



Federal Grants Provide \$6 Benefit for Each \$1 Invested

Introduction

Natural hazards present significant risks to many communities across the United States. Fortunately, there are measures governments, building owners, developers, tenants and others can take to reduce the impacts of such events. These measures—commonly called mitigation—can result in significant savings in terms of safety, prevent property loss and disruption of day-to-day life.

The National Institute of Building Sciences Multihazard Mitigation Council (MMC) undertook a study in 2017 to update and expand upon the findings of its *2005 Mitigation Saves* study on the value of mitigation. In the *2017 Interim Report* (now incorporated into the *2018 Interim Report*), the project team analyzed two areas of mitigation programs:

- **Federal grants:** The impacts of 23 years of federal grants made by the Federal Emergency Management Agency (FEMA), Economic Development Administration (EDA) and the Department of Housing and Urban Development (HUD), resulting in a national benefit of \$6 for every \$1 invested.
- **Beyond code requirements:** Designing new structures to exceed select provisions of the *2015 International Building Code (IBC)* and *International Residential Code (IRC)* and the adoption of the *2015 International Wildland-Urban Interface Code (IWUIC)*. This resulted in a national benefit of \$4 for every \$1 invested.

Results of Federal Grant Programs

Considering the subtotal for the past 23 years of federally funded natural hazard mitigation, at the cost-of-borrowing discount rate, the analysis suggests that society will ultimately save \$6 for every \$1 spent on up-front mitigation cost. The past 23 years of federally funded natural hazard mitigation is estimated to prevent deaths, nonfatal injuries and PTSD worth \$68 billion, equivalent to approximately 1 million nonfatal injuries, 600 deaths and 4,000 cases of PTSD. Table 1 provides benefit-cost ratios (BCRs) for each natural hazard the project team examined. Figure 1 shows the contributions to the calculation of these benefits.

The federal agency strategies consider 23 years of public sector mitigation of buildings funded through FEMA programs including the Flood Mitigation Assistance Grant Program (FMA), Hazard Mitigation Grant Program (HMGP), Public Assistance Program (PA) and Pre-Disaster Mitigation Grant Program (PDM), plus the HUD Community Development Block Grant Program (CDBG) and several programs of the EDA. Barring identification of additional federal data sets or sources of federal mitigation grant and loan funding, these analyses represent essentially the complete picture of such mitigation measures. In the future, the project team might also look at mitigation measures directly implemented by federal agencies.¹ Results represent an enhanced and updated analysis of the mitigation measures covered in the 2005 study. Public-sector mitigation strategies include:

- For flood resistance, acquire or demolish flood-prone buildings, especially single-family dwellings, manufactured homes and 2- to 4-family dwellings.
- For wind resistance, add shutters, safe rooms and other common measures.
- For earthquake resistance, strengthen various structural and nonstructural components.
- For fire resistance, replace roofs, manage vegetation to reduce fuels and replace wooden water tanks.

¹Such measures include U.S. Army Corp of Engineers levees and other water management programs; National Oceanic and Atmospheric Administration early warning systems for weather; and U.S. Department of Agriculture (USDA) Forest Service prescribed burns.

The national-level BCRs aggregate study findings across natural hazards and across state and local BCRs. The *Interim Study* examined four specific natural hazards: riverine and coastal flooding, hurricanes, earthquakes and fires at the wildland-urban interface (WUI). Discussion of each hazard and the associated BCRs are provided in separate summaries.

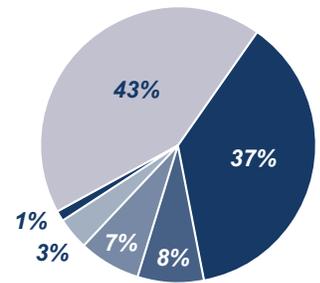
Natural Hazard Mitigation Saves in Every State

Every state in the contiguous United States is estimated to experience at least \$10 million in benefits from federal grants to mitigate flood, wind, earthquake, or fire at the wildland-urban interface. The majority of states enjoy at least \$1 billion in benefits. Four states—Louisiana, New Jersey, New York and Texas—enjoy at least \$10 billion in benefits. See Figure 2.

National Benefit-Cost Ratio Per Peril <small>*BCR numbers in this study have been rounded</small>		Federally Funded	Beyond Code Requirements
Overall Hazard Benefit-Cost Ratio		6:1	4:1
Riverine Flood		7:1	5:1
Hurricane Surge		Too few grants	7:1
Wind		5:1	5:1
Earthquake		3:1	4:1
Wildland-Urban Interface Fire		3:1	4:1

Benefit: \$157.9 billion

- 43% – Casualties & PTSD: \$68.1
 - 37% – Property: \$58.1
 - 8% – Additional living expenses & direct business interruption: \$12.9
 - 7% – Insurance: \$10.5
 - 4% – Indirect business interruption: \$6.3
 - 1% – Loss of service: \$2.0
- billions 2016 USD*



Cost: \$27.4 billion

Table 1. Benefit-Cost Ratio by Hazard and Mitigation Measure.

Figure 1. Total costs and benefits of 23 years of federal mitigation grants.

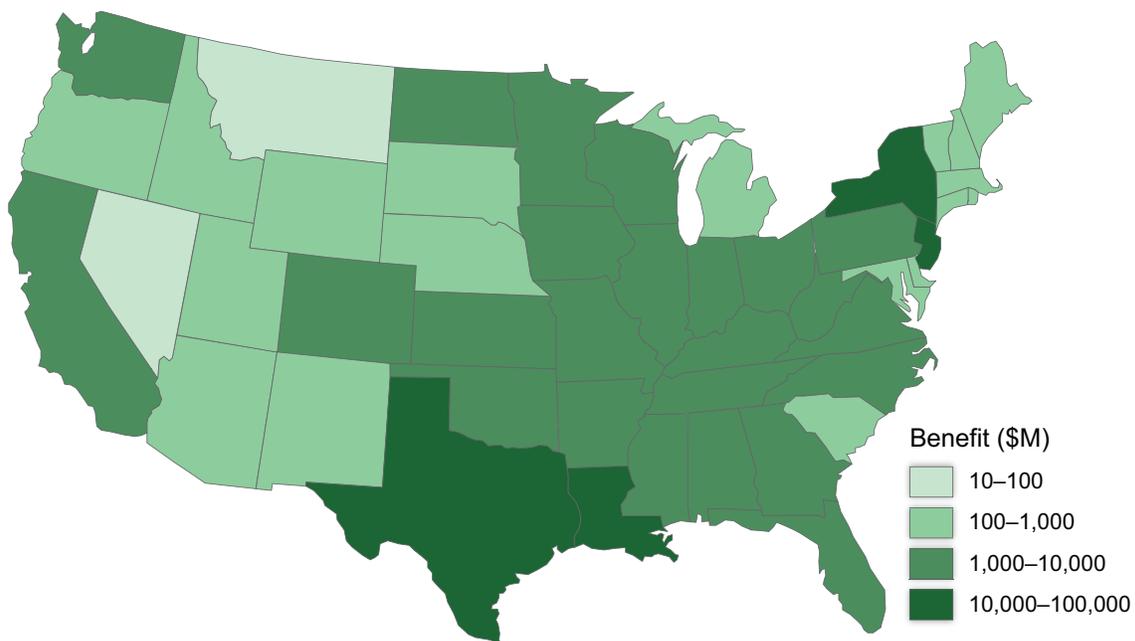


Figure 2. Aggregate benefit by state from federal grants for flood, wind, earthquake, and fire mitigation.