

Mitigation Matters: Policy Solutions to Reduce Local Flood Risk

This brief is one of 13 that examine state and local policies that have resulted in actions to mitigate flooding.



L. John Weaver, Poudre Fire Authority

A trailer catches fire as floodwaters engulf the Johnson Mobile Home Park in 1997.

Colorado City Revamps Flood Plain Management After Severe Flood

New construction standards helped protect Fort Collins from later storm

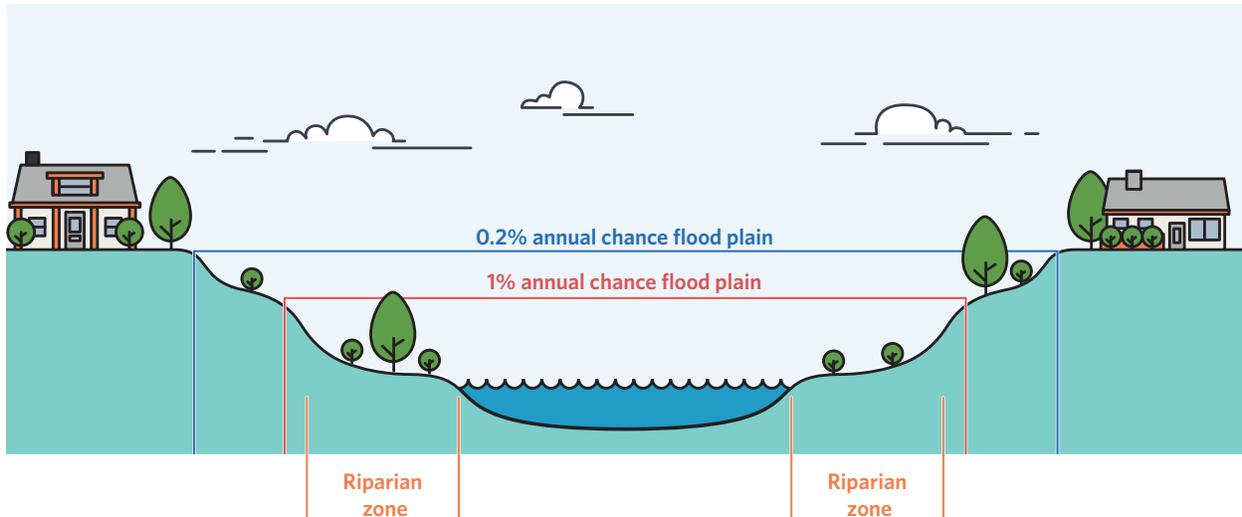
Overview

In July 1997, 14.5 inches of rain fell on Fort Collins, Colorado, in about 30 hours, triggering flash floods that killed five people and caused more than \$200 million in damage to properties. The losses catalyzed city officials to pass stringent regulations in 2000 for construction in the Cache la Poudre River's flood plain. The regulations prohibited residential construction in 100-year flood plains and required nonresidential development to be built at least 2 feet above projected flood levels.

In September 2013, floods devastated many parts of Colorado, but the new policy helped Fort Collins escape relatively unscathed.¹ Nearly 14,000 structures had been built in the city since the 1997 flood and only eight were damaged.²

What is a flood plain?

Flood plains are areas near to streams and rivers that experience repeated flooding. They reduce floodwaters' energy and flow speed and provide storage for floodwater.



Riparian zone: The land along a river or stream where soils, vegetation, and habitat transition from aquatic to terrestrial. The extent of this zone will vary.

1% annual chance (aka 100-year) flood plain: The land area that is projected to be inundated by a flood with a statistically estimated 1 percent chance of being equaled or exceeded in any given year. Structures in this area have roughly a 1 in 4 chance of experiencing a flood of this scale over the lifetime of a standard 30-year mortgage.

0.2% annual chance (aka 500-year) flood plain: The land area that is projected to be inundated by a flood with a statistically estimated 0.2 percent chance of being equaled or exceeded in any given year.

Source: Federal Emergency Management Agency, NFIP Guidebook, https://www.fema.gov/media-library-data/20130726-1647-20490-1041/nfipguidebook_5edition_web.pdf.

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Storm prompts city to rethink flood management

Fort Collins, home to Colorado State University, is a vibrant city at the foothills of the Rocky Mountains, 65 miles north of Denver. The scenic Poudre River, a vital water source for residents and farmers, cuts through it.

The Poudre River flood plain is one of 12 drainage basins within Fort Collins. After years of recurring floods, the city created a stormwater utility in 1980,³ one of the first in the nation. It has since been replicated by many communities around the country as a way to reduce flooding and associated stormwater pollution.⁴ Fort Collins' population has grown by nearly 40 percent since 2000, to about 165,000,⁵ making smart development an imperative to reduce flood risk.

When the 1997 storm hit, heavy rains flooded Colorado State University, overwhelming the city's stormwater capacity and turning streets into rivers.⁶ More than 1,500 homes and businesses were damaged, costing the city more than \$200 million in damages.⁷

Capt. Steve Fleming of the Poudre Fire Authority described the scene to *The Coloradoan* newspaper: “Explosions at the laundromat, [a] train derailment, people yelling for help, oil in the water, electricity shocking me in houses, water up within one foot of the ceilings—and all of it happened within 30 minutes.”⁸



In a restored flood plain in Fort Collins, a rock indicates where a 100-year flood would reach, with the 500-year marker in the background.

Officials identify policy solutions

In 2000, the city upgraded its building code to prohibit new residential construction in the river's 100-year flood plain—areas with a 1 percent chance in any given year of being flooded.⁹ It also required that new nonresidential structures or additions close to the Poudre River be elevated 2 feet, a provision that exceeds Federal Emergency Management Agency (FEMA) and Colorado requirements. For substantial improvements or redevelopments of a nonresidential structure in the 100-year flood plain, the structure's lowest floor (including the basement and all heating, ventilating, air conditioning, and electrical work) must be elevated 2 feet above projected flood levels or be floodproofed.

Critical facilities

Two years before the 1997 flood, Fort Collins passed a measure to protect its critical facilities, those considered important to the community,¹⁰ from being inundated. In 1995, legislation prohibited the construction of hospitals, fire stations, police stations, nursing homes, schools, hazardous material storage stations, gas stations, and essential government service buildings in the 100-year flood plain. It also banned buildings for at-risk populations and facilities that provide essential services in the 500-year flood plain—an area with a 0.2 percent chance in any given year of being flooded. This move, while not early enough to prevent damage from the 1997 flood, has helped to protect key city buildings and infrastructure, and should ease the burden on emergency response efforts and speed recovery after floods.

Stormwater Utility Fees in Fort Collins, Tulsa

In 1980, Fort Collins became one of the first cities in the country to create a utility that collects fees to fund capital improvements and stormwater maintenance and operations. The city has since changed how it collects and disperses these fees, and today all property owners pay stormwater rates based on their lot size and the surface area that does not absorb rainwater. This approach has been replicated in cities across the United States.

Tulsa, Oklahoma, created its stormwater management utility in response to a devastating flood that killed 14 people and caused more than \$420 million in property damage in 1984. A year later, it established the Department of Stormwater Management, which centralizes responsibility for all city stormwater activities, and instituted a utility fee in 1986 to fund the program.

Today, Tulsa's flood plain and stormwater program includes comprehensive watershed management, dedicated funds for maintenance and operation, a prototype alert system, and a \$200 million capital improvement program. The stormwater department is also working to add parks in flood plains, sports fields in stormwater detention basins, and trails on creek banks.

Sources: City of Fort Collins, "Utilities: History," <https://www.fcgov.com/utilities/what-we-do/stormwater/history>; City of Tulsa, "Flood Control," <https://www.cityoftulsa.org/government/departments/engineering-services/flood-control/>

Additional policy actions

Fort Collins is also boosting its resilience to flooding by preserving open spaces. Under its Natural Areas Program, the city has bought parcels in the flood plain in the Poudre River corridor to keep the corridor intact and allow it to act as a sponge should the river overflow. The program has preserved 66 percent of the river's 100-year flood plain through these purchases as natural areas and parks.¹¹

The city's stormwater program also offers buyouts for people who own properties in the flood plain at high risk of being damaged by floods. The Willing Seller-Willing Buyer program, run jointly with the Natural Areas Program, works with owners interested in selling their flood-prone properties who can't find buyers through the real estate market. The program acquired two residential properties and two commercial structures before 2013 that would have been damaged that year in the floods, which also affected a large portion of the state.¹²

In a single week in September 2013, areas in and upstream of Fort Collins received up to a foot of rain—three-quarters of the city's annual average—pushing the Poudre River to levels not seen since 1930 and threatening its residents and businesses.

But Fort Collins escaped with minimal impact, due in large part to the flood mitigation efforts it had taken in the preceding two decades.¹³

Creative Design Allows a Big Employer to Reduce Flood Risk

Woodward Inc., which supports the aerospace and industrial markets, is one of Fort Collins' largest employers.¹⁴ Starting in 2013, the company worked closely with city officials to move its headquarters to a parcel in the Poudre River corridor that was previously a private golf course. The \$200 million facility, which opened in June 2016, sits on 100 acres in the river's flood plain. To protect the facility, the company removed 31 acres of fill and collaborated with the city to return a significant amount of the land to nature, planting native vegetation, setting aside areas for floodwater storage, and creating public trails.¹⁵

Much of the excavated fill was used to create building pads for the foundations of Woodward's 300,000-square-foot turbomachinery systems and its 60,000-square-foot corporate headquarters. Woodward asked architects to elevate these buildings above the projected flood levels—exceeding the city's building requirements.¹⁶ The complex highlights how a city policy can help protect new development from future floods.

Results and outcomes of policy actions

In recognition of the city's flood mitigation actions, FEMA has designated Fort Collins as Class 2 under its Community Rating System, a voluntary program to incentivize communities to reduce their flood risk. Only seven other communities in the country have achieved Class 2 or higher.¹⁷ The rating means that residents and businesses receive reductions of up to 40 percent on flood insurance costs—one of the highest discounts in the country.¹⁸

The high rating reflects not only Fort Collins' efforts to protect critical facilities, but also its important work to educate the public about flooding and its outreach program to communicate flood risk.

Conclusion

For the past three years, an annual report by the Milken Institute has ranked Fort Collins in the top 10 best performing cities.¹⁹ Fort Collins' regulations may have contributed to the ranking, as they promote economic development while protecting the city's assets from potential flood damage.

The city is continuing to launch more projects in the Poudre River corridor to mitigate flood risk. The Natural Areas Program has begun a series of small restoration projects, including lowering the river banks to allow water to spill more easily onto flood plains and planting new cottonwood groves. The city's efforts demonstrate how proactive measures can encourage smart development while prioritizing the natural functions of flood plains.

“Mitigation Matters: Policy Solutions to Reduce Local Flood Risk” examines policies in 13 locations: Arkansas; Brevard, North Carolina; Fort Collins, Colorado; Indiana; Iowa; Maryland; Milwaukee; Minnesota; Norfolk, Virginia; South Holland, Illinois; Vermont; Washington state; and Wisconsin.

To prepare the briefs, The Pew Charitable Trusts contracted with the consulting engineering firm Dewberry, which identified a range of state and local policies across the U.S. that are helping to reduce flood risk. Local officials and disaster resilience experts provided input during the research process. Two external reviewers—Nate Woiwode, project manager of The Nature Conservancy’s North American Risk Reduction and Resilience team, and Elizabeth Albright, assistant professor of the practice of environmental science and policy methods at Duke University’s Nicholas School of the Environment—provided expert insight. Neither they nor their organizations necessarily endorse the conclusions.

Endnotes

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For further information, please visit:
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