by completing the HMP and communicating its importance.

As of this report writing, the Hazard Identification and Risk Assessment portion of the Pawnee County HMP is complete. The county is working on completing the other components of the plan.

(b) Engage key decision makers through workshops to investigate the adaptation enabling environment

The second part of Phase 2 included hosting virtual workshops that explored decision makers' adaptation enabling environment (Dilling et al. 2017). Their study noted that other research has identified the following factors that can affect the enabling environment: financial incentives, having a local champion promote the efforts (Birkland 2006), experience with an extreme event (Birkmann et al. 2010; Godschalk et al. 2003; Pearce 2003; Penning-Rowsell et al. 2006), local political support, public acceptance or approval (Grothmann and Patt 2005), adjacent community pressure, and supportive institutional environments (Burch 2010; Tompkins and Amundsen 2008). Translated into language that is more relevant to local officials, the purpose of the workshops was to better understand the factors that make hazard mitigation and climate adaptation planning and implementation more likely across Oklahoma and Utah. In Oklahoma, four 2.5-hour virtual workshops were held in October 2021. Two were geared towards decision makers working in rural areas or small towns, and two were focused on decision makers working in urban or suburban environments. The motivation for the different emphasis was to allow attendees to better relate to one another and to ensure that rural challenges and needs were not overshadowed by those that are more prevalent in larger jurisdictions. In Utah, one workshop was convened that included representatives from organizations that plan for hazards at federal, state, county, and

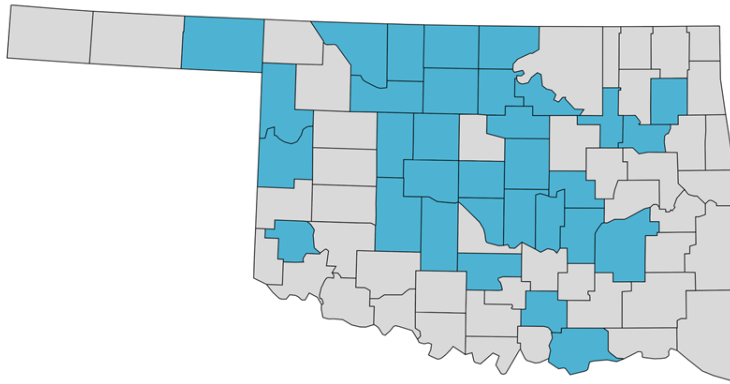


Figure 2. Blue shaded areas represent the locations in which the Oklahoma workshop participants worked

local levels. Thirty-seven people registered and 26 participated in the Oklahoma workshops and there were 30 participants from 18 different organizations at the Utah workshop. The Oklahoma pre-workshop questionnaire (see Appendix 1) revealed sufficient spatial representation of participants across the

state (Figure 2). Of the registrants, 28 worked in rural jurisdictions and 18 worked in urban areas. Some people worked in both. A majority of registrants ($n = 30$) worked for a publicly funded organization, and seven registrants worked for a private firm. Additionally, 21 registrants were planners, 14 were emergency managers, and 2 had a different occupation.

In Utah, one virtual workshop was convened with hazard planners working at federal, state, county, and local organizations. Workshop engagement was limited in Utah because other project resources were spent in Phase 1, including one virtual stakeholder meeting that focused on the UHP Tool. The January 2022 Utah workshop attendance varied throughout the meeting with a peak of 30 participants, in which 20 participants stayed until the end of the meeting. Forty-two registered, 25 of which attended the 2021 UHP Tool meeting. Eighteen registrants were new stakeholders. Registrants included 16 from state agencies, 12 from federal agencies, 7 from local or county governments, 1 from a water conservancy district, and 1 consultant. Federal agency participants were from the Natural Resources Conservation Service, U.S. Forest Service, Department of the Interior, FEMA, Bureau of Reclamation, and NOAA-NWS. Utah state agency participants represented the Utah Division of Emergency Management, Division of Drinking Water, Utah Geological Survey, Division of Water Resources, the Governor’s Office, and Department of Transportation. County or local government participants represented Five Counties Association of County Governments (AOG), Mountainland AOG, Bear River AOG, Wasatch County, Provo, and Payson.

Workshop content included an overview of each state’s climate hazards and new scientific advancements related to climate change, a discussion of barriers to taking action, an introduction to and discussion about factors that enable hazard mitigation planning and action, and a discussion about connecting current hazard planning to future risks. Because past SCIPP and WWA research and other literature have reported on barriers, most of the discussion focused on factors that lead to greater implementation of hazard mitigation or climate adaptation actions. Two poll questions

about grants and workforce training were also posed to attendees. A summary of the workshop findings for both states is presented below.

Oklahoma Workshops

In the pre-workshop survey, most participants ranked extreme rainfall/flooding or tornadoes/severe thunderstorm winds as the most impactful climate hazard to their jurisdiction. Attendees were then asked about the impacts they typically experience. Attendees primarily commented about stormwater systems being overwhelmed, flash ponding occurring in and near homes, and in rural areas, roads and bridges washing out which can cause people to get stuck and need to be rescued. There were also comments about additions to the built environment making flooding worse. Additionally, one attendee noted that extreme heat affects more people than flooding, but the costs and recovery time is less. Another participant said the February 2021 extreme cold event was very problematic for their small town. A power outage affected their water plant, which then caused cascading issues.

Barriers to Action. Next, attendees were asked about the primary barriers that keep them or their jurisdiction/company from making progress toward their hazard mitigation or climate adaptation goals besides time and money. Discussion included points about how local builders and builder associations push back on proposals to increase building codes because of increased costs, even though the financial savings achieved through this action greatly outweighs the construction cost (National Institute of Building Sciences 2019). Many communities also view any policies that have the potential to limit growth and real estate development as negative. Strengthened building codes are often viewed as something that could limit growth. A few participants mentioned that standard building codes seem to be outdated because they are experiencing heavier rainfall events and flooding in areas that have not flooded in the past, so enhanced building codes would be beneficial.

Several finance-related barriers were also mentioned. First, determining mechanisms to finance projects is challenging. Second, there is a disconnect between the content of hazard mitigation plans (e.g., mitigation action goals) and the grants that are available after a disaster occurs. Some officials are unaware that a proposed project must be listed in their current approved HMP to be eligible for post-disaster funding. Also, some participants voiced frustration over the lack of transparency at the state level on how funds are spent as well as the length of time it takes for a grant application to be processed at both the state and federal levels.

Attendees said that *how* emergency management is funded has a significant impact on whether hazard mitigation actions are implemented. If hazard mitigation funding is internal to a department or part of a much larger budget rather than being a specific line item, it will likely not be a priority for a jurisdiction. Some attendees mentioned that leadership priorities are reflected in the budget, and in many instances little funding is available for hazard mitigation. This ties back to the need to increase awareness of the importance and benefits of hazard mitigation planning.

Many participants commented that a major barrier is that their city and community leaders, whose political terms are shorter than the long-range planning horizon, do not view hazard mitigation and climate adaptation actions as priorities. Consequently, very little local money is available to address the problems they face. Several attendees provided their ideas for why it might not be a priority, which was that city and county leaders do not understand what hazard mitigation is or why it benefits communities. Community members can also be a barrier. For example, some older adults do not understand why change needs to occur when they have lived their entire lives without that change.

For rural areas, updating an HMP is very time consuming. One person commented that the FEMA Building Resilient Infrastructure and Communities (BRIC) funding is “pie in the sky” and unattainable for many communities. And not only do small and rural communities themselves face many challenges, but smaller consulting firms also experience challenges. One attendee said smaller firms often lose bids to larger firms who have more resources but are often less connected to community needs.

Factors Enabling Action. The discussion was then moved past barriers to focusing on what is needed to move forward on planning and projects. Three questions related to the factors that would help enable action or resources were posed to attendees. Buy-in from community leaders and community members was discussed the most. There was a general sentiment that much could be accomplished with more support from leaders and the community. One person mentioned that federal programs that pay for someone on staff to focus on these issues initially (e.g., 2-4 years) can help get the ball rolling. Once local leaders realize the value of that person, they will be more willing to spend money out of the regular budget to keep that person on staff, which then has trickle down effects toward making progress. It was clear from the conversations that in most cases, an emergency manager alone is insufficient to tackle a community’s climate-related challenges. The knowledge and skills needed to lead in this area cross multiple disciplines and go far beyond what emergency managers are trained to do. Additionally, emergency managers need to have a seat at the table with planners and engineers.

Buy-in from other organizations such as councils of governments, state municipal leagues, and associations of county commissioners is also needed. One planner said that he rarely hears politicians denying the reality of climate change anymore. The challenge, now, is determining specific actions that local officials can take to address climate change, and how to fund those actions.

To achieve buy-in, participants said the information must be digestible and data must be translated into contexts that are meaningful to government leaders, planners, and community members. Data are also needed on costs over time and the cost of inaction. Clarity and standardization are also needed. Clarity is needed on who bears the cost of taking action (e.g., city government vs. property owners), and standardization of FEMA rules is needed. Several participants said that inconsistent application and complexity of FEMA requirements across regions and states makes the HMP application difficult. Furthermore, the economic benefits of hazard mitigation and climate adaptation need to

be communicated in a meaningful way to key stakeholders, and impacts need to be communicated with increased specificity. As an example, one participant pointed out that Oklahoma Gas & Electric, a major utility company operating in the state, still faces costs related to the February 2021 extreme cold event. Connecting costs of inaction to specific events in a timely fashion might help leaders and the general populace better understand why certain hazard mitigation actions are needed.

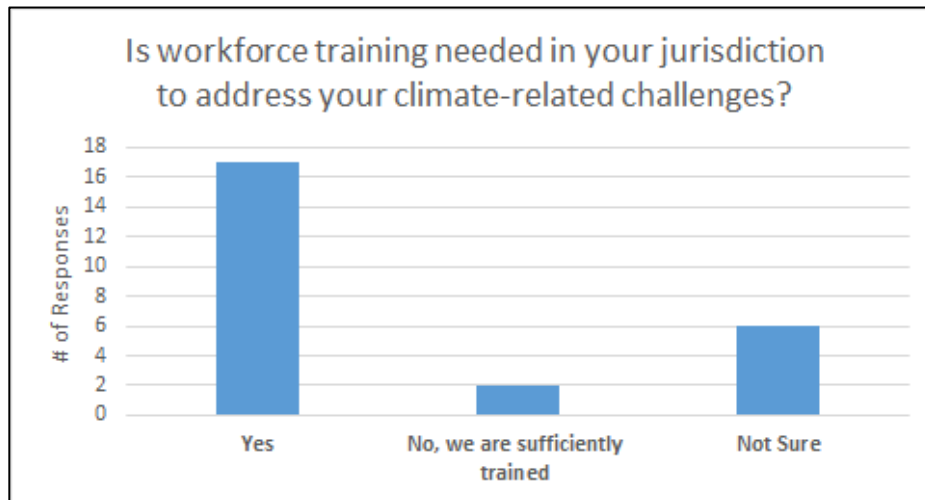


Figure 3. Oklahoma workshop responses to the question, "Is workforce training needed in your jurisdiction to address your climate-related challenges?"

To make progress, hazard mitigation also needs to be prioritized and infiltrate all plans rather than being an add-on task. With respect to FEMA requirements, some participants expressed the desire to have some flexibility with their HMPs with respect to what they are allowed to take action on. For example, perhaps in their HMP they said that addressing a drought-related problem was a priority, but by the time the money was available, flooding was a larger priority. Community members are more likely to support a project if it addresses a problem that occurred in recent memory. Workforce training and general education is needed to help officials understand the benefits of hazard mitigation and climate adaptation. A poll question was posed to attendees related to the topic (Figure 3). Almost all of the attendees who answered the question said “yes” (n = 17). Six attendees said “not sure” and two people said they are “sufficiently trained.”

Federal Grants. Federal grants are a primary source of funding for hazard mitigation and climate adaptation projects. As such, attendees were asked about the factors that make them or someone in their jurisdiction more likely to apply for a federal grant. The amount of application requirements along with the amount of match money required were two primary factors. With respect to the first, producing a benefit-cost analysis is often very time-consuming and challenging. In fact, many rural communities don't have the knowledge to be able to complete those calculations. With respect to the second point, match money must be budgeted ahead of time, and a community cannot apply for a grant without a match in hand. The timeline is often not feasible. One anecdote was that a city of 50,000 could not afford the match money that was required by FEMA BRIC

to bury transmission lines. Even the larger cities in Oklahoma (i.e., Oklahoma City and Tulsa with populations of approximately 680,000 and 410,000, respectively) have trouble meeting the match to qualify for these funds, and many said their grant applications were rejected. Furthermore, some grants require a jurisdiction to pay up front and then get reimbursed, which is simply not feasible for smaller jurisdictions. It was noted that the state department of emergency management used to temporarily cover the costs up front but that is no longer the case.

Attendees were asked via a poll question if they or someone else in their jurisdiction are confident that they have the knowledge to be able to apply for a federal grant that addresses a hazard mitigation or climate adaptation need (e.g., through FEMA, EPA, HUD, DOT, etc.). A majority of attendees said “yes” (n = 14). However, four attendees said “no” and six said “not sure” (Figure 4). One attendee commented that it was difficult to answer the question because grant requirements frequently change.

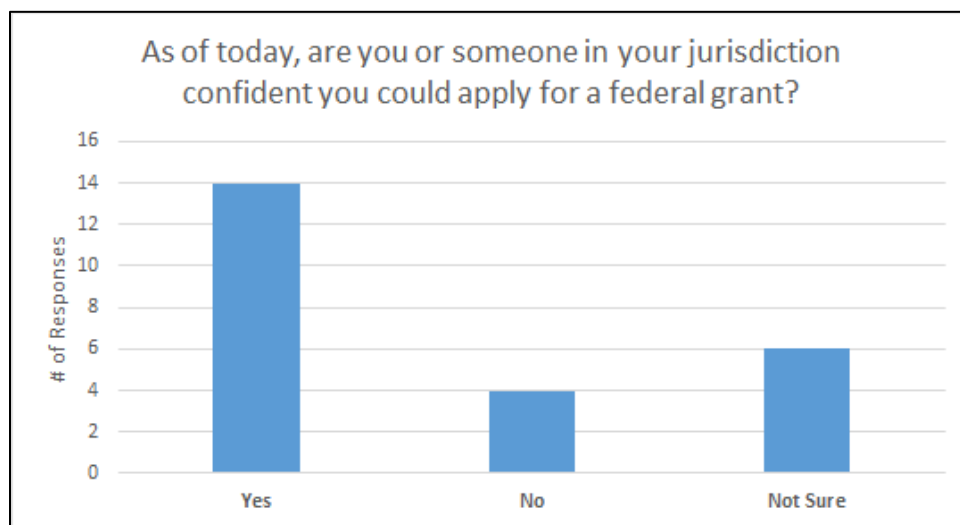


Figure 4. Oklahoma workshop responses to the question, "As of today, are you or someone in your jurisdiction confident you could apply for a federal grant?"

Climate Change and Future Risks. The final two discussion questions had a more philosophical focus. First, attendees were asked whether thinking about planning and future risk feels tangible or overwhelming. The consensus was that it is both. Comments included that it is difficult to get people to think about the future, and a community’s political stance can make it difficult to plan for future risk. However, climate projections are still useful for starting conversations. There was also a view that there is a lack of urgency across the state and by the time sufficient buy-in and political will are achieved, it may be too late to have any positive impact. One conversation suggestion was to talk about climate change in terms of smaller changes that people are already experiencing. If climate change is framed too broadly or on a very large scale, the conversation will probably shut down.

Second, attendees were asked if it is easier now than a decade ago to talk with colleagues about climate change. Some said it is still a challenge but is being discussed

more. Another said that it has gotten easier and that there are fewer and fewer examples of specific language about climate change being pulled from official reports and memos. Another attendee said they have decided to simply treat climate change as a fact when they communicate rather than worry about what people think due to the urgency of the problem.

Additional Points. A few points were brought up in conversations that were not directly related to the questions that were posed but were important. First, while hail is an incredibly costly hazard (Brown et al. 2015), it is difficult to get a disaster declaration for it because so much of the affected property (homes, businesses, and vehicles) is insured. With respect to hail, the cost is passed on to insurance companies, which then pass the cost back to policy holders. But, given the delay between an event occurrence and the cost showing up on insurance policies, many people do not recognize the connection between the two.

Another point raised by an emergency manager was whether climate change action (i.e. greenhouse gas emissions reduction) should be addressed in an HMP. In other words, since climate change is exacerbating some hazards and changing the climate to which society is accustomed, taking action to reduce greenhouse gas emissions would also fit into an HMP. This is something that the authors had not thought about prior to the workshops but is a valid question and something that FEMA and other granting agencies may want to consider.

Finally, an important point was made about the time horizon for community planning. What used to be 20-year comprehensive plans are now turning into 5-year strategic plans because results are more tangible and immediate. 20-year plans often become obsolete in the first 3-5 years due to changing politics, leaders, and employees. This is a trend about which climate adaptation researchers and professionals should take note and again speaks to the need for actionable information.

Utah Workshop

Information was gathered from participants at the Utah workshop through in-meeting polls, questions in the chat, and small group discussions. The results of three poll questions are summarized in Figures 5-7. Participants viewed drought and wildfire as the most important hazards; 57% of respondents reporting that drought had the greatest impact in Utah (Figure 5). Most participants were familiar with applying for federal grants to assist in hazard mitigation or climate adaptation projects (Figure 6). The high level of knowledge about federal hazard mitigation is not surprising considering the large number of state and federal agency employees in attendance. Many of the participants from local or county governments worked specifically as hazard planners. A majority of poll respondents (69%) had considered climate change in planning activities (Figure 7) and most respondents (n = 17) worked for state or federal agencies. Many federal agencies are required to consider climate change in their work, mostly notably the U.S. Forest Service and FEMA. While most state agencies in Utah do not consider climate change in planning, the Division of Emergency Management (DEM) recently began to

consider climate change in all hazard mitigation activities. Nine of the respondents to this poll work for Utah DEM.

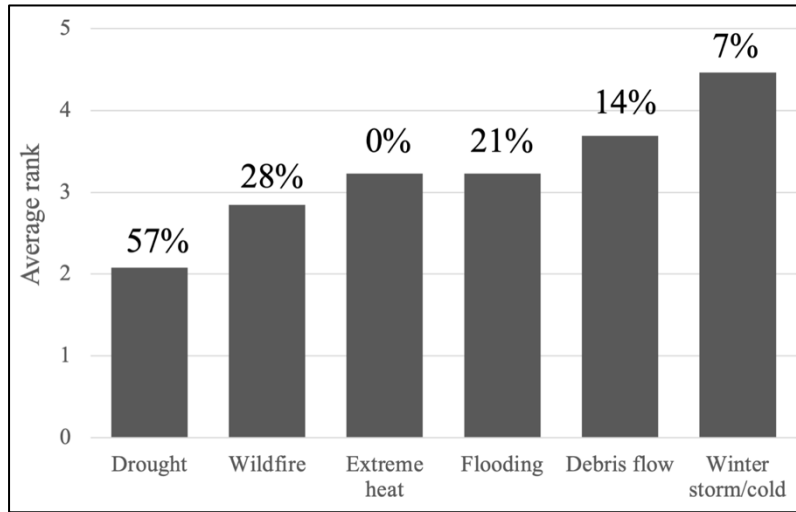


Figure 5. Utah workshop responses in which they ranked the impact of each hazard (high impact is a rank of 1). Percentages above represent the percentage of participants that ranked the hazard as having the greatest impact.

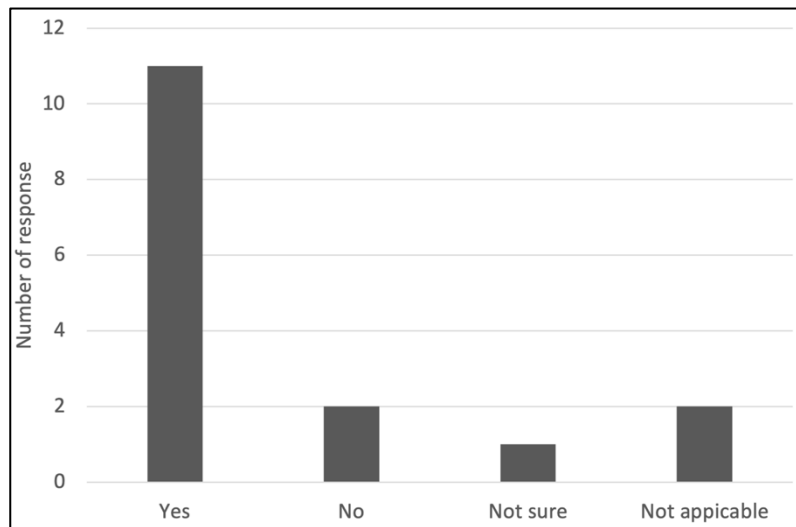


Figure 6. Utah workshop responses to the question, “Do you know how to apply for federal grants to assist in hazard mitigation or climate adaptation planning?”

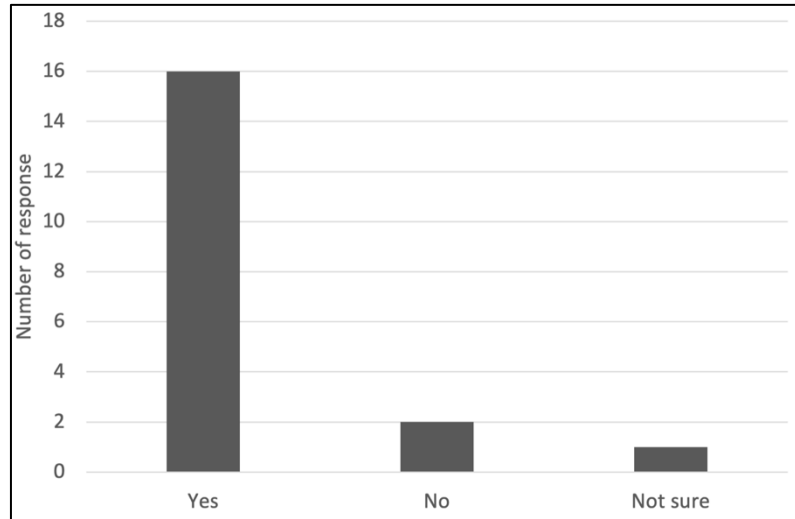


Figure 7. Utah workshop responses to the question, “Has climate change been considered in planning or other work by your organization?”

Barriers to Action. Participants were questioned about potential barriers to hazard and climate adaptation planning in general and specifically about considering climate change in planning. Responses included that there needs to be adequate political will to plan for natural hazards and climate change and that political will in the Utah Legislature and at county levels is often lacking. Related to political will, participants from state agencies commented that the State Legislature often does not act on recommendations about natural hazard or climate adaptation planning given by state agencies. This highlights a common theme that certain types of planning will be effective only if policy is enacted. In many cases, the State Legislature specifically tasked agencies with providing recommendations that were subsequently not taken. A mismatch in the timing of natural hazard or extreme events and planning for those events often creates another barrier for planning. Government officials are often most aware of problems caused by natural hazards or climate change-influenced weather events immediately following the event. When there is a significant time lag between the event and the opportunity to plan for or build resilience to future events, momentum is lost. Multiple participants also expressed the availability of current hazard data and future projections as a barrier to planning. The UHP Tool will help meet this need. Finally, many participants expressed the topic of climate change as a barrier for planning because the topic is very politically charged in Utah and the mere mention of the topic can often stop conversations before they even start, especially when introduced without sensitivities to its divisiveness.

Several other important barriers of hazard and climate adaptation planning were mentioned by only one group. These comments fell into four broad categories: stakeholder buy-in, education, Utah's pro-development environment, and the timescale of natural hazards. Buy-in was mentioned as a substantial barrier to planning. One

participant mentioned that it is especially important to include oft-overlooked planning process stakeholders such as businesses, faith groups, and non-governmental organizations. Education about natural hazards risks was mentioned in two contexts. Natural hazards are often compounded by other hazards or can occur as a cascading series of events, such as drought, wildfire, and flash flooding/debris flows. The compound effects of and links between multiple hazards are not always well-understood by decision-makers and the general public. The participants also noted that an important time to consider hazards is when new residential or commercial zones are being developed. Developers do not often consider certain hazards such as wildfire or landslide risks when selecting areas to build. One participant expressed the pro-development environment and strong desire for economic growth in Utah as a barrier for planning. Additional regulations imposed by hazard or climate adaptation planning on new development are often considered a burden by both developers and policymakers in the state. Finally, the infrequent nature of natural hazards and the uncertainty on how climate change will affect the frequency of hazards was expressed as a barrier to planning.

Climate change is an especially challenging topic in Utah. While there is greater general acceptance of climate change as a real threat to Utah, the topic continues to be both divisive and addressing it is not a priority. Even among those in Utah that are convinced climate change is a real and important problem, it is considered a future problem that does not require immediate action. Many planners perceive the topic of climate change to be large and far-reaching and difficult to know how it should be addressed. Since climate change impacts many aspects of planning (e.g., development, water, infrastructure), it can be challenging to determine how climate adaptation fits into existing planning structures. A lack of data and projections on how climate change will impact the future frequency and magnitude of hazards also represents a potential challenge to planning.

Factors Enabling Action. An additional goal of the workshop was to understand the factors that lead to successful implementation of hazard or climate adaptation plans. Six factors were expressed by multiple workshop participants: the perceived urgency of a hazard, how recently a hazard occurred, the cost recovering from a hazard compared to the benefit of planning, buy-in from stakeholders, including stakeholders early in the planning process, and focusing on multiple, related hazards. Successful plan implementation was more likely to occur if a larger population was affected by the hazard. Having clear data about how many people are affected by a hazard and the value of infrastructure protected by a project can make it more likely to obtain federal funding. Projects that are simple and easily understood by decision-makers and community members and include federal funding are more likely to be implemented. Projects that align with current mandates and priorities (at a state or county level) were also more likely to be implemented. Maintaining momentum throughout a hazard or climate adaptation project and quickly bringing it to completion was an important factor in successful project implementation. If a project takes longer to complete than

expected or momentum amongst stakeholder groups dwindles, enough time may pass that election cycles alter policy priorities.

Resources Needed. Participants were also asked what additional types of help or resources were needed to plan for hazards and climate change more effectively. Greater availability of climate and hazard data resources and the capability to analyze these data was needed by nearly all participants. None of the organizations present at the workshop had a staff member dedicated to considering issues and data related to climate change and adaptation, but many participants expressed a need for that type of expertise in their organizations. Data that are available on climate change and future hazard risk are often at the regional level rather than a state or local level which is much more relevant to the planning scale. Participants also felt there was a limited availability of data about the historical incidence of natural hazards and analyses of trends in the frequency and magnitude of hazards in Utah. Some participants believed the lack of good data on historical incidence of hazards was related to a problem of reporting of the impacts of hazards in rural communities. One participant stated that comparisons of natural hazards that occurred in other states and how those states mitigated or adapted to the hazard could be very useful for educating politicians and other decision-makers.

Increasing Preparedness. The final question posed to participants serves as a summary for many themes expressed in the workshop: How can Utah be better prepared for the impact of climate change on natural hazards? Education was expressed as extremely important; education of politicians, specifically in the Utah Legislature, is especially important. According to participants, legislators need to better understand the benefits of hazard and climate adaptation planning (and the cost of inaction) and the interconnections between development, housing, and hazards (e.g., drought, wildfire, and landslides). Participants desire improved connections between scientists and legislators. Division of Emergency Management employees believe that more collaboration with legislators is needed to craft legislation that more effectively considers hazard risk. Public audiences also need more education on hazards, especially regarding home ownership. Utah is a “buyer beware” state where risks to hazards such as wildfire and landslides are not required to be disclosed by sellers. Growth is also not constrained by hazards because the perceived risk is not great enough to developers or buyers. Infilling urban and suburban areas reduces exposure to hazard risk compared to the expansion of residential housing in wildfire-prone areas in the wildland urban interface. While participants stated that policy and action at the state level is necessary, local communities should be empowered to make their own decisions to reduce hazard risk and adapt to climate change. Local planning is often the most immediately effective.

Comparison Across States

The workshop discussions revealed many similarities about the contexts within which decision makers are working in Utah and Oklahoma. Regarding barriers, any kind of code enhancement that raises costs, no matter how small, is perceived negatively by many policy makers and developers in both states. Second, a mismatch between the

timing of an impactful event and the opportunity to address it through specific funding or within a political appointee's time in office limits adaptation planning and implementation.

Several similarities related to enabling action were also illuminated. Achieving buy-in from political leaders and professional associations, educating political leaders and staff about the benefits of hazard mitigation and climate adaptation, especially compared to inaction, and supplying climate information in formats and amounts that is digestible to policy makers, government officials, and their staff will help enable action. A need for workforce training and climate specialists was also identified in both states.

Finally, the workshop discussions also revealed some findings particular to each state. Part of the uniqueness may have been due to the topics that participants brought up. Utah participants pointed out that involving businesses, faith groups, and non-governmental organizations in planning initiatives is important. Utah participants also cited the need for hazard and climate change data that is relevant to smaller geographical areas, some of which is now being met through the UHP Tool.

In Oklahoma, ideas and needs included: potentially reducing hazard mitigation planning requirements for smaller jurisdictions to better match their capacities, involving officials across multiple city departments, not just emergency management, and including hazard mitigation and climate adaptation actions as line items in city budgets rather than being under the auspices of a smaller department.

Conclusions and Outcomes

The primary purpose of this work was to understand the strategies that can be used to promote climate adaptation planning across two climate-discourse sensitive states that experience different climates. The discussions that occurred through the workshops illuminated the need to achieve buy-in from municipal, county, and state political leaders and communicate climate change information in ways that are meaningful to and actionable in local and state contexts.

In addition to learning about adaptation enabling environments through the workshops, this project produced a few outputs and outcomes. First, a version of SCIPP's Simple Planning Tool was expanded to Utah. Not only will the tool meet a climate information need, the development of the UHP Tool fostered new relationships with hazard planners in Utah and strengthened WWA's collaboration with the Utah DEM. The Utah DEM began considering climate change in all aspects of their work but is still in the early stages of effectively incorporating climate change into all projects. Discussions with Utah DEM during the January 2022 workshop led to an additional meeting to discuss how WWA can help DEM in achieving their goal of incorporating climate with hazard planning. This cross-RISA project came at an opportune time in WWA's work and funding cycle as WWA began a new five-year grant in October 2021 that focuses on adaptation to compound hazards. The stakeholder connections developed in this project

will be immensely beneficial to WWA's future work in Utah. WWA is also considering applying the model of the UHP Tool to both Colorado and Wyoming.

Second, SCIPP learned a great deal about the HMP process while developing the Hazard Identification and Risk Assessment and gained insight into challenges that rural communities face when completing an HMP. ODEMHS may use the Hazard Identification and Risk Assessment that was developed for Pawnee County, Oklahoma, as an outline for other counties to use for their HMP.

Finally, to address one need identified through the project, a 2-page state-specific document that describes the benefits of hazard mitigation, including FEMA funding eligibility and cost/benefits of mitigation versus recovery, is being developed for Oklahoma through a collaboration with ODEMHS. This document will serve as a high-level educational resource for county commissioners and other jurisdictional leaders. Input will also be sought from stakeholder contacts in the other SCIPP states to create documents for Texas, Arkansas, and Louisiana. Moreover, Oklahoma State University staff, who were not affiliated with this project but lead training for elected officials, have offered to share the resource with trainees and workshop and conference attendees. SCIPP is leveraging existing networks and is working towards developing relationships with the Association of County Commissioners of Oklahoma, the Oklahoma Municipal League, and any other relevant groups to educate a wider range of decision makers.

Acknowledgements

The authors thank the workshop participants for their time and insight. Without them, this work would not have been possible. This work was funded by the NOAA Climate Program Office through grants NA18OAR4310337 and NA20OAR4310144A.

Appendix 1: Pre-workshop Questionnaire Results

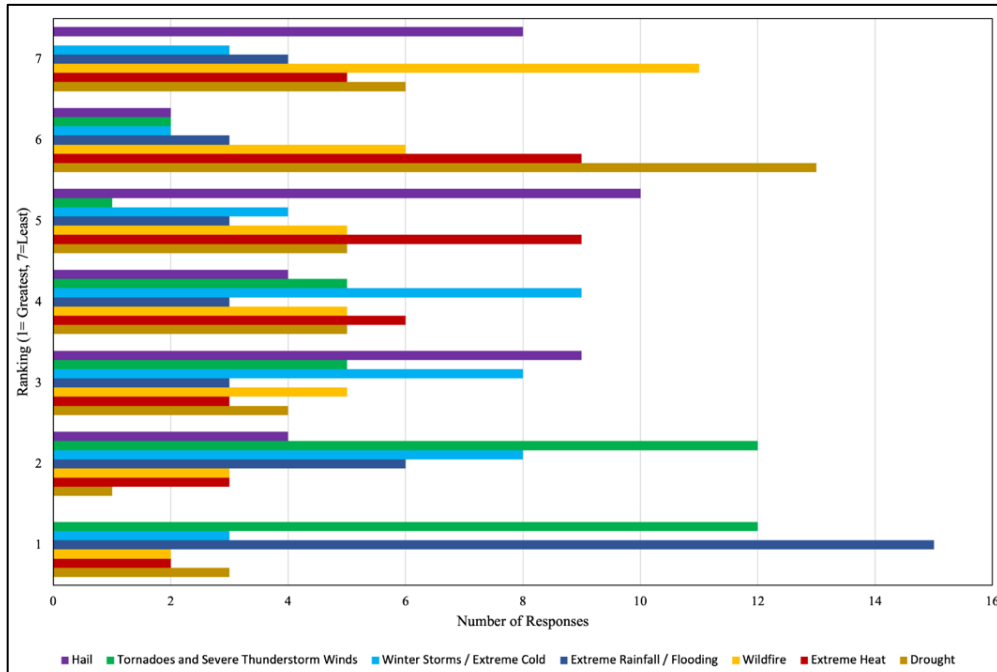


Figure A1. Oklahoma pre-workshop responses in which participants were asked to rank climate hazards in the order in which they impact their jurisdiction, from greatest impact (1) to least impact (7).

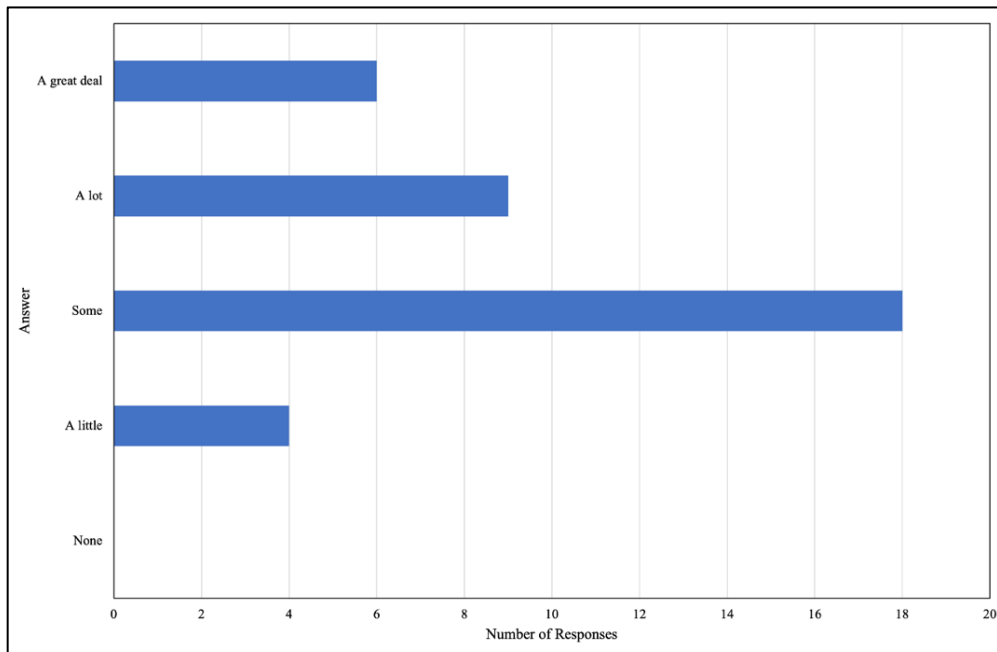


Figure A2. Oklahoma pre-workshop responses to the question, “How much support do you think you have from leaders in your jurisdiction (e.g., mayor, city manager, county commissioner, etc.) to tackle projects that reduce hazard risks and impacts?”

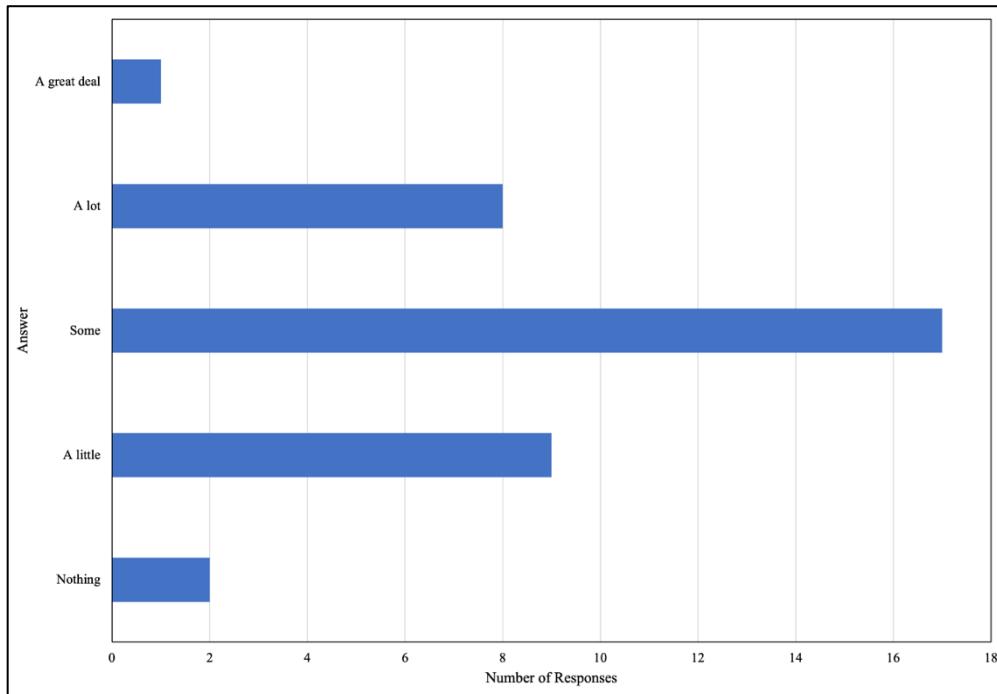


Figure A3. Oklahoma pre-workshop responses to the question, "How much do you know about climate adaptation?"

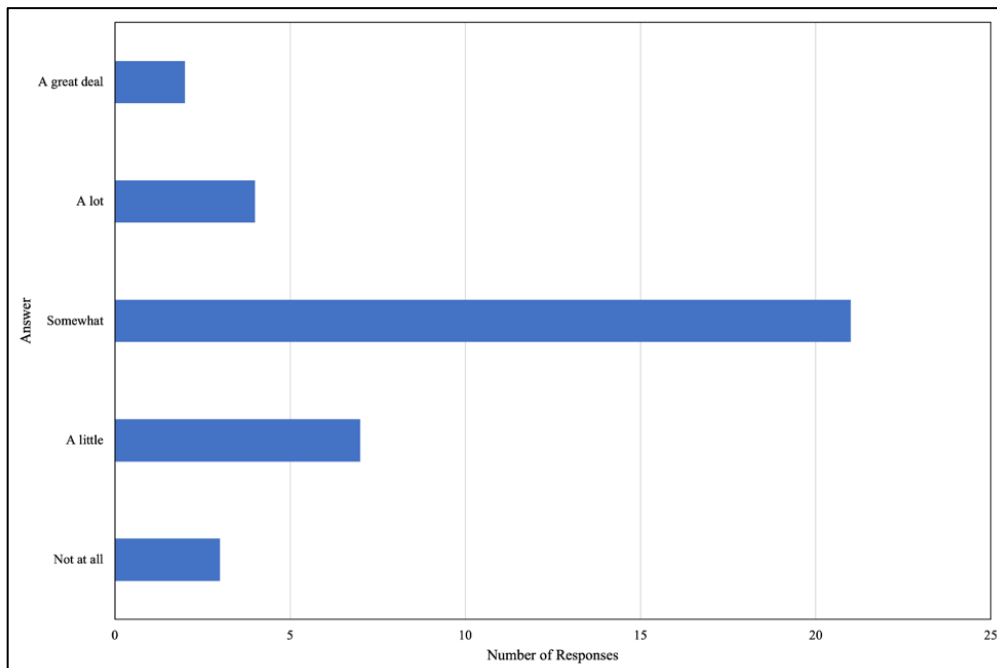


Figure A4. Oklahoma pre-workshop responses to the question, "How familiar are you with the methods (e.g., grants, bonds, utility fees) that can be used to pay for projects that reduce your jurisdiction's risk to hazards?"

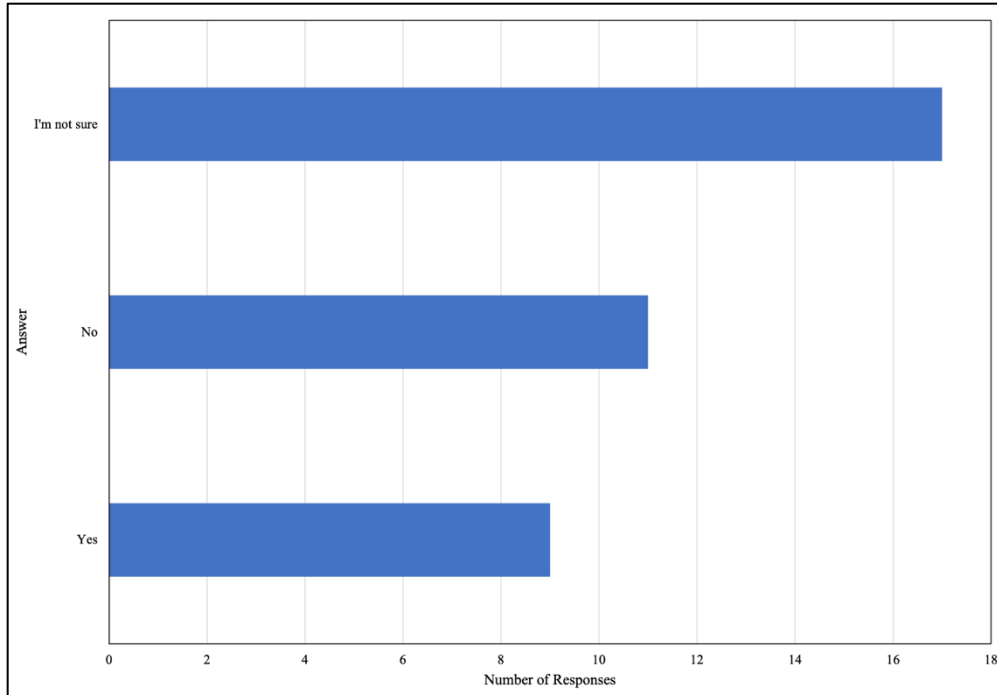


Figure A5. Oklahoma pre-workshop responses to the question, "Has climate change ever been considered in any policies or decisions in your jurisdiction?"

References

- Birkland, T. A., 2006: *Lessons of Disaster: Policy Change After Catastrophic Events*. Georgetown University Press, 240 pp.
- Birkmann, J., P. Buckle, J. Jaeger, M. Pelling, N. Setiadi, M. Garschagen, N. Fernando, and J. Kropp, 2010: Extreme events and disasters: a window of opportunity for change? Analysis of organizational, institutional and political changes, formal and informal responses after mega-disasters. *Natural Hazards*, **55**, 637-655, <https://doi.org/10.1007/s11069-008-9319-2>.
- Brown, T. M., W. H. Pogorzelski, and I. M. Giammanco, 2015: Evaluating hail damage using property insurance claims data. *Weather, Climate, and Society*, **7(3)**, 197-210, <https://doi.org/10.1175/WCAS-D-15-0011.1>.
- Burch, S., 2010: Transforming barriers into enablers of action on climate change: Insights from three municipal case studies in British Columbia, Canada. *Global Environmental Change*, **20(2)**, 287-297, <https://doi.org/10.1016/j.gloenvcha.2009.11.009>.
- Dilling, L., E. Pizzi, J. Berggren, A. Ravikumar, and K. Andersson, 2017: Drivers of adaptation: Responses to weather- and climate-related hazards in 60 local governments in the Intermountain Western U.S. *Environment and Planning*, **49(1)**, 2628-2648, <https://doi.org/10.1177/0308518X16688686>.
- Godschalk, D. R., S. Brody, and R. Burby, 2003: Public participation in natural hazard mitigation policy formation: Challenges for comprehensive planning. *Journal of Environmental Planning and Management*, **45(5)**, 733-754, <https://doi.org/10.1080/0964056032000138463>.
- Grothmann, T., and A. Patt, 2005: Adaptive capacity and human cognition: The process of individual adaptation to climate change. *Global Environmental Change*, **15(3)**, 199-213, <https://doi.org/10.1016/j.gloenvcha.2005.01.002>.
- Multi-Hazard Mitigation Council, 2019: Natural Hazard Mitigation Saves: 2019 Report. Principal Investigator Porter, K.; Co-Principal Investigators Dash, N., Huyck, C., Santos, J., Scawthorn, C.; Investigators: Eguchi, M., Eguchi, R., Ghosh., S., Isteita, M., Mickey, K., Rashed, T., Reeder, A.; Schneider, P.; and Yuan, J., Directors, MMC. Investigator Intern: Cohen-Porter, A. National Institute of Building Sciences. Washington, DC. http://2021.nibs.org/files/pdfs/NIBS_MMC_MitigationSaves_2019.pdf.
- Pearce, L., 2003: Disaster management and community planning, and public participation: How to achieve sustainable hazard mitigation. *Natural Hazards*, **28**, 211-228, <https://doi.org/10.1023/A:1022917721797>.
- Penning-Rowsell, E., C. Johnson, and S. Tunstall, 2006: 'Signals' from pre-crisis discourse: Lessons from UK flooding for global environmental policy change?

Global Environmental Change, **16(4)**, 323-339,
<https://doi.org/10.1016/j.gloenvcha.2006.01.006>.

Tompkins, E. L., and H. Amundsen, 2008: Perceptions of the effectiveness of the United Nations Framework Convention on Climate Change in advancing national action on climate change. *Environmental Science and Policy*, **11(1)**, 1-13,
<https://doi.org/10.1016/j.envsci.2007.06.004>.