Global Resilience Institute
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Beyond the Floodplain: Communicating Flood Risks to Community Members

Location: Springfield-Greene County, Missouri

2025

Community Narratives

Narrative Summary

In Springfield-Greene County, where frequent flooding occurs outside of mapped floodplains and funding constraints limit infrastructure upgrades, local stakeholders identified the need for clearer, more accessible data to support public understanding and planning. *FloodSavvy's* streamflow data and flood maps can help identify vulnerable areas, justify mitigation projects, and start important flood risk conversations with the community.

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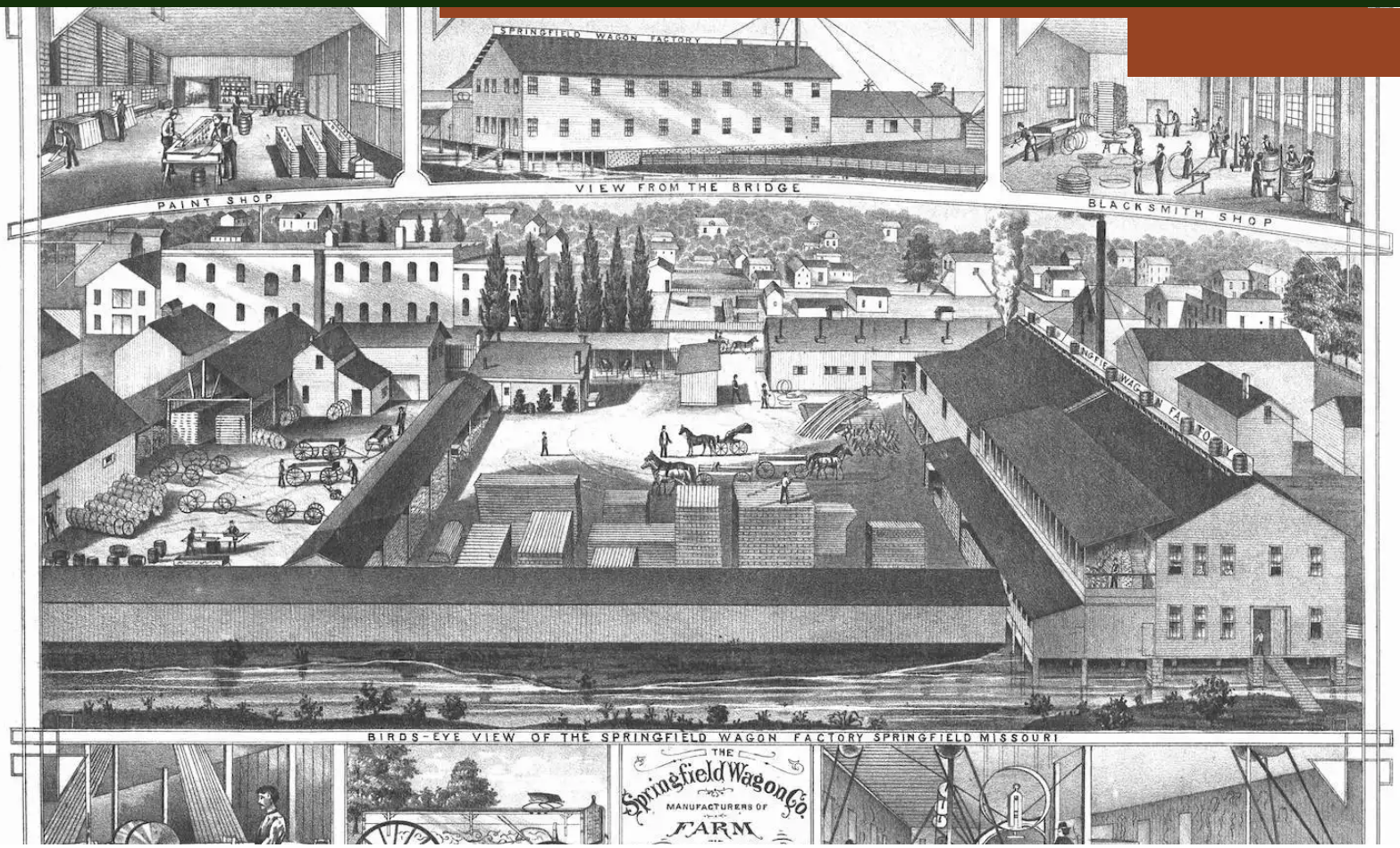
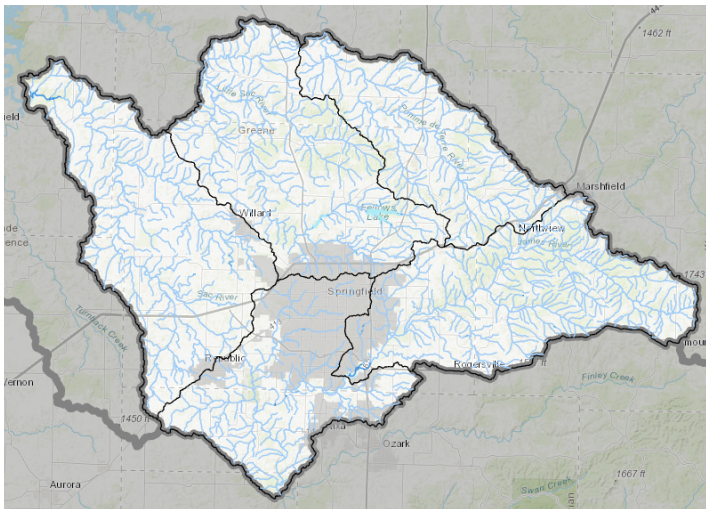


Community Context

Springfield, the third-largest city in Missouri, serves as the county seat of Greene County and is a regional hub for education, healthcare, and manufacturing. The city is located on the rugged, dissected Springfield Plateau of the Ozark Mountains, which is characterized by several clear, flowing streams, including the James River, which runs along the eastern side of the city. Other creeks in the area include Jordan Creek, Galloway Creek, and Wilson Creek. Aside from being known for its diverse wildlife and opportunities for outdoor recreation, the Springfield area has an extensive karst topography characterized by springs, sinkholes, losing streams, and caves. Missouri itself is also referred to as "The Cave State," with over 7,500 documented caves, many of which are located in the Springfield area.

The Springfield-Greene County area is vulnerable to heavy rainfall, flash and riverine flooding, erosion, sinkholes, drought, and sediment buildup. Despite ongoing drought conditions, the city has seen a notable increase in rainfall intensity, even during dry periods, which has led to more frequent and severe flooding since 2010.

These changes have driven the installation of local gauges to track how rivers respond to heightened flows. A hydrologist from NWS Springfield noted that rivers respond so quickly to rainfall that warning time before flooding occurs is significantly limited. Karst topography adds complexity, as sinkholes can either absorb or worsen flooding. Compounding this is outdated infrastructure, such as U.S. highways running through sinkhole-prone areas, which amplifies flood risks. While Springfield has reclaimed floodplains through property acquisitions in flood-prone corridors, flooding persists in urban zones due to aging infrastructure and historic development patterns that did not account for stormwater.



Key Players

City officials in Springfield-Greene County are responsible for local decision-making, including in development and zoning efforts, and prioritizing property buy-outs. They also have a key role in flood mitigation projects and communicate new and ongoing project progress to the community. They are often supported by the Missouri Hydrologic Information Center (MoHIC), launched in 2022 under the Missouri Department of Natural Resources (MoDNR).

MoHIC's primary aim is to make hydrologic and climate data more accessible, actionable, and user-friendly for MO communities. Although in the early stages of their partnership, Springfield-Greene County has been supported by MoHIC through both the expansion of gauge networks and the creation of the 2020 Missouri Water Resources Plan in collaboration with Springfield's Utility Department. Springfield-Greene County is also supported by the National Weather Service (NWS), which provides stream gauge data, and coordinates emergency response, as well as the Ozarks Environmental and Water Resources Institute (OEWRI), which provides technical expertise, data collection, and water quality monitoring.

Challenges and Information Gaps

Interviews with local decision-makers emphasized that in Springfield's small watersheds, even slight errors in rainfall data can result in missed flood predictions, making accurate and timely information critical. Flash flooding in the region occurs so quickly that it limits emergency response, underscoring the need for improved forecasting models that better account for river flow and runoff trends. The area's karst topography further complicates planning, as the role of groundwater and sinkholes in flood behavior remains poorly understood and requires more research. At the same time, aging infrastructure and development in flood-prone zones leave critical roads, bridges, and neighborhoods vulnerable.

Local emergency managers also vary in expertise and capacity, with many wearing multiple hats, such as fire chief or school board member, which limits their time and technical ability compared to full-time emergency managers. Additionally, while emergency management staff often struggle with communicating risks to local populations, some residents also fail to report problems.

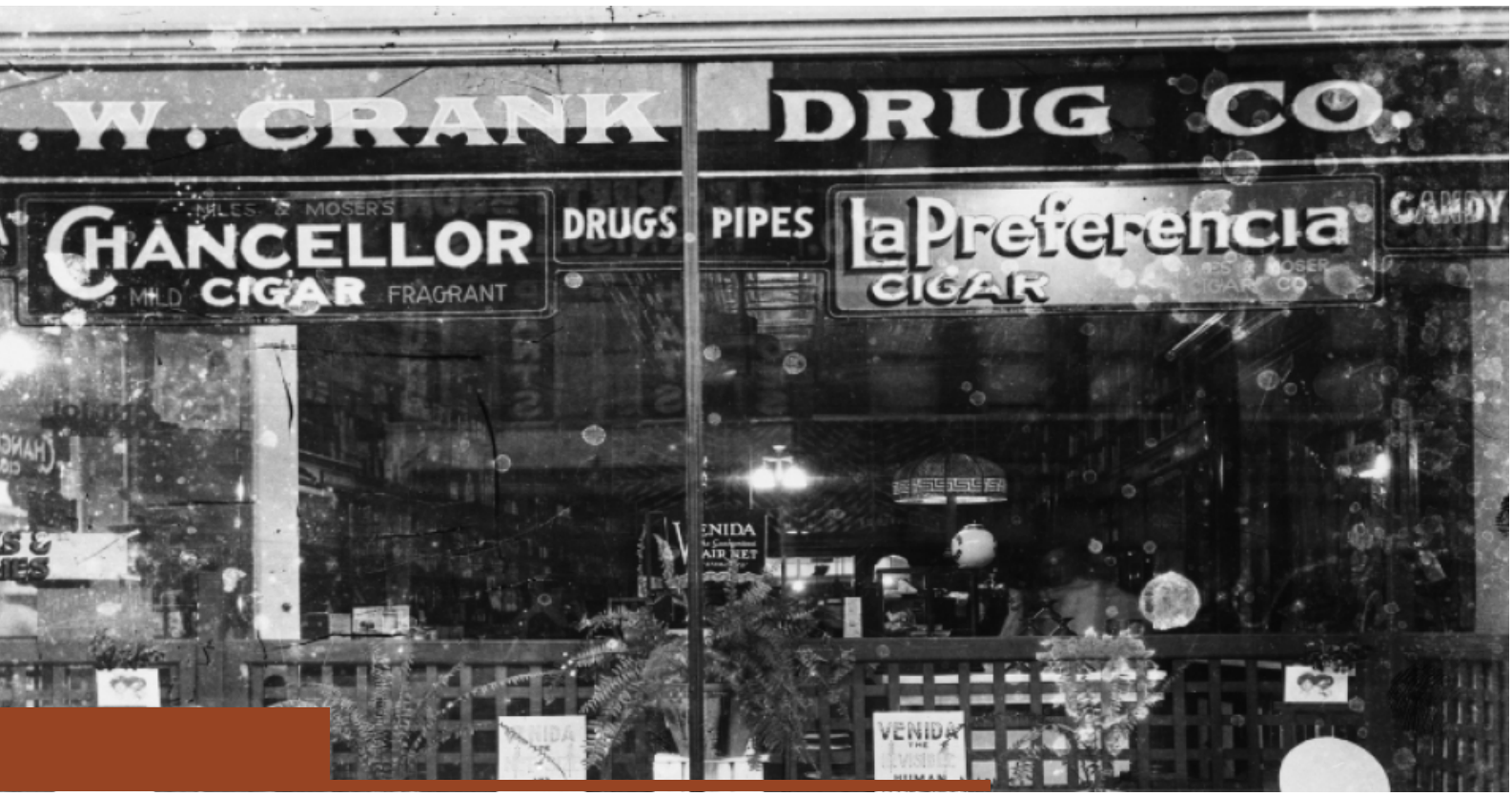
> *Many people are not vocal about problems faced and do not report it to the city. So those areas and populations go underserved despite having major issues.*
>
> *- Stormwater Engineer*

FloodSavvy: A National Water Model-derived Tool for Accessible Flood Risk Information and Water Decision-Making

NOAA's National Water Model (NWM) simulates streamflow at 18-hour, 10-day, and 30-day intervals, while also storing 40 years of retrospective data for both gauged and ungauged rivers across the U.S. While stakeholders in Springfield-Greene County recognized the value of NWM data, they also noted that its technical complexity creates accessibility barriers for first-time users or users without hydrological expertise.

To address this, our team worked with Springfield-Greene County to develop *FloodSavvy*, a web interface that translates complex NWM outputs into clear, actionable flood risk insights for this community. We also created a beginner-friendly NWM Tutorial: A 101 Guide to Understanding and Using the NWM, available in both PDF and video format, to help new users navigate the model. Both resources were shaped with input from Springfield-Greene County stakeholders to ensure they serve as practical, intuitive entry points for applying NWM data to local decision-making. See our project website for more details on *FloodSavvy* and the co-development process.

After piloting these tools with Springfield-Greene County stakeholders, they identified several ways they could integrate NWM data, *FloodSavvy*, and the NWM Tutorial in their work. Users found the tools especially useful for visualizing flood inundation extents and using these to convey both potential risks and opportunities to strengthen flood resilience.



Using FloodSavvy to Improve Public Awareness and Planning through Accessible Flood Forecast Data

FloodSavvy allows users to easily view the NWM streamflow data from 2016 to present, on a gauged or ungauged river of interest. For Springfield-Greene County, this ensures the continuity and expansion of useful predictive data, particularly in cases where gauges are lost to flooding events. Since many flooding issues in Springfield occur outside of mapped floodplains, they also emphasized the tool's potential to educate the public about risks in overlooked areas where flooding frequently damages streets and properties. By better understanding streamflow trends and comparing this to other sources of data, city officials can make more informed decisions and support outreach efforts.

> *I'd say our biggest problems now, in terms of the properties and streets that are flooding, are areas outside the floodplain. So being able to help educate the public on flood risk outside the floodplain is huge.*
>
> *- City Engineer*

Floodsavvy's flood map capability further allows users to explore potential inundation flooding events under different streamflow conditions on a river of interest. Since 2012, reduced county funding and regulatory barriers have limited stormwater infrastructure investments in Springfield, complicating flood management efforts. City engineers pointed to the usefulness of FloodSavvy for creating presentations for public meetings and project planning discussions that show flood extents and inundation zones. By exporting flood extents as well as simplified hydrographs, the tool could be valuable for community engagement by providing simple visuals that help explain existing flood risks as well as post-project conditions.

> *Let's say we're doing a project in one of these [river] reaches – to be able to show people the flood risk they have now, and then post-project, would be helpful.*
>
> *- City Engineer*

What Can You Do If Your Area Is Not Covered by FloodSavvy?

Our project demonstrates how NOAA's National Water Model (NWM) can be made more accessible and useful for different types of end-users. In Springfield-Greene County, for example, *FloodSavvy* used NWM data to produce interactive flood maps that supported community outreach efforts.

If your community is outside the six currently served by *FloodSavvy*, you can still leverage the NWM in your work. The NWM Tutorial is publicly available and designed for first-time users.

01 Access our NWM Tutorial here.

02 For users who interested in Springfield-Greene County's experience, Section 5 details how to access Flood Inundation Mapping for covered areas experiencing active or forecasted flooding.

03 Other useful resources include:

- U.S. Geological Survey's Water Data: Comprehensive hydrological data at gauged sites.
- U. S. Geological Survey's Flood Inundation Mapper: Interactive flood maps for select gauged sites.

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