

GAO Highlights

Highlights of [GAO-24-105496](#), a report to congressional requesters

Why GAO Did This Study

More frequent extreme weather events and rising sea levels associated with climate change pose risks to the nation's flood management infrastructure, according to the 2023 *Fifth National Climate Assessment*.

From 2014 through 2023, the Corps dedicated at least \$19 billion in annual appropriations to flood risk management activities, according to GAO's analysis. During that same period, Congress provided at least \$46.1 billion in supplemental appropriations to the Corps for repairs to damaged flood risk management infrastructure, construction of such infrastructure in areas affected by disasters, and other activities.

In 2013, GAO added *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* to its High Risk List. Enhancing climate resilience—by planning for climate hazards and acting to reduce potential losses—can help manage the federal government's fiscal exposure.

GAO was asked to review the climate resilience of the federally funded flood risk management infrastructure. This report examines (1) the Corps' actions in this area and (2) the strengths and limitations of options available to the Corps to further enhance those efforts. GAO reviewed Corps documents, interviewed Corps officials and 21 knowledgeable stakeholders, and used GAO's *Disaster Resilience Framework* to evaluate the Corps' efforts and potential options to further enhance the climate resilience of such infrastructure.

View [GAO-24-105496](#). For more information, contact J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov.

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CLIMATE CHANGE

Options to Enhance the Resilience of Federally Funded Flood Risk Management Infrastructure

What GAO Found

The U.S. Army Corps of Engineers (Corps) is responsible for planning, designing, and constructing much of the nation's federally funded flood risk management infrastructure—for example, levees, dams, floodwalls, floodgates, and hurricane barriers—that help protect communities from coastal storms and floods. Corps' flood risk management infrastructure, such as levees, can be breached by flooding exacerbated by changes in the climate (see fig.).

Breached Levee along the Missouri River, June 2011



Source: U.S. Army Corps of Engineers Omaha District photo by Eileen Williamson. | GAO-24-105496

The Corps has taken, and plans to take, actions to enhance the climate resilience of federally funded flood risk management infrastructure. The Corps has also taken steps to develop climate policies and plans, conduct research, and provide climate-related information and guidance for planning flood risk management infrastructure projects.

On the basis of a review of relevant literature and interviews with knowledgeable stakeholders and Corps officials, GAO identified 14 options to further enhance the climate resilience of federally funded flood risk management infrastructure (see table).

What GAO Recommends

GAO recommends that the Corps (1) analyze the 14 options for enhancing the climate resilience of federally funded flood risk management infrastructure identified in this report; and (2) integrate them, as appropriate, into the Corps' future climate resilience prioritization and planning efforts. Such analysis should also include legislative proposals that identify any additional authorities and resources the Corps would need to implement the options.

Congress should consider—in light of any analyses or proposals submitted by the Corps—providing direction or authority to implement one or more of the 14 options for enhancing the climate resilience of federally funded flood risk management infrastructure identified in this report.

The Corps concurred with GAO's recommendation.

Options to Further Enhance the Climate Resilience of Federally Funded Flood Risk Management Infrastructure

1. Create clear institutional authority to mainstream climate resilience.
2. Research the feasibility of innovative approaches.
3. Expand technical assistance for planning.
4. Update climate information for planning.
5. Update planning guidance.
6. Integrate climate resilience into project-level benefit cost analysis.
7. Expand the use of adaptive management in projects.
8. Update engineering standards and regulations.
9. Conduct climate screening assessment of authorized but unfunded projects.
10. Prioritize projects that incorporate climate resilience.
11. Update manuals for operation and maintenance.
12. Expand technical assistance to nonfederal sponsors for operations and maintenance.
13. Conduct climate vulnerability assessments of existing infrastructure.
14. Establish process for retrofitting existing infrastructure to account for climate change.

Source: GAO analysis of relevant literature and interviews with knowledgeable stakeholders. | GAO-24-105496

Each option has strengths and limitations. For example, updating planning guidance to require that climate resilience be incorporated into all flood risk management infrastructure studies and projects could increase the extent to which projects adopt resilience measures but might require additional capacity or result in additional costs to implement effectively.

Determining which options to implement to enhance the climate resilience of federally funded flood risk management infrastructure requires detailed analyses of complex issues. Making such determinations may also require difficult decisions involving trade-offs related to the costs and benefits of different options. Nevertheless, conducting a comprehensive analysis of the options identified in this report could help the Corps determine which options to prioritize in future climate resilience planning efforts. Such an analysis would also help the Corps seek congressional approval, as appropriate, for statutory authorities and resources necessary to implement the selected options to reduce federal fiscal exposure.

Implementing multiple options could better leverage the strengths and address the limitations of the different options and offers the greatest potential to improve the climate resilience of federally funded flood risk management infrastructure, according to knowledgeable stakeholders and GAO's *Disaster Resilience Framework*. Corps officials told GAO that they likely would need additional direction or authority from Congress to act on some, or a combination of, options.

Congress is expected to pass a new Water Resources Development Act in 2024, thus presenting Congress with an opportunity to seek and consider any analyses or proposals from the Corps and to provide direction or authority to the agency to take additional actions to implement one or more options for enhancing the climate resilience of federally funded flood risk management infrastructure. Doing so would help the Corps better ensure that such infrastructure can withstand and recover from extreme weather events and natural disasters expected to be exacerbated by climate change.