How Can Community Discourse Inform Natural Disaster Mitigation Activities?

Guidance for Developing Governance and Collaborative Capacity

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***Executive Summary*:** This report describes stakeholders contributing to a community's discourse on flooding events in three SCIPP communities. We find that:

1. A wide range of stakeholders (representing the community, governments, organizations, individuals, and even wildlife) are identified in public discourse related to flooding. (*see page 3*)
2. Different factors motivate stakeholder engagement before, during, and after a flood. The motivation can come from a direct or negative impact, a desire to help those at risk or in need, or a role-based obligation to "do something". (*see pages 4-5*)
3. Many stakeholders get involved because flooding and future mitigation actions are salient. They often have subject matter expertise or a desire to improve the community's resilience. (*see pages 6-7*)
4. Some stakeholders may need assistance or resources to develop participation efficacy. (*see pages 7-8*)
5. Knowing stakeholders' characteristics allows one to engage voluntary stakeholders who may provide non-financial, yet tangible, resources to co-produce disaster mitigation. (*see page 9*)

These findings confirm that disaster response and mitigation are community activities, relying on assistance from stakeholders who are not the "usual suspects" (government representatives with position authority and job-based duties) but who can provide valuable financial and non-financial resources. Public discourse analysis can help identify stakeholders who need to be more engaged but have elevated vulnerabilities or untapped resources and may be willing to engage in co-production activities.

SCIPP
A NOAA CAP TEAM

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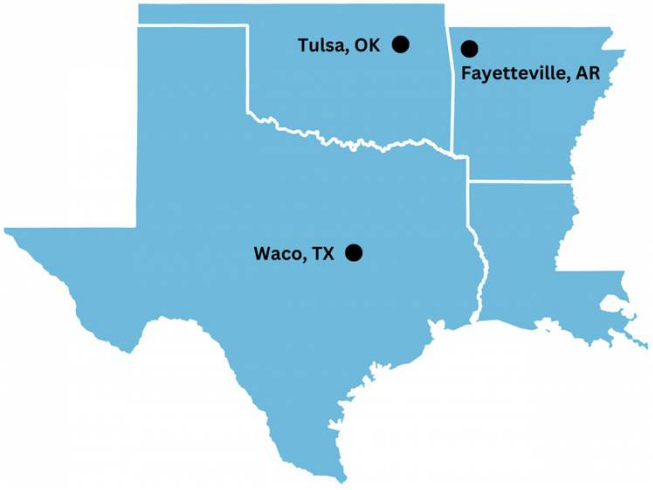
An Introduction to Three Cities with Frequent Flooding

This research reports on three cities in the SCIPP Region with a long history of flooding events. Each city experiences heavy precipitation and river overflow, causing inundation, urban and downstream flooding. All have patterns of growth and development into flood-prone areas that reduce floodplain retention and drainage.



The cities were chosen to leverage differences in the robustness of their flooding mitigation efforts.[1]

- Tulsa, Oklahoma, is one of two FEMA Class 1 Community Rating System cities nationwide. In 1984, citizens stormed City Hall to demand a commitment to long-term mitigation.
- The City of Fayetteville, Arkansas, has committed to sustainability efforts that feature flooding mitigation by government and individuals.
- Waco, Texas, has more frequent but less extreme flooding events and encourages community partnerships.
- All have vulnerable populations concentrated in geographic areas within the communities.

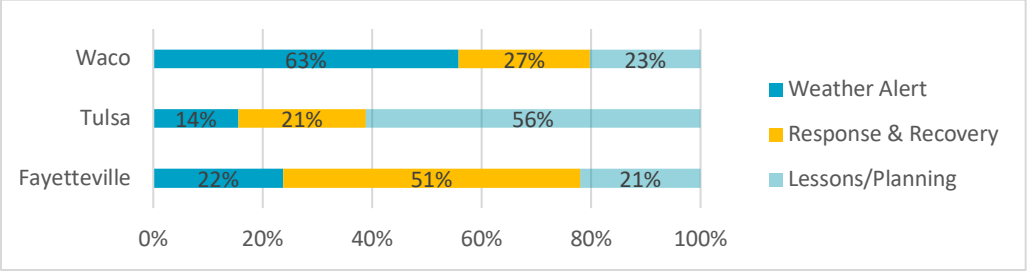
Table 1: Community Characteristics Influencing Hazard Mitigation and Disaster Response Activities

City	Population	Sq Miles Land & Water	# of Cities In County	Hazard Mitigation Plan Level
Tulsa Tulsa MSA[1]I	411,401 1M in MSA[1]	197.8 & 4.1 6269	7 Counties 16 Cities	City
Waco	139,594	95.5 & 11.3	20 Cities	County
Fayetteville	95,230	55.8 & 1.4	13 Cities + 8 ISD[1]	County

[1] MSA is Metropolitan Statistical Area, ISD is Independent School District

As illustrated in Figure 1, there are differences in the focus of community discourse. Our analysis considers who is represented in community discourse and what phases of a flooding event they discuss.

Figure 1: Community Discourse Based on Disaster Phase



[1] Our data are drawn from naturally occurring and planned public discourse in the Tulsa, OK; Fayetteville, AR; and Waco, TX newspaper markets between 1987 to 2022. We searched newspapers, internet commentary, government websites, and planning and disaster mitigation documents. Represented in 242 data sources are 1509 stakeholders (1 to 43 stakeholders identified in a single article with an average of 11.3): 39% are in Tulsa, 34% in Fayetteville, and 26% in Waco public discourse. The Appendix contains more details on our research design.

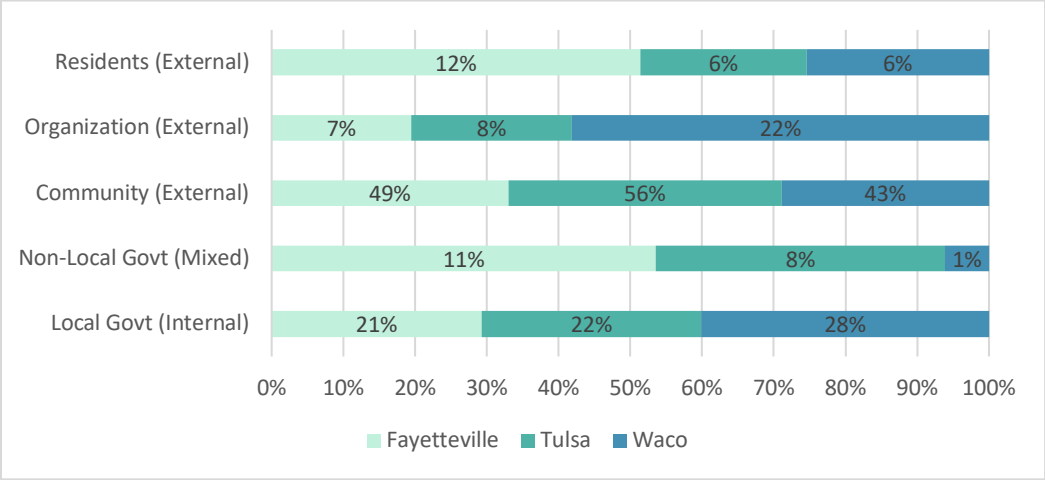
Who are the Stakeholders Represented in Community Discourse?

Stakeholders in local government are tasked with providing services related to flooding events. However, high-profile community members and those partnering with government have a louder "public voice." There are opportunities to involve more residents and organizations outside of government.

Traditionally, stakeholders have been grouped into internal and external types to differentiate those who are part of an organization tasked with providing some good or service from those who do not. Franklin (2020) argues that more precision is needed since some stakeholders have a mixed role related to government, such as elected officials and people from state and federal governments who make decisions or authorize local disaster mitigation or recovery funding. Other examples are contractors who may assist in developing hazard mitigation plans, homeowners' associations, or affinity groups that partner with local government organizations to implement infrastructure changes to prevent future flooding. Mixed stakeholders are more involved but are not primarily responsible for good or service delivery.

For the cities in this analysis, three types of stakeholders are consistently discussed in public commentary: representatives from local and non-local governments, elected officials, and representatives of residents/victims/users. Government employees are **internal** stakeholders. Elected officials and partners with local government are **mixed** stakeholders. Residents, victims, and users are **external** stakeholders. Figure 2 provides the distribution and type of stakeholders for the three case cities.

Figure 2: Stakeholders & Their Relationship to Local Government[1]



Community stakeholders are activists, homeowners' associations, volunteer organizations, & nearby community residents.

Comparing cities, we find that Fayetteville has a higher-than-average representation of non-local government stakeholders and residents. Both types are **external** stakeholders. In contrast, Tulsa has a higher-than-average representation of **mixed** stakeholders at 64% (56% + 8%) v. the all-city average of 57% (50% + 7%). Waco has a higher-than-average percentage of **internal** and combined **external** stakeholders.

These data suggest that Tulsa has opportunities to increase the number of external stakeholders, such as non-profits, businesses, volunteer organizations, residents, and public space users. Doing this can widen community engagement practices to include stakeholders who may provide non-financial resources or supplement financial resources for flooding disasters and mitigation. On the other hand, Waco could identify stakeholders with a community perspective, rather than an individualistic perspective, to encourage future mitigation activities important to all residents and organizations.

What Motivates Stakeholders to Get Involved in Community Discourse?

In all cities, stakeholders without direct flood impacts dominate community discourse.
Cities can encourage an even distribution of stakeholders who do and do not have a role-based obligation to engage.
Engaging voluntary stakeholders can be a "force multiplier" for developing co-production opportunities.

Many factors influence stakeholders to "use their voice" concerning some issue or event. We examine two of these. The first is the impact experienced by an event or a decision on an issue. For example, if a stakeholder directly experienced harm from a flooding event, it is more likely that the stories they tell, or the future actions they plan or desire, will appear in community discourse.

The second is a role-based obligation to engage. Some stakeholders have an involuntary obligation due to their position and the event phase.[2]. Examples are emergency responders during the disaster and elected officials funding future disaster mitigation activities. For others, engagement is a voluntary choice reflecting an altruistic concern for the community. This concern may arise from an organizational affiliation, such as residents active in a homeowners' association that creates natural flooding barriers.

Differences in Stakeholders Experiencing Direct or Indirect Flooding Impacts

We examined the distribution of stakeholders who experienced direct or indirect impacts from flooding. Table 2 reveals that stakeholders with direct impacts in Fayetteville add up to 47%, Tulsa 41%, and Waco 25%, with an average of 40% for all cities.

We noticed the differences and examined the direct or indirect impacts on stakeholders by event phase. Public discourse more prominently features stakeholders who experience **indirect** impacts (adding up to 51% overall; the range is 53-57% for individual cities). Tulsa had the most stakeholders, with indirect impacts in dialogue about Lessons Learned/Planning. Fayetteville had the highest dialogue focused on Disaster Response for direct and indirect stakeholders. Indirect impact stakeholders dominated public discourse in all flood stages in Waco.

Table 2: Impacts Stakeholders Experienced based on Flooding Event Phase

Disaster Phase	Fayetteville	Tulsa	Waco	All Cities
Weather Alert	**2%**	**1%**	**8%**	**3%**
Direct	1%	0%	2%	1%
Indirect	1%	1%	6%	2%
Disaster Response	**66%**	**24%**	**46%**	**44%**
Direct	30%	10%	12%	18%
Indirect	36%	14%	34%	27%
Lessons Learned/Planning	**32%**	**75%**	**46%**	**52%**
Direct	16%	31%	11%	21%
Indirect	16%	44%	35%	32%

Stakeholders who were indirectly impacted but were part of disaster response or future planning activities can be valuable sources of information and assistance during future flooding events. They can provide feedback on how to phrase and when to provide weather alerts, problematic areas during the disaster, and how people in the community can better prepare for a natural disaster.

[2] Our research is limited to three flooding event phases: Weather Alert, Disaster Response, and Lessons Learned/Future Planning.

Stakeholder Engagement and Role-based Obligations

Another way to look at engagement is to consider if the stakeholder has a role-based obligation (involuntary since they must do something) or if their community assistance is self-motivated (voluntary).

Our research found that, on average, 48% of stakeholders have an **involuntary** role-based obligation (mostly government employees and local elected officials), with Fayetteville having the highest percentage at 51%. Tulsa has fewer involuntary stakeholders involved in disaster response than the other two communities. This result may suggest that people in the community are actively planning how to respond to a flooding event rather than relying on the government to "save" them.

Table 3: Stakeholder Role-based Obligation based on Flooding Event Phase

Role Based Obligation	Fayetteville	Tulsa	Waco	All Cities
Involuntary	**51%**	**50%**	**39%**	**48%**
Weather Alert	1%	0%	4%	1%
Disaster Response	37%	10%	19%	22%
Lessons/Planning	14%	39%	17%	25%
Voluntary	**49%**	**50%**	**61%**	**52%**
Weather Alert	2%	1%	4%	2%
Disaster Response	29%	14%	27%	23%
Lessons/Planning	18%	36%	29%	28%

The data for Waco in Table 3 is interesting since they have a higher rate of voluntary stakeholders featured in community dialogue. **Voluntary** obligation stakeholders include businesses, non-profit and voluntary organizations, community activists, residents, victims, or public space users. The average for stakeholders with a role-based obligation was 52%. In Waco, the number for all flooding phases was higher than the three-city average. In the Waco data, statements by local elected officials often argued that people "knew" property was in a flood-prone area when they bought it. So, "they should not expect government to rescue them."

Paying close attention to discourse from voluntary stakeholders can suggest why they get involved. Purposeful engagement of those without a role-based obligation but speaking on this topic could reveal novel strategies or unleveraged resources that can be incorporated into future mitigation plans. At a minimum, engaging voluntary stakeholders can raise awareness of their role in future mitigation efforts that could benefit them personally and improve community resilience.

How to Incorporate Stakeholder Engagement into the Policymaking Process

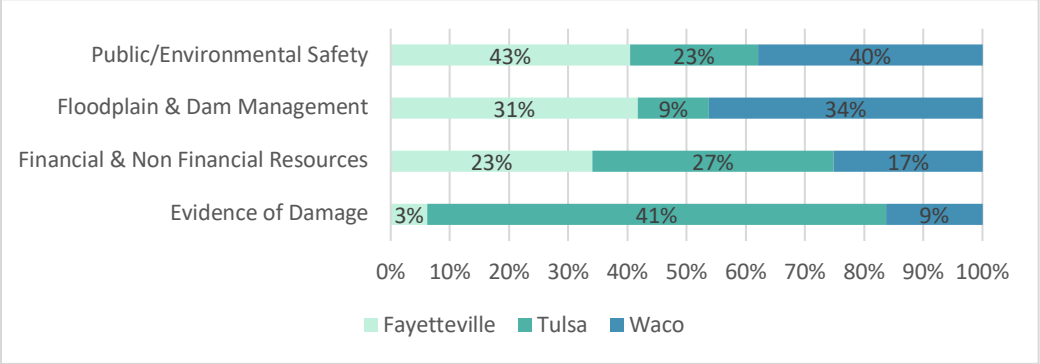
Identifying stakeholder flooding concerns can encourage future voluntary engagement by stakeholders. Voluntary stakeholders and those who experience indirect effects are involved in lessons learned and planning activities. Communities can support low-efficacy stakeholders to make them comfortable with engagement.

Stakeholder Concerns

Beyond direct impacts and involuntary role obligations, other factors may motivate stakeholders to identify concerns and participate in planning for disaster mitigation activities. Through community dialogue or group membership, non-active stakeholders can become aware of others who share their concerns. When this occurs, the stakeholder has instrumental and expressive interests in the issue, increasing the likelihood of participating if invited to engagement activities (Franklin, 2020). We examined stakeholder concerns to determine the salience of future flooding impacts in the three communities. For issues that are a concern, stakeholders will likely become involved in identifying corrective actions that reduce future risks.

Public/environmental safety is the most crucial concern in all three cities (Figure 3). However, the concerns distribution for Tulsa stakeholders varies from Fayetteville and Waco stakeholders. Tulsan's elevated concerns about damage reporting may reflect that the community's expectations for less damage are higher than the other cities based on the results from disaster response and mitigation activities undertaken since a citizen "uprising" in the 1980s (Tulsa Public Works Department, 2023). Stakeholder concerns in Fayetteville and Waco are similar, except for concerns related to damage reporting, which are lowest in Fayetteville.

Figure 3. Stakeholder Flooding Concerns by City (n=1510)



Issue Salience

The salience of an issue is elevated when there are concerns about accountability (Khagram et al., 2013). Salience can arise from **in/direct impacts and in/voluntary obligations** to act. For example, concerns about flooding are more salient for people directly impacted by an event. Flooding concerns are also more salient for stakeholders with a role-based obligation (involuntary). Higher salience levels are expected to result in stakeholders becoming more engaged in community dialogue.

Table 4 displays issue salience by combining the impact and role-obligation variables for the disaster response and lessons learned/planning phases. Salience levels were similar across the three cities except for the direct/voluntary stakeholder grouping. Overall, the salience of flooding concerns was highest for indirect and voluntary stakeholders. This result was different than expected.

Table 4: Flooding Concern Salience for Disaster Response and Lessons Learned/Planning

Salience= Impacts x Role Obligation	Fayetteville (n=509)	Tulsa (n=588)	Waco (n=364)	All Cities (n=1460)
Indirect/Voluntary	33%	43%	49%	41%
Direct/Involuntary[1]	35%	35%	19%	31%
Indirect/Involuntary	17%	15%	19%	17%
Direct/Voluntary[2]	12%	6%	4%	8%

[1] Direct and Involuntary Stakeholders included external & mixed stakeholders (activists, organizations, associations, businesses & consultants).
[2] All Direct and Voluntary Stakeholders are external stakeholders (victims, residents, homeowners & users).

Another surprising finding in Table 4 is that the perspectives of indirect/involuntary stakeholders occupied a similar amount of public discourse space. This category most frequently includes internal and mixed stakeholders (government organizations, public officials, government partners) directly responsible for some activity during the disaster cycle. The category with the lowest percentages is direct and voluntary stakeholders (n=49). This variation between cities in this stakeholder group may offer insight into who is more willing to engage voluntarily in future mitigation efforts to avoid the disaster impacts directly experienced in the past.

Understanding and Developing Policy Action Efficacy

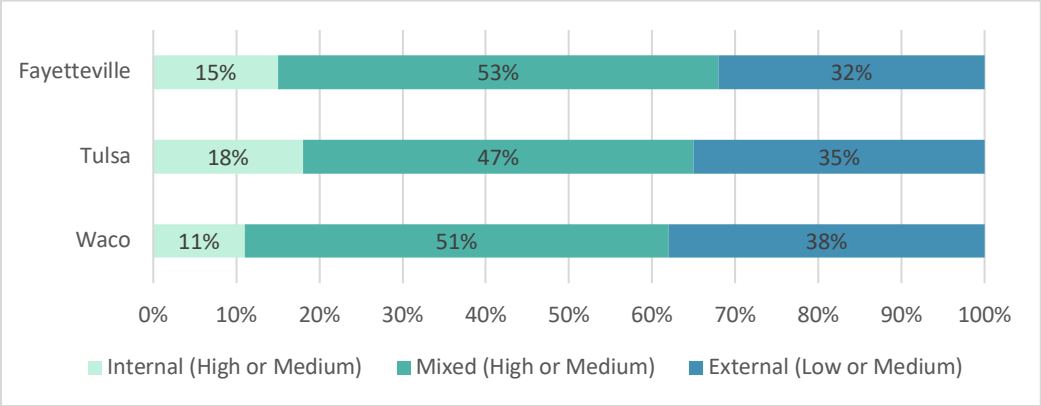
The combination of factors that predict issue salience (impacts experienced and role-based obligation) can evaluate stakeholder policy action efficacy. Policy action efficacy is predicted by the stakeholders' location relative to the person or organization responsible for taking action. For example, public engagement is often part of a government worker's job duties. Based on this, we expect government workers, as **internal** stakeholders, to have the highest policy action efficacy and the most potent voices in community dialogues.

Internal stakeholders inside government are tasked with planning community engagement activities. Disaster mitigation plans can be improved by regularly identifying the mixed and external stakeholders participating in policy decision-making and implementation. Based on their official roles, **mixed** stakeholders such as elected officials and weather and flooding subject matter experts regularly interact with government on flooding issues. Like government workers, elected officials have high policy action efficacy. In contrast, subject matter experts and government partners have medium policy action efficacy since they are familiar with the government organization taking action but lack position-based authority to decide on funding or government service provision.

External stakeholders have no "official" standing in policymaking venues. Limits on accessing information can restrict their engagement in decision-making and policy implementation, which may lower policy action efficacy. Based on this, we expect fewer contributions to the community discourse from external stakeholders since they have the lowest policy action efficacy.

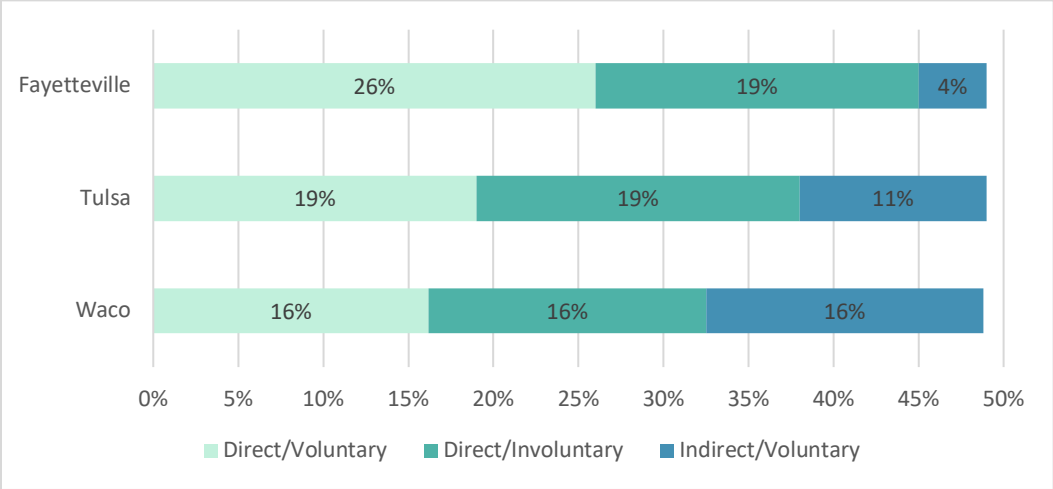
Figure 4 shows representation and policy action efficacy levels. Internal stakeholders have the lowest, not the expected highest, level of representation in community discourse. There can be many reasons for this lower-than-expected representation – maybe they defer requests for comment to others. For example, mixed stakeholders with high efficacy, such as elected officials and non-local government organizations. In this data set, these kinds of stakeholders are frequently mentioned alongside local government organization officials (recall that each article, on average, mentioned more than 11 stakeholders).

Figure 4: Stakeholder Representation Based on Policy Action Efficacy



The policy action efficacy of external stakeholders is also elevated above what is expected. In Figure 5, we analyze only the low-efficacy stakeholders to understand what motivates them to participate in the Lessons Learned/Planning Phase. Low-efficacy stakeholders have no role-based obligation and become involved voluntarily (representing between 30% and 32% of all low-efficacy stakeholders). It is not surprising that motivation to participate increases in all three cities when there are direct impacts from the flooding event. What is surprising is the number of volunteers who have not had a direct impact and still have voluntary involvement, ranging from 4% in Fayetteville to 16% in Waco.

Figure 5: Low-efficacy Stakeholders in Lessons Learned/Planning Phase
(49% of all Stakeholders)[1]



[1] Maximum value is lower since low-efficacy stakeholders are 49% of the data set.

This information can be valuable for city leaders. First, it demonstrates that low-efficacy stakeholders are willing to learn about disaster response and mitigation activities and how to protect themselves and assist others. Second, it suggests opportunities for education and training to improve stakeholder efficacy.

Can Voluntary Stakeholders Contribute to Disaster Response & Hazard Mitigation?

The contributions of voluntary stakeholders are important during disaster response and future planning. Non-financial resources, such as co-production and subject matter expertise, are valuable. Community education & training on safe flooding responses and mitigation strategies can engage more people and leverage non-financial disaster resources.

To answer this question, we look at who is voluntarily engaged and in which disaster phases. Table 6 shows that voluntary stakeholders are highly discussed in the disaster response and lessons learned/planning phases. For Fayetteville, voluntary stakeholders are more prominent in discussions of disaster response (39%), while in Tulsa, voluntary stakeholders are described mainly in the lessons learned/planning phase (49%).

Table 5: Voluntary Stakeholders Offering Non-Financial Assistance

Disaster Phase	Fayetteville (n=50)	Tulsa (n=67)	Waco (n=48)	All Cities (n=145)
Weather Alert	**3%**	**0%**	**6%**	**3%**
Disaster Response	**39%**	**19%**	**34%**	**31%**
Co-production	23%	8%	19%	16%
Co-production/Subject Matter Expertise	17%	11%	18%	15%
Lessons Learned/Planning	**29%**	**49%**	**41%**	**40%**
Co-production	16%	18%	21%	18%
Co-production/Subject Matter Expertise	13%	30%	20%	22%

Many stakeholders will take direct action and roll up their sleeves to volunteer to co-produce needed public goods. Often they are affiliated with a business, non-profit, or voluntary organization. Other voluntary stakeholders can provide subject matter expertise, such as University-based weather experts; or businesses and organizations like the Red Cross, emergency shelter operators, or churches that offer volunteer labor, temporary space in a shelter, and other forms of disaster aid. There is a wide variety for the three cities. However, when combined, the non-financial assistance voluntary stakeholders provide is significant.

Recognizing this, officials and organizations tasked with overseeing the different weather event phases can offer community members opportunities for training and sharing their expertise before disaster strikes so that more resources are available to respond to the disaster. Additionally, voluntary stakeholders can be a great source of input and good partners in developing hazard mitigation plans and flood safety protocols.

Higher utilization of these non-financial resources and volunteers can be valuable for achieving many of FEMA's Community Rating System (CRS) activities in the current hazard mitigation plans for each of the three cities. While these achievements will not dramatically reduce insurance premiums based on flooding risk, cumulative achievement of less financial resource-dependent activities could make a tangible impact. Engaging low-efficacy and volunteer stakeholders also connects people for whom the issue of flooding is salient with those tasked with hazard mitigation and can reduce the human impacts of flooding and increase community resilience. Reading public discourse has confirmed that "feel good" stories of volunteers assisting those in need have a place alongside reporting negative flooding impacts in the community.

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APPENDIX: METHODOLOGY

Our data are drawn from naturally occurring and planned public discourse in the Tulsa, OK; Fayetteville, AR; and Waco, TX newspaper markets between 1987 and 2022. We searched city and regional newspapers, internet public commentary, government websites, and planning and disaster mitigation documents for each city/county describing stakeholder engagement in public meetings with discussions of planning for, responding during, or recovering from flooding disasters. The primary search terms were flood and flooding. Secondary search terms were disaster, FEMA, and funding.

The data set includes 242 data sources: 49% are for Tulsa, 30% for Fayetteville, and 21% for Waco. There are 1509 stakeholders represented in the data entries for an average of more than six stakeholders per source. The distribution of stakeholders mentioned in each city is similar to that of data sources, with 39% for Tulsa, 34% for Fayetteville, and 26% for Waco.

A literature-informed codebook was used for an initial deductive coding process. Data sources were coded with information describing each stakeholder mentioned in the document and the kind of stakeholder they represented, the phase in the disaster cycle, the main concern and action desired, and the kinds of resources typically associated with the type of stakeholder.

The data set also included relevant language from each data source to allow for coding verification by a second team member. In addition, each coder could suggest emergent codes at team meetings. Three variables were purposefully coded using verbatim language from the data source. At the end of data collection, this language was analyzed to develop codes inductively to identify: 1) the primary concern voiced in the data source, 2) the actions desired to mitigate future flooding hazards, and 3) the three phases of the disaster cycle as understood by the local stakeholders. The number of phases in these cities is smaller than in scholarly literature.

The team regularly discussed questions arising from coding or verification. The codebook was updated to reflect sharing understanding and encourage coding consistency. When emergent (second round) codes were adopted, the codebook was updated to include a definition and categories for the code. A secondary coder reviewed the coding for compliance with dictionary terms (Miles, Huberman, & Saldana, 2019). During the data analysis, several variables were recoded to collapse the categories and avoid thin cells.

Threats to internal validity:
1. Not all stakeholders are included in public source documents. Our analysis aimed to document the residents of the three communities and then compare this to extant literature to determine where there is potential for more diversity in the voices represented in the community's dialogue.
2. There are differences in the number of sources and stakeholders discussed across the three cities. This is unavoidable since Tulsa is a larger metropolitan community with a more robust daily newspaper and other public discourse outlets. We purposefully expanded our search for Fayetteville and Waco to examine community discourse in neighboring cities and non-traditional media outlets.