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.

Marlin Levison/Star Tribune via Getty Images

Surging waters from the nearby Straight River wash out Steele County Road 18 near Owatonna, Minnesota, on Sept. 24, 2010.

Minnesota Uses Bonds to Support Flood-Ready Infrastructure

The North Star State renovates roads, bridges after successive floods

Overview

After design problems caused a Minneapolis bridge to collapse in 2007, the Minnesota Department of Transportation (MNDOT) decided to do a comprehensive assessment of the state's bridges and invest $1.8 billion in upgrading and rebuilding infrastructure. Following three major floods in 2010, MNDOT used a portion of these funds—from bonds issued for road repairs—to make key highways less vulnerable to severe weather. Since 2011, the department has used this funding stream for 34 flood mitigation projects, such as raising roadways and bridges.

Flooding in 2010 points to infrastructure vulnerability

Minnesota has a long history of flooding caused by snowmelt, heavy rainfall, and the general topography and geology of the area.[1] As in many other parts of the United States, flooding is the most common, dangerous, and damaging natural hazard.[2]

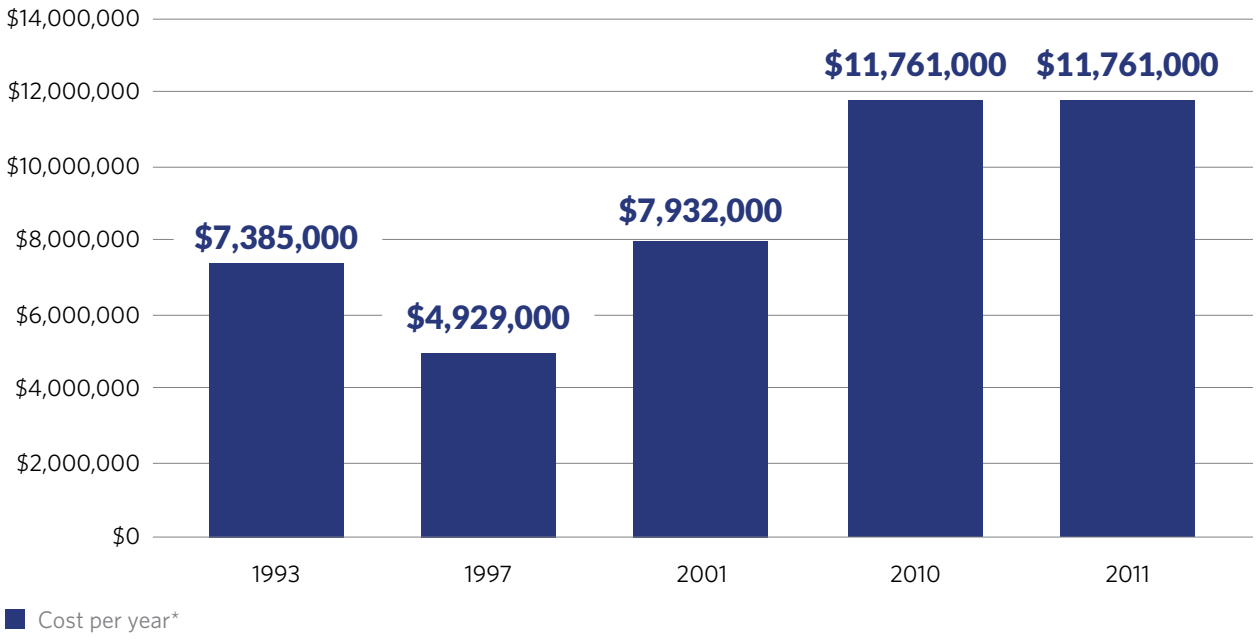
In 2010, three severe floods affected parts of the state. Starting in the spring, the Red River Basin flooded from a combination of snowpack with high-water content, saturated soils, and ice jams, all of which spread out and severely flooded the flat terrain. Multiple roadways became impassible. Highway 101, a vital throughway between the cities of Shakopee and Chanhassen in the greater Minneapolis-St. Paul metropolitan area, was closed for almost a month.[3] In June, intense storms brought damaging wind, hail, tornadoes, and heavy rains that triggered another flood in the area. And in September, southern Minnesota experienced one of its worst flash floods: Over 5,000 square miles received more than 6 inches of rain in 24 hours, and some places recorded over 10 inches.[4] Highway 101 closed again, this time for more than two weeks.[5]

Each day the highway closed—43 in all—cost the state $274,000 and ultimately added up to more than $10 million in estimated economic losses.[6] The vulnerability of roadways such as Highway 101 to floods both contributes to the costs of disasters and impedes efforts to help communities recover.

Figure 1

Economic Cost of Highway 101 Closures in Years With Significant Flooding

86 days between 2010 and 2011 cost Minnesota more than $20 million



Note: Updated to 2019 dollars

Source: Minnesota Department of Transportation, "Minnesota River Flood Mitigation Study" (2011), http://www.dot.state.mn.us/floodmitigation/docs/mn-river-study.pdf

Bonds to pay for a new flood mitigation program

The bridge collapse in 2007 prompted the state legislature to significantly increase spending on transportation infrastructure to upgrade and rebuild aging and deteriorating roads and bridges.[7] In 2008, it authorized $1.8 billion in highway trunk bonds—bonds specifically for highway construction—to renovate highways and bridges throughout the state.

A significant portion of the funds went to assessing the condition of bridges in the state and repairing or replacing them. But after the 2010 floods caused major road closures, highlighting the threat posed by high water, MNDOT decided to use some of the undesignated funds—$50 million in bonds—to create the Flood Mitigation Program.[8] To repay some of the debt for this bond, Minnesota increased the gas tax.[9] Funding was dedicated to projects that "ensure long-term sustainability" for flood-prone transportation infrastructure.[10] A subsequent severe flood in 2011 forced the closure of Highway 101 again, this time for more than six weeks, strengthening the state's resolve to reduce flood risk.[11]

MNDOT puts $50 million to use for 34 projects

After the legislature authorized the $50 million bond for the program, MNDOT conducted a study to identify low-cost projects with the greatest potential benefit. The department chose 34 flood mitigation projects covering a wide range of measures,[12] including updating and creating new culverts to better withstand changing precipitation patterns and upgrading drainage systems in flood-prone areas.

One of the biggest projects, for which it devoted $20 million, was to make Highway 101 less susceptible to flooding. MNDOT funded the construction of a 4,100-foot bridge where the highway crosses the Minnesota River, effectively raising the roadway out of the 100-year flood plain.[13] The project has helped to reduce the number of road closures from seasonal flooding in the Minnesota River Valley[14] and the associated economic losses. St. Francis Regional Medical Center in Shakopee, Minnesota, for example, estimated that at least a quarter of its employees rely on Highway 101 and had lost time and money in the past when it flooded.[15]

Conclusion

The department was required to spend all of the Flood Mitigation Program's funds by 2016.[16] Although the program has ended, MNDOT is continuing to review the cost effectiveness of strengthening vulnerable transportation infrastructure. Minnesota is also tracking precipitation data and hydrologic studies so that officials can close any gaps in the state's flood preparedness efforts.[17]

"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

1 A. Kean, "Brief Analysis of Flooding in Minnesota: Recent Flood Events, Statewide Flood Risk Assessment, and Hazard Mitigation" (2011), www.leg.state.mn.us/edocs/edocs?oclcnumber=711779599.

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3 Minnesota Department of Transportation, "Minnesota River Flood Mitigation Study" (2011), http://www.dot.state.mn.us/floodmitigation/docs/mn-river-study.pdf.

4 Minnesota Department of Natural Resources, "Heavy Rainfall - September 22-23, 2010," accessed Aug. 29, 2019, https://www.dnr.state.mn.us/climate/journal/ff100924.html.

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7 M. Burress and K. Zewers, "2008 Transportation Finance Legislation: Laws 2008, Chapter 152" (2008), https://www.leg.state.mn.us/docs/2009/other/090017.pdf.

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9 National Cooperative Highway Research Program, "Minnesota Transportation Revenue Program Case Study" (2009), http://www.transportation-finance.org/pdf/featured_documents/nchrp_20_24_62_minnesota.pdf.

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12 Minnesota Department of Transportation, "Statewide Flood Mitigation Program," accessed Aug. 29, 2019, http://www.dot.state.mn.us/floodmitigation/.

13 Southwest Reconnection Project, "Highway 101 County Road 61 Flood Mitigation Project" (2013).

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15 U. Zuege, "Highway 101 Project to Move Ahead," Southwest News Media, June 7, 2018, https://www.swnewsmedia.com/chanhassen_villager/news/highway-project-to-move-ahead/article_dfd464e5-3d85-561e-81f6-aaca068131d6.html.

16 Southwest Reconnection Project, "Highway 101 County Road 61 Flood Mitigation Project."

17 Minnesota Department of Transportation, "Adaptation."

For further information, please visit:

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