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THESIS

**INEQUITY IN ACTION: A QUANTITATIVE
ANALYSIS OF THE IMPLEMENTATION
OF STATE HAZARD MITIGATION PLANS**

by

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March 2023

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IMPLEMENTATION OF STATE HAZARD MITIGATION PLANS**

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ABSTRACT

As disasters become more frequent, intense, and costly, all levels of government are incentivized to reduce disaster risk. FEMA's Hazard Mitigation Grant Program (HMGP) provides competitive funding to cover much of the cost of mitigation projects after presidentially declared disasters. By creating a database of mitigation priorities (as quantified in FEMA-mandated state hazard mitigation plans) and analyzing their correlation with the actual distribution of HMGP funding, this thesis finds that there is no statistically significant relationship between priorities established for mitigation funding and the way it is ultimately spent. This lack of correlation is a negative impact of grant cost sharing. By requiring participating governments to provide a significant portion of the funding, federal law limits participation by poorer jurisdictions, regardless of how much money those projects may save FEMA in the long term. By eliminating the cost-sharing requirement and funding the entirety of selected projects, Congress would increase the pool of potential participants, make critical mitigation assistance available to under-resourced communities, and increase the value of the program by empowering states to select only the most valuable projects for funding.

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LIST OF ACRONYMS AND ABBREVIATIONS

BCA	Benefit-Cost Analysis
BCR	Benefit-Cost Ratio
BRIC	Building Resilient Infrastructure and Communities
DMA	Disaster Mitigation Act of 2000
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
GAO	Government Accountability Office
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
NFIP	National Flood Insurance Program
PA	Public Assistance
PDM	Pre-Disaster Mitigation
SLTT	State, Local, Tribal, Territorial
UHMA	Unified Hazard Mitigation Assistance

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EXECUTIVE SUMMARY

As disasters become more frequent, intense, and costly, all levels of government are incentivized to reduce disaster risk.¹ Hazard mitigation (“sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects”) aims to reduce these increasing impacts.² Many grant programs, including several from the Federal Emergency Management Agency (FEMA), can provide funding to local and state governments to complete mitigation projects. One such program, the Hazard Mitigation Grant Program (HMGP), provides post-disaster funding to states that have experienced major natural disasters to reduce their risk in future events. While FEMA must approve each project for eligibility, states administer these grants and decide which projects to prioritize for funding. Because this funding is limited in nature and demand can outpace supply, FEMA requires that states and local governments have FEMA-approved hazard mitigation plans to be eligible to participate. At the state level, these plans must articulate what types of projects are most important to that state and identify priorities for funding that becomes available.

Theoretically, states should be able to select projects for funding under HMGP that mirror the priorities outlined in their plans. We would thus expect a measurable correlation between these priority rankings and the actual distribution of HMGP funds across project types. This thesis seeks to quantitatively analyze this relationship, and documents an analysis that consisted of the following steps:

1. Creation of a database of the ranked hazard mitigation actions outlined in state plans, and conversion of the projects’ rankings and priorities to a common measurement of priority.

¹National Centers for Environmental Information, “Billion-Dollar Weather and Climate Disasters,” National Centers for Environmental Information, 2022, <https://www.ncdc.noaa.gov/billions/>.

² Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program* (Washington, DC: Department of Homeland Security, 2015), 1, https://www.fema.gov/sites/default/files/2020-07/fy15_HMA_Guidance.pdf.

2. Review of the HMGP grants obligated in these states for disasters declared in the years that the plan in question was or has been in effect.
3. Comparative analysis of the relationship between plan priorities and actual funding, and of what governmental, demographic, or other variables might influence that correlation.

A linear regression of the relationship between the priority points assigned to an action in the plan and the amount of funding states assigned to that action shows that there is no statistically significant relationship between these two variables. Worded differently, the types of projects that states identified as more important were not likely to receive more funding than those it listed as low priority ($p=0.95$, $R^2=1.606e^{-5}$). This degree of correlation was not measurably stronger in “enhanced” states (which FEMA has determined to have sufficiently robust state programs and expertise to grant them additional funding and responsibility for managing the program), indicating that states’ failure to implement their priorities is not due to a lack of state capacity or expertise. The correlation was not measurably stronger in states that hired professional contractors to write their plans, or in those with higher income. Population, population density, land area, housing availability, whiteness, and broadband access at home did not have any impact on this correlation either, indicating that a state’s demographic and socioeconomic report card has no bearing on whether its priorities get implemented. These findings together indicate that our collective inability to implement our hazard mitigation priorities represents a structural issue with the design of the program.

While mitigation projects generally provide long-term financial benefits, they tend to be expensive, and FEMA generally only funds 75% of eligible costs with their grants.³ Many communities are unable to fund the non-federal share of hazard mitigation measures due to budget constraints or a lack of political will, even if they are expected to represent

³ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 26.

a cost savings in the long term.⁴ Unless a state that is actively recovering from a major disaster wants (and is able) to cover the remaining 25% of project costs, often increasing their hefty disaster bill by tens of millions of dollars, they will be choosing from a pool of applications that were submitted exclusively by communities with the resources and funding to do so. States that have been given HMGP grants have often struggled to find enough communities who are able to utilize the mitigation funding made available to them, particularly in the cost-strapped months and years following a major disaster. A significant number of the projects funded in the review period (567 of the 980 analyzed projects) were for project types that were not reflected in that state's plan at all. This supports the assertion that states are not necessarily selecting projects to fund based on what they think is the most important, but rather based on what they are asked to fund by the local governments who can afford to participate.

Providing funding only to communities that have the resources to take part in this complex and expensive processes without support is not risk-informed decision making and represents a significant detriment of the overall value of the HMGP program. Congress can make significant progress in reducing disaster inequity and increasing the value provided by post-disaster mitigation funding by making two simple changes to the structure of the program:

1. Remove non-federal matching requirements, and fund projects at 100%.
2. Increase minimum required BCR from 1.0 to 1.33.

Congress has determined that projects with a 1.0 BCR provide enough return on investment to justify the federal government covering 75% of the cost. If Congress removes the cost-sharing requirement, using the same funding that would already have been made be made available to cover 100% of a smaller number of projects (instead of only 75% of a larger number of projects), a much broader pool of communities would be able to

⁴ Department of Homeland Security, Office of Inspector General, *FEMA Has Not Prioritized Compliance with the Disaster Mitigation Act of 2000, Hindering Its Ability to Reduce Repetitive Damages to Roads and Bridges*, OIG-21-43 (Washington, DC: Department of Homeland Security, Office of Inspector General, 2021), <https://www.oig.dhs.gov/reports/2021/fema-has-not-prioritized-compliance-disaster-mitigation-act-2000-hindering-its-ability-reduce-repetitive-damages-roads-and-bridges/oig>.

participate in federally funded hazard mitigation. If cost share was not a barrier to entry, states could approach the communities at risk and work with them directly to access federal funding for the highest priority and most effective projects. States would be able to make risk informed, strategic choices about spending their mitigation funding and implementing the goals outlined in their plans. Congress could allow FEMA to keep the same total program costs and the same relative benefits for its spending by increasing the minimum BCR of HMA projects to 1.33, a highly achievable threshold that is well below the average for HMGP-funded projects.

Hazard mitigation planning and action are too important (and too expensive) to be inefficient. FEMA and the states collectively spend tens of millions of dollars per year on mitigation planning and hundreds of millions of dollars on mitigation projects, with a goal of creating the greatest possible reduction in risk for the greatest number of people. Limiting that funding to communities with enough funding to participate directly undercuts that goal, and has led to a national pattern of scattershot mitigation action and a structural inability for state strategies to be implemented. An extremely simple change to the calculations, with a minimal impact on workload at all levels of government, would make a profound positive impact on the nation's ability to withstand increasingly frequent and severe disasters.

ACKNOWLEDGMENTS

Thank you, Steve.

Lucky us!

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*“The test of our progress is not whether we add more
to the abundance of those who have much; it is whether
we provide enough for those who have too little.”*

— Franklin D. Roosevelt

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I. INTRODUCTION

A. BACKGROUND

Disasters are becoming more frequent, more intense, and more costly. Since 1980, there have been 308 disasters in the United States that caused more than \$1 billion in damages, according to estimates from NOAA.¹ In the 1980s, there were an average of 3.1 such incidents per year (adjusting for inflation). In the 2010s, there were an average of 12.8. So far in the 2020s, there have been an average of 20.² In the 1980s, 2,870 Americans were killed by natural disasters. In the 2010s, despite technological advances in forecasting and other public safety measures that enhanced the ability to protect Americans from the impacts of disasters, there were 5,224 such deaths, an 82% increase.³ These disasters place a significant financial and logistical burden on municipalities, counties, states, and the federal government, who share much of the cost of responding to and recovering from such events. The Federal Emergency Management Agency (FEMA) shoulders much of the burden of paying for disasters through its Public Assistance (PA) program. The PA program provides funding to cover 75% of eligible costs incurred by municipalities, counties, states, tribes, and nonprofits in responding to and rebuilding from disasters that are not covered by insurance.⁴ The remaining 25% of those costs, which are borne by non-federal government entities like towns and states, can measure in the billions of dollars per year. FEMA has estimated that in Fiscal Year (FY) 2023, the agency will require \$19.7 billion in funding to cover disaster recovery costs, assuming no additional “catastrophic

¹ National Centers for Environmental Information “Billion-Dollar Weather and Climate Disasters,” National Centers for Environmental Information, 2022 <https://www.ncdc.noaa.gov/billions/>.

² National Centers for Environmental Information.

³ National Centers for Environmental Information.

⁴ Federal Emergency Management Agency, *Public Assistance Program and Policy Guide*, FP 104–009-2 (Washington, DC: Federal Emergency Management Agency, 2020), 25, https://www.fema.gov/sites/default/files/documents/fema_pappg-v4-updated-links_policy_6-1-2020.pdf.

events” (those that cost FEMA \$500 million or more) occur in that timeframe.⁵ Given these significant costs, FEMA and the communities it supports are strongly incentivized to reduce disaster risk.

Hazard mitigation is “any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects.”⁶ Many types of work fall under this definition. Structural and utility retrofits reduce the likelihood that buildings and utility generation and distribution infrastructure are rendered unusable after a disaster. Property acquisitions remove structures from the floodplain and convert land back to greenspace, providing flood reduction benefits to remaining structures. Tornado shelters reduce fatalities in severe weather events. Backup power allows critical facilities like 911 call centers, fire stations, and hospitals to continue operating during outages. According to FEMA, the overall goal of mitigation is to “reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident [and] reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.”⁷

Mitigation is one of the key phases of the perpetually ongoing cycle of preparedness and emergency management. Communities *prepare* for events before they happen (including the creation of emergency plans, exercises, and stockpiling of resources), *respond* to events as they occur, *recover* from those events, and *mitigate* against those events so future incidents are not as damaging, costly, or dangerous.⁸ Each event teaches

⁵ Federal Emergency Management Agency, *Disaster Relief Fund: Fiscal Year 2023 Funding Requirements* (Washington, DC: Department of Homeland Security, 2022), 4, <https://www.dhs.gov/sites/default/files/2022-06/FEMA%20-%20Disaster%20Relief%20Fund%20Fiscal%20Year%202023%20Funding%20Requirements.pdf>.

⁶ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program* (Washington, DC: Department of Homeland Security, 2015), 1, https://www.fema.gov/sites/default/files/2020-07/fy15_HMA_Guidance.pdf.

⁷ Federal Emergency Management Agency, 1.

⁸ Federal Emergency Management Agency, *National Preparedness Goal*, 2nd ed. (Department of Homeland Security, 2015), https://www.fema.gov/sites/default/files/2020-06/national_preparedness_goal_2nd_edition.pdf.

a community more about its vulnerability and necessitates updates to emergency operations plans to reflect that new knowledge. Mitigation is a necessary step in this process, as it allows communities to break the cycle of repeatedly repairing the same damage, facing the same preventable operational complications, or needing to meet the same preventable need.

The primary goal of hazard mitigation is to increase public safety and reduce the threat to human life posed by disasters. A secondary but critical benefit of mitigation is the cost savings it can create, which are often significant. The National Institute for Building Sciences recently estimated that the \$27.4 billion that FEMA spent on mitigation 1995 and 2020 will result in \$157.9 billion in cost reduction, a benefit-cost ratio (BCR) of roughly 6:1 (worded differently, for every dollar FEMA spent, we will collectively save approximately six dollars in the long term).⁹ Certain types of projects create much higher BCRs; for utility retrofits, this figure is often as high as 31:1. Figure 1 notes the average BCRs of mitigation projects for a variety of hazards.

National Institute of BUILDING SCIENCES™		ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
Overall Benefit-Cost Ratio		11:1	4:1	4:1	4:1	6:1
Cost (\$ billion)		\$1/year	\$4/year	\$520	\$0.6	\$27
Benefit (\$ billion)		\$13/year	\$16/year	\$2200	\$2.5	\$160
 Riverine Flood		6:1	5:1	6:1	8:1	7:1
 Hurricane Surge		not applicable	7:1	not applicable	not applicable	not applicable
 Wind		10:1	5:1	6:1	7:1	5:1
 Earthquake		12:1	4:1	13:1	3:1	3:1
 Wildland-Urban Interface Fire		not applicable	4:1	2:1	not applicable	3:1

Figure 1. The Financial Benefits of Hazard Mitigation¹⁰

Mitigation (reducing the impact of disasters on our infrastructure and resources when they occur) is a separate and distinct activity from *prevention*, the process of reducing

⁹ Multi-Hazard Mitigation Council, *Natural Hazard Mitigation Saves: 2019 Report* (Washington, DC: National Institute of Building Sciences, 2019), 10, <https://www.nibs.org/projects/natural-hazard-mitigation-saves-2019-report>.

¹⁰ Source: Multi-Hazard Mitigation Council, 2.

the likelihood that a human-caused event (such as a technological failure, attack, or other non-natural disaster) occurs at all.¹¹ The many grant programs from the Department of Homeland Security that fund these types of activities are outside of the scope of this thesis, which focuses on mitigating against the effects of *natural* disasters (like hurricanes, tornadoes, earthquakes), which the government (as of this writing) is unable to prevent from occurring.

1. The Unified Hazard Mitigation Assistance Grant Programs

While mitigation projects generally provide long-term financial benefits, these projects can be expensive. Many communities are unable to fund hazard mitigation measures directly due to budget constraints or a lack of political will.¹² Because FEMA bears such a significant portion of the burden of uninsured disaster costs through the Public Assistance program, FEMA is heavily incentivized to reduce disaster costs nationwide, as it will receive much of the benefit of that savings. The State, Local, Tribal, and Territorial (SLTT) governments that pay the remainder of these disaster-related costs (including the non-federal cost share of PA-funded projects, and the costs of projects that are not eligible for PA funding) are similarly incentivized to reduce their risk. The Stafford Act, which authorized the PA program, also authorized the Hazard Mitigation Assistance (HMA) grant programs, which provide funding for risk reduction measures at similar levels of cost sharing.¹³ There are three major grant programs underneath the Unified Hazard Mitigation Assistance (UHMA) umbrella: Flood Mitigation Assistance (FMA), Building Resilient Infrastructure and Communities (BRIC), and the Hazard Mitigation Grant Program (HMGP). Many of the key regulatory conditions, limitations, and requirements of these grants, including the requirement that the non-federal entity cover a significant portion of

¹¹ Federal Emergency Management Agency, *National Response Framework*, 4th ed. (Washington, DC: Department of Homeland Security, 2019), 12, https://www.fema.gov/sites/default/files/2020-04/NRF_FINALApproved_2011028.pdf.

¹² Chris Currie, *Hurricane Sandy: An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters*, GAO-15-515 (Washington, DC: Government Accountability Office, 2015), <https://www.gao.gov/products/gao-15-515>.

¹³ Robert T. Stafford Disaster Relief and Emergency Assistance Act, Pub. L. No. 100-707 102 Stat. 4689 (1988). <https://www.govinfo.gov/content/pkg/STATUTE-102/pdf/STATUTE-102-Pg4689.pdf>

the cost, are enshrined in the Stafford Act. FEMA is acting at the direction of Congress, and is unable to change many of the key elements of these programs without Congressional intervention.

a. *Flood Mitigation Assistance (FMA)*

Flood Mitigation Assistance (FMA) is funded through the National Flood Insurance Program (NFIP) and allows for nationally competitive grants to mitigate risk to structures with flood insurance policies.¹⁴ Its long-term aim is to increase the solvency of the NFIP by reducing the number of structures with severe, repetitive losses (four or more separate claims exceeding \$5,000, or at least two claims that cumulatively exceed the value of the structure).¹⁵ Because the primary beneficiary of these projects is the NFIP, FEMA provides grant funding through this program on a sliding scale, up to 100% federal funding for properties that have experienced the most severe loss.¹⁶ This funding is available annually, but is nationally competitive, and demand for the program has routinely outpaced the available funds.

b. *Building Resilient Infrastructure and Communities (BRIC)*

The Building Resilient Infrastructure and Communities (BRIC) program provides funding on an annual basis for a wide variety of mitigation work, in an amount tied to FEMA's overall disaster costs for the previous year.¹⁷ BRIC funding is largely awarded through a national competition, but there is generally also a moderate non-competitive amount set aside for each state. Maximum funding for BRIC each year is equal to 6% of federal post-disaster grant funding. For example, if FEMA spends \$100 billion in one year responding to disasters, there will be up to \$6 billion available the following year in BRIC funding. This represents a significant escalation of funding availability from the Pre-

¹⁴ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 5.

¹⁵ Federal Emergency Management Agency, 116.

¹⁶ Federal Emergency Management Agency, 26.

¹⁷ Federal Emergency Management Agency, *Mitigation Assistance: Building Resilient Infrastructure and Communities*, FP-104-008-05 (Washington, DC: Department of Homeland Security, 2022), <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>.

Disaster Mitigation (PDM) program, BRIC’s predecessor, which provided annual, nationally competitive grants in an amount determined annually by legislators through the routine budget process.¹⁸ The cost share for BRIC is generally 75% federal and 25% non-federal. As with FMA, demand for BRIC has outpaced the supply of funding.¹⁹

c. Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) is a *post-disaster* program that provides funding to states that have already been affected by a disaster. States can request funding from this program when they receive a Presidential Major Disaster Declaration under the Stafford Act, which is the administrative step that authorizes most FEMA recovery funding.²⁰ Funding for HMGP is equal to 15% of the total disaster cost. For example, if FEMA spends \$100 million responding to a disaster, that state can receive \$15 million in additional funding under HMGP for mitigation actions. This funding is competitive within the state, not nationally; for disasters that affect multiple states, each state would receive its own disaster declaration and its own HMGP funding. HMGP grants can provide up to 75% of the cost of a project, with the applicant paying the rest.²¹

Grants are provided to the states and territories (“grantees” or “recipients” or “applicants”), who in turn provide subgrants to communities and nonprofits (“subgrantees” or “subrecipients” or “subapplicants”). One of the key roles of the states in HMGP is making decisions about how available mitigation funding should be spent. Unlike other nationally competitive grant programs under HMA, FEMA does decide which applications are selected for HMGP funding. Although FEMA provides the funding for these programs,

¹⁸ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 4–5.

¹⁹ “Building Resilient Infrastructure and Communities FY 2020 Subapplication Status,” Building Resilient Infrastructure and Communities (BRIC), December 13, 2021, <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/after-apply/fy-2020-subapplication-status>; Federal Emergency Management Agency, “Building Resilient Infrastructure and Communities FY 2021 Subapplication and Selection Status,” Building Resilient Infrastructure and Communities (BRIC), October 31, 2022, <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/after-apply/fy-2021-subapplication-status#subapplications>.

²⁰ Emergency Management and Assistance, 44 C.F.R. 206 (1990), <https://www.ecfr.gov/current/title-44/chapter-I/subchapter-D/part-206?toc=1>.

²¹ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 26.

establishes regulatory guidelines for how they are implemented, and has veto power over what projects are funded, these grants are administered by the states and territories. While states retain the key decision-making power in how HMGP funds are utilized, it is important to note that FEMA has to approve every funded project as well. While states determine the order in which proposed mitigation projects are funded, FEMA has to individually review and approve each project the states wish to fund, including environmental and historic preservation, technical feasibility, and programmatic review.²²

States are also responsible for supporting communities in developing and refining grant applications, coordinating subapplicant compliance for requests for information during the application process, ensuring that the scope of work and budget for each project selected for funding are followed, ensuring that subgrantees comply with any applicable environmental or historic preservation laws or conditions, determining and documenting the total final cost of each grant funded project, reimbursing the subrecipients, and providing appropriate documentation to FEMA to close the individual subgrants. These supports are extremely necessary; 75% of jurisdictions recently interviewed by the Government Accountability Office (GAO) reported that the technical complexity of the application process (including engineering and grant management concerns) presented a barrier, and 100% of jurisdictions reported that the Benefit-Cost Analysis (BCA) process was a challenge.²³

FEMA provides management costs to the states (proportional to the total available funding) to hire staff to perform this work.²⁴ Figure 2 demonstrates the relationship between FEMA, applicants, and subapplicants (and, where relevant, end beneficiaries of grant funded projects like homeowners).

²² Federal Emergency Management Agency, 74–76.

²³ Chris Currie, *Disaster Resilience: Opportunities to Improve National Preparedness*, GAO-22-106046 (Washington, DC: Government Accountability Office, 2022), 8, <https://www.gao.gov/products/gao-22-106046>.

²⁴ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 402.

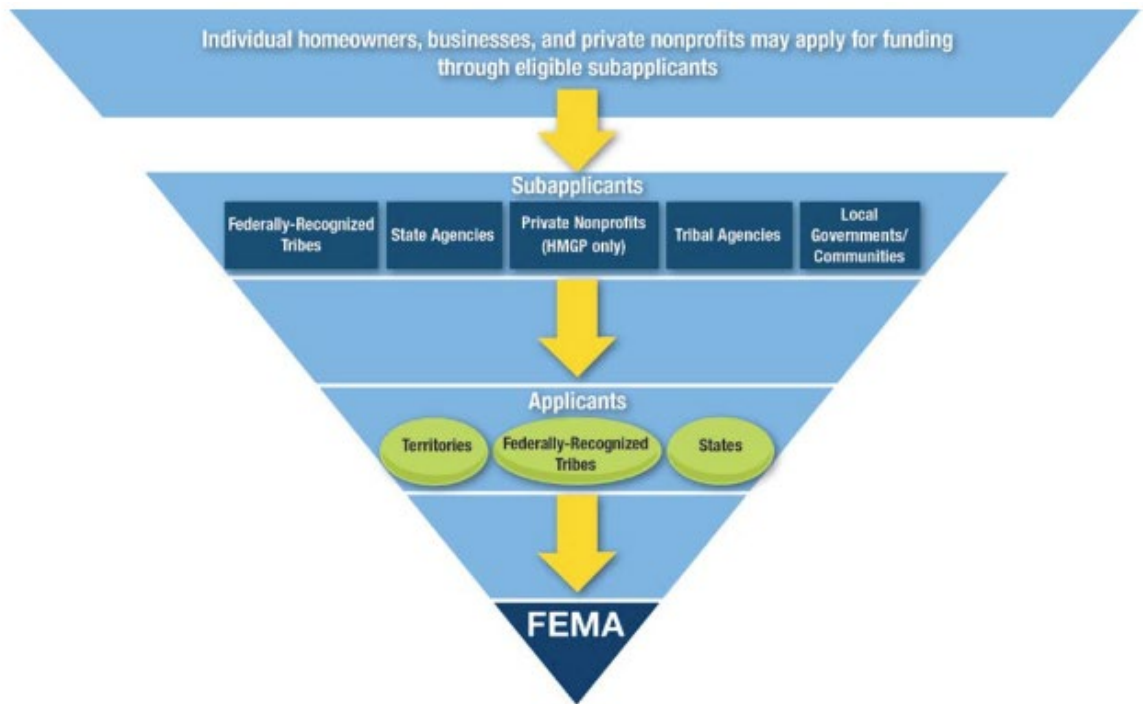


Figure 2. The Applicant-Subapplicant Relationship²⁵

The HMA programs cumulatively represent a massive investment of federal funds in hazard mitigation. The FY2020 BRIC program included \$500 million in funding, and the FY2021 BRIC program provided \$1 billion.²⁶ The FY2020 FMA program included almost \$200 million in funding.²⁷ For disasters declared since August 1, 2017, FEMA has obligated more than \$3.8 billion in HMGP funding to date.²⁸ Despite these significant investments, there is more demand for these programs than available funding. For the \$500

²⁵ Source: Federal Emergency Management Agency, 7.

²⁶ Federal Emergency Management Agency, “Building Resilient Infrastructure and Communities FY 2020 Subapplication Status”; Federal Emergency Management Agency, “Building Resilient Infrastructure and Communities FY 2021 Subapplication and Selection Status.”

²⁷ “Flood Mitigation Assistance FY 2020 Subapplication Status,” Flood Mitigation Assistance (FMA) Grant, December 28, 2021, <https://www.fema.gov/grants/mitigation/floods/previous-fiscal-year-subapplication-statuses/fy2020-subapplication-status>.

²⁸ “Disaster Relief Fund: Monthly Report as of January 31, 2023” (Federal Emergency Management Agency, February 7, 2023), 12, https://www.fema.gov/sites/default/files/documents/fema_disaster-relief-fund-report_112021.pdf.

million FY2020 BRIC grant, FEMA received 1,227 applications requesting \$4 billion in funding, and for the \$1B FY 2021 program, it received requests for \$4.16 billion.²⁹

Because grant funding for these mitigation programs is unable to meet demand, each program has a structure by which grant applications are prioritized. For FMA, states and territories rank each subapplication included in their overall application each year in order of funding priority, but FEMA ultimately makes the funding decisions.³⁰ For BRIC, FEMA takes a hybrid approach. A portion of the total funding is made available as a set-aside for each state, territory, and federally recognized tribe, who rank subapplications for funding within that small amount.³¹ The rest of the funding is nationally competitive, and FEMA makes decisions about how to distribute that funding based on a list of criteria and priorities that is published for each fiscal year.³² For HMGP, because funds are not nationally competitive, prioritization is left entirely to the states, who rank the subapplications sent to FEMA for review and approval.³³ These rankings determine who receives FEMA funding.

2. Hazard Mitigation Planning

To encourage the development of clear priorities, congress passed the Disaster Mitigation Act of 2000 (“DMA”). To increase local and state capacity, the DMA amended the Stafford Act to require SLTT entities to create hazard mitigation plans, which contemplate the hazards a community faces, the risk that those hazards pose to its critical assets, and which mitigation actions to prioritize when funding is available.³⁴ The goal is

²⁹ Federal Emergency Management Agency, “Building Resilient Infrastructure and Communities FY 2020 Subapplication Status”; Federal Emergency Management Agency, “Building Resilient Infrastructure and Communities FY 2021 Subapplication and Selection Status.”

³⁰ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 118.

³¹ Department of Homeland Security, Office of Inspector General, *The Department of Homeland Security (DHS) Notice of Funding Opportunity (NOFO)—Fiscal Year 2021 Building Resilient Infrastructure and Communities* (Washington, DC: Department of Homeland Security, 2021), 6–7, https://www.fema.gov/sites/default/files/documents/fema_nof-fiscal-year-2021-building-resilient-infrastructure.pdf.

³² Department of Homeland Security, Office of Inspector General, 6–7, 26–31.,

³³ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 52.

³⁴ Disaster Mitigation Act of 2000, Pub. L. No. 106–390 (2000), § Sec. 322 (c), 114 Stat. 1552 (2000).

to encourage communities to have a conversation about their risk before disasters occur, so that when they do (and post-disaster mitigation funds are available), they can incorporate hazard mitigation into their rebuilding efforts. To ensure that local and state plans were sufficiently robust, FEMA published guidelines for required content in these plans, and reviews plans for compliance with these guidelines.³⁵ A FEMA-approved hazard mitigation plan is a requirement at the local and state level to be eligible for HMA funding.³⁶ To support local governments in acquiring federal approval, states review plans before FEMA does and serve as subject matter experts.³⁷ State mitigation plans are reflective of the needs of communities statewide and are governed by separate guidance than local plans.³⁸

There is little guidance from FEMA on how to prioritize grant applications, or how to prioritize mitigation actions at the community level during the planning process. One of the key tools for identifying the relative value of these projects is Benefit Cost Analysis (BCA), the process of determining the ratio of costs to benefits (using FEMA's proprietary methodology and tools). FEMA requires a minimum BCR of 1.0; for each dollar spent on hazard mitigation, the project in question must save at least one dollar in future losses or costs.³⁹ Interestingly, FEMA guidance requires local plans to include cost-benefit analysis as a decision making factor in prioritization, but does not require states to do so.⁴⁰ This guidance provides no comprehensive national strategy identifying how limited mitigation funding is to be spent or prioritized, except to articulate what is and is not eligible for funding. There is limited, if any, scholarship regarding how limited mitigation funding

³⁵ Federal Emergency Management Agency, *Local Mitigation Plan Review Guide* (Washington, DC: Department of Homeland Security, 2011), https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-plan-review-guide_09_30_2011.pdf; Federal Emergency Management Agency, *State Mitigation Plan Review Guide*, PF 302–094–2 (Washington, DC: Department of Homeland Security, 2015), https://www.fema.gov/sites/default/files/2020-06/fema-state-mitigation-plan-review-guide_03-09-2015.pdf.

³⁶ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 44–46.

³⁷ Federal Emergency Management Agency, *Local Mitigation Plan Review Guide*, 31–34.

³⁸ Federal Emergency Management Agency, *State Mitigation Plan Review Guide*.

³⁹ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 64–65.

⁴⁰ Federal Emergency Management Agency, *Local Mitigation Plan Review Guide*, 25; Federal Emergency Management Agency, *State Mitigation Plan Review Guide*, 18.

should be prioritized at the SLTT level, except for a general agreement that BCR is important at a macro level. Communities are free to use their best judgement to establish priorities, but there is minimal guidance, scholarship, or support available to support this decision-making process.

3. Government Limitations

a. Local Limitations

Mitigation planning is an expensive and complex endeavor involving risk analysis, data, hydrological studies, plan document development, and community engagement.⁴¹ Many local governments, particularly in poor or rural areas, do not have the subject matter expertise or capacity to conduct the more technical aspects of the planning process.⁴² FEMA provides strong incentives for communities to develop these hazard mitigation plans (namely, continued eligibility for HMA funding), but provides very little support in doing so, or in implementing those plans once they are written. Mitigation planning is an eligible activity under some HMA programs, but those grants come at a cost to local governments (who can apply for FEMA funding to pay 75% of the cost of planning).⁴³ Because the process is technically complex and requires a significant amount of staff time and expertise, many communities turn to contractors to write their hazard mitigation plans on their behalf. The cost of doing so can easily exhaust a community's budget for completing mitigation work, if it exists.

While the number of mitigation plans has increased significantly since the passage of the DMA, a 2012 study found that the quality of those plans tends to be low, as those plans are written to meet FEMA specifications and not community needs.⁴⁴ This is

⁴¹ Federal Emergency Management Agency, *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies*, Local Mitigation Planning How-To Guide (Washington, DC: Department of Homeland Security, 2003).

⁴² Currie, *Disaster Resilience*, 2022.

⁴³ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 26–28.

⁴⁴ Ward Lyles, Philip Berke, and Gavin Smith, *Evaluation of Local Hazard Mitigation Plan Quality* (Chapel Hill, NC: Center for Sustainable Community Design and Coastal Hazards Center, 2012), <http://mitigationguide.org/wp-content/uploads/2013/01/Evaluation-of-Local-HMP-Quality-full.pdf>.

particularly true when under-resourced communities hire consultants to write their plans for them, further distancing the planning process from an understanding of community's needs. The goal of the mitigation plan requirement is for communities to be prepared to implement hazard mitigation measures as soon as funding is available, but low-quality plans that do not reflect public concerns, accurate assessments of risk, or detailed project proposals are a less-than-useful tool in this endeavor.

FEMA requires communities to identify specific hazard mitigation actions in their plans, but the process of articulating the solution to a complicated problem can itself be expensive. Many plans identify addressing specific structural issues as a priority, but do not contain any specific information as to how that might be done, because hiring an engineer to develop a scope of work for a project application, or even to accurately identify the source of a problem, can cost hundreds of thousands of dollars. Gathering the documentation FEMA requires to apply for its grant programs (including schematics, architectural drawings, and sometimes environmental impact or hydrological studies) can involve undertaking significant cost, which may be out of reach for many communities.

Public engagement is also a key part of developing a useful mitigation plan. FEMA asserts that its requirement to update mitigation plans every five years has made them “more inclusive and actionable,” with a wider variety of participating partners and stronger community engagement.⁴⁵ However, analysis of local plans across the U.S. indicates that this is not the case. While engaging the whole community in a planning process helps generate buy-in and fosters the development of plans that the community wants to see implemented, this is difficult to achieve and expensive, and many communities do the bare minimum amount of engagement that is required by FEMA.⁴⁶ This is particularly true for contractor-written plans. Outsourcing this planning work to a third party may reduce the degree of holistic community input that is possible. Plans that are written without

⁴⁵ Kathy Smith, “The Disaster Mitigation Act of 2000: 20 Years of Mitigation Planning,” *News & Multimedia* (blog), October 19, 2020, <https://www.fema.gov/blog/disaster-mitigation-act-2000-20-years-mitigation-planning>.

⁴⁶ Jennifer Horney et al., “Assessing the Quality of Rural Hazard Mitigation Plans in the Southeastern United States,” *Journal of Planning Education and Research* 37, no. 1 (2017): 56–65, <https://doi.org/10.1177/0739456X16628605>.

community input are less likely to be representative of community wants and needs, and plans that are not backed by community support are likely to have the political support needed to be implemented, which would affect the availability of funding for those efforts in the long term. A Government Accountability Office (GAO) report following Hurricane Sandy described a common scenario:

Officials in one state we visited described an example where they had initially planned to use HMGP funds for flood control measures in the economic center of a small town that regularly floods—a project they had determined was the best path to enhancing the state’s overall disaster resilience. However, in the wake of the disaster, political considerations trumped their experience and professional judgment, and the funds were used instead to elevate beachfront properties.⁴⁷

Even for communities that have the resources to undertake a comprehensive and holistic planning process, the process of receiving FEMA plan approval can be challenging. Making iterative revisions to a plan the community has already agreed upon for the sake of FEMA approval represents yet another cost. In its post-Sandy report, the GAO noted that many communities struggled to receive plan approval for reasons unrelated to the plans’ value to their community:

The officials stated that among the reasons why FEMA returned the two plans were that they did not contain a definition of “hurricane,” did not follow the agency’s formatting guidelines, or because they included hazard mitigation activities that were not eligible for FEMA funding but may have been of benefit to the local jurisdictions.⁴⁸

b. State Limitations

States, too, are structurally limited in their support of effective and valuable mitigation planning. The DMA underscored the importance of the role of the state in supporting communities interested in pursuing hazard mitigation but does not provide them with the resources required to build such programs.⁴⁹ When FEMA awards grants to states,

⁴⁷ Currie, *Hurricane Sandy*, 35.

⁴⁸ Currie, 24–25.

⁴⁹ Gavin Smith, Ward Lyles, and Philip Berke, “The Role of the State in Building Local Capacity and Commitment for Hazard Mitigation Planning,” *International Journal of Mass Emergencies and Disasters* 31, no. 2 (August 2013): 178–203.

it includes management costs to allow them to hire and train staff and purchase equipment to support subrecipients. This funding, though, is not available until SLTTs successfully apply for and receive grants to perform mitigation projects in those states. Due to a lack of funding in states that have not received mitigation grants recently, there is little to no state support for communities interested in mitigation. For post-disaster grants, states must rapidly train staff to provide support to local governments in applying for competitive grants, using management cost funding that is not made available until several months after the disaster occurs, as grant deadlines begin to approach. States do a good job managing the administrative requirements of a passthrough entity, but generally are not able to maintain the expertise required to provide the technical assistance local governments need.⁵⁰ Due to these constraints, the emphasis of state support in the grant application and plan approval processes is meeting FEMA’s minimum requirements, not on developing plans that comprehensively address community risk, or conducting projects that provide the maximum benefit or add value at the local level.⁵¹

States face the same issues and challenges in developing their state hazard mitigation plans as local governments, and struggle similarly with community engagement, technical issues, and prioritization. The funding that FEMA provides for this effort is again the same funding that is used for mitigation action, putting the need to plan in competition for funding with the need to take action. The process of prioritizing at the state level is similarly subject to politicization and bias.

While mitigation planning is eligible as a standalone activity under some HMA programs, there are relatively few resources available to increase SLTT capacity to conduct mitigation planning and activities, as FEMA generally only provides states with funding to manage their mitigation programs when they have already received federal grants.⁵² States are not incentivized (or funded) to maintain subject matter expertise and capability when

⁵⁰ Gavin Smith and Olivia Vila, “A National Evaluation of State and Territory Roles in Hazard Mitigation: Building Local Capacity to Implement FEMA Hazard Mitigation Assistance Grants,” *Sustainability* 12, no. 23 (2020): 1–18, <https://doi.org/10.3390/su122310013>.

⁵¹ Smith, Lyles, and Berke, “The Role of the State in Building Local Capacity.”

⁵² Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 41–42.

there have not been any recent major disasters, even though providing technical and capacity-building support to local governments is a key role of the states. States with frequent disasters, and those with large budgets, maintain more staffing and subject matter expertise than their less-resourced neighbors, increasing their ability to receive additional mitigation funding for their communities.

c. Federal Limitations

The federal government struggles with prioritizing hazard mitigation actions and creating comprehensive strategies to address risk and utilize limited funds effectively. The Disaster Recovery Reform Act of 2018 (“DRRA”) required FEMA to find a way to prioritize mitigation projects that address facilities that have been repeatedly damaged, and repeatedly repaired with FEMA funds.⁵³ They have not done so, citing capacity limitations caused by the ongoing burden of responding to and recovering from recent disasters. In its post-Sandy report, the GAO noted that:

[t]here is no comprehensive, strategic approach to identifying, prioritizing, and implementing investments for disaster resilience, which increases the risk that the federal government and nonfederal partners will experience lower returns on investments or lost opportunities to strengthen key critical infrastructure and lifelines.⁵⁴

Like their local and state counterparts, the FEMA mitigation workforce has a significant post-disaster workload that encourages a reactionary approach to managing risk. At a broader level, there is minimal coordination among FEMA and the other federal agencies that provide funding for mitigation.⁵⁵ Varied regulatory structures mean that federal mitigation programs implemented in response to the same disaster will have entirely different timelines and requirements, which poses a challenge for communities looking to identify sources of mitigation funding during the rebuilding process.

⁵³ Disaster Recovery Reform Act, Pub. L. No. 115–254, § 1201–1246, 132 Stat. 3438–3469 (2018).

⁵⁴ Currie, *Hurricane Sandy*, Highlights.

⁵⁵ Currie, *Hurricane Sandy*.

4. Problem Statement

FEMA's HMA programs and mitigation planning requirements create a complex and interdependent system that ultimately relies on local governments' willingness to perform much of the work to address risk. Because the barriers to entry for local government are so high, the question of identifying priority projects (at local and state level) is moot, as the real limiting factor is local capacity. To conduct a FEMA-funded mitigation project, a community needs to (at minimum) expend funds to develop a hazard mitigation plan to FEMA's strict standards, get their plan approved, wait for funding to be available (through an annual competitive opportunity, or after a disaster), conduct a complex benefit-cost analysis, scoping, and design in support of an application for a grant that it may or may not receive (often while responding to or recovering from a disaster), wait (often upwards of a year) for project approval, expend their own funds to conduct the work, submit documentation for reimbursement, and wait for reimbursement from the State, which may deny their claim for reimbursement if it identifies issues with procurement and documentation.⁵⁶

Addressing issues of equity in the implementation of HMA programs is a stated FEMA priority, but much work remains in this area. While grant applications generally exceed funding availability, those applications do not necessarily come from a representative sample of the population. FEMA provides an overwhelming majority of its HMA funding post-disaster through the HMGP program. In the federal fiscal years 2010–2018, FEMA awarded \$11.3 billion in total mitigation funding, of which \$10 billion (88%) was only made available after major disaster.⁵⁷ Disasters have been proven to exacerbate existing inequality, and communities that had minimal resources before an incident are likely to be even less able to participate in these programs while they are still responding to and recovering from a disaster. If the pool of applications for a funding opportunity

⁵⁶ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 87; Uniform Administration requirements, Cost Principles, and Audit requirements for Federal Awards, 2 C.F.R. 200 (2023), <https://www.ecfr.gov/current/title-2/subtitle-A/chapter-II/part-200?toc=1>.

⁵⁷ Chris Currie, *Disaster Resilience: FEMA Should Take Additional Steps to Streamline Hazard Mitigation Grants and Assess Program Effects*, GAO-21-140 (Washington, DC: Government Accountability Office, 2021), <https://www.gao.gov/products/gao-21-140>.

represents only communities that have the resources to participate in the planning and grant processes without support, the state will only be able to spend their mitigation funds on communities that can afford to receive it. This is not risk-informed decision making, and represents a significant detriment to the overall value of the HMGP program.

FEMA allows up to 7% of all HMGP funding to be used to write mitigation plans for its approval, representing an investment of \$174,182,263 of HMGP funding by the end of 2022.⁵⁸ These figures reflect only grants FEMA provides for planning, and do not include their overhead costs, which may be significant. FEMA maintains a staff at each of the ten FEMA regional offices to review and approve mitigation plans, and validate that every grant request is “consistent with the goals and objectives identified in the current, FEMA-approved State or Tribal (Standard or Enhanced) Mitigation Plan as well as the local or Tribal Mitigation Plan for the jurisdiction in which the activity is located,” and headquarters expends significant effort to routinely promulgating and updating planning guidance.⁵⁹ If a primary goal of hazard mitigation grant funding is to reduce local and state reliance on the Federal government for disaster relief in the long term, it is of vital importance that the priorities outlined in these \$174 million in federally funded hazard mitigation plans are actually implemented. There is no data or research available that considers the degree to which state hazard mitigation plans are ultimately utilized. If they are not adding value, the expensive national mitigation planning infrastructure may simply be draining funds that could be used for hazard mitigation projects, or to support applicants in applying for funding.

B. RESEARCH QUESTION

What is the relationship between states’ mitigation priorities and the types of mitigation projects FEMA funds in those states?

⁵⁸ “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3,” accessed January 5, 2023, <https://www.fema.gov/openfema-data-page/hazard-mitigation-assistance-projects-v3>.

⁵⁹ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*.

C. LITERATURE REVIEW

1. Measuring Plan Quality

Several authors investigated (and attempted to analyze quantitatively) the quality of mitigation plans, primarily at the local level. Many use the strategy outlined by Berke and Godschalk in 2009 to assess the quality of plans. It recommends analyzing both “external plan quality” (its acknowledgment of and suitability to address actual conditions in the community and the degree to which it takes the needs of stakeholders into account) and “internal plan quality” (its basis in fact, goals, policies, and implementation strategy).⁶⁰ Notably, this methodology does not explicitly address hazard mitigation plans or how to assess the degree of plan implementation.

Horney et al. analyzed the HMPs of twelve randomly selected rural counties in each state in FEMA Region IV.⁶¹ They employed the methods outlined by Berke and Godschalk to rate the degree to which they achieved “direction setting principles” and “action-oriented principles” of plan quality. They found that plan quality is low in rural areas, noting that a lack of resources and expertise and the need to hire contractors to complete this work may be contributing factors. This assessment was limited to local rural plans and within only one region, and its findings may not represent the whole country.

In “Evaluation of Local Hazard Mitigation Plan Quality,” Lyles, Berke, and Smith perform a similar analysis, randomly sampling LHMPs from six coastal states (CA, FL, GA, NC, TX, and WA).⁶² They find that the quality of LMHPs in these states is “moderate to weak overall and varies widely” and that improvement is needed. Their limitation to coastal states again undercuts the generalizability of this analysis to the entire nation. Using a similar methodology, Frazier et al.’s study of HMPs in the state of Washington finds

⁶⁰ Philip Berke and David Godschalk, “Searching for the Good Plan: A Meta-Analysis of Plan Quality Studies,” *Journal of Planning Literature* 23, no. 3 (2009): 227–40, <https://doi.org/10.1177/0885412208327014>.

⁶¹ Horney et al., “Assessing the Quality of Rural Hazard Mitigation.”

⁶² Lyles, Berke, and Smith, *Evaluation of Local Hazard Mitigation Plan Quality*.

significant quality differences between urban and rural hazard mitigation plans, indicating that resource shortages may be a contributing factor.⁶³

Although much of the literature assesses the quality of local hazard mitigation plans in the United States, few studies analyze that of state plans or the national mitigation strategy. Lyles, Berke, and Smith found a “moderate” level of implementation of local hazard mitigation plans, but their methodology focused on a survey about the status of individual policies, not funding or grant data.⁶⁴ Berke, Smith, and Lyles find in a separate study that planning quality is highly inconsistent from one state to another, and the overall quality of state hazard mitigation plans requires improvement.⁶⁵ Although the federal government does not have to have a national hazard mitigation plan that prioritizes specific types of hazard mitigation or analyzes risk nationally, a GAO report notes that:

There is no comprehensive, strategic approach to identifying, prioritizing and implementing investments for disaster resilience, which increases the risk that the federal government and non-federal partners will experience lower returns on investments or lost opportunities to strengthen key critical infrastructure and lifelines.⁶⁶

While FEMA publishes policy-focused mitigation planning guidance, evidence-based quality indicators for state hazard mitigation plans are lacking, and the existing literature does not analyze the degree to which a plan’s priority implementation indicates plan quality. The quality and usefulness of state hazard mitigation planning, which represents a tremendous ongoing local, state, and federal investment, and the value of federally regulated hazard mitigation planning as a practice, require further analysis.

⁶³ Tim G. Frazier et al., “Opportunities and Constraints to Hazard Mitigation Planning,” *Applied Geography* 40 (June 2013): 52–60, <https://doi.org/10.1016/j.apgeog.2013.01.008>.

⁶⁴ Ward Lyles, Philip Berke, and Gavin Smith, “Local Plan Implementation: Assessing Conformance and Influence of Local Plans in the United States,” *Environment and Planning B: Planning and Design* 43, no. 2 (2016): 381–400, <https://doi.org/10.1177/0265813515604071>.

⁶⁵ Philip Berke, Gavin Smith, and Ward Lyles, “Planning for Resiliency: Evaluation of State Hazard Mitigation Plans under the Disaster Mitigation Act,” *Natural Hazards Review* 13, no. 2 (May 2012): 139–49, [https://doi.org/10.1061/\(ASCE\)NH.1527-6996.0000063](https://doi.org/10.1061/(ASCE)NH.1527-6996.0000063).

⁶⁶ Currie, *Hurricane Sandy*, Highlights.

2. Quantifying Mitigation's Value

Local, state, and federal hazard mitigation spending is often politically justified by the long-term cost savings it can create. This puts measurable trust in the methodologies by which those savings are calculated, and on the underlying research supporting those calculations. It would be logical for all levels of government to closely track their hazard mitigation spending and the return on their investment, but in a 2018 brief, the Pew Charitable Trust found that neither states nor the federal government maintained clear visibility on their spending on mitigation across agencies, programs, grants, and projects, and thus are ill-equipped to make informed and efficient mitigation spending choices.⁶⁷ However, attempts to quantify the value of mitigation (from the project to national levels) have certainly been made. Godschalk first analyzed the overall financial impacts and cost savings stemming from federally funded hazard mitigation in 2009, and found that taxpayers saved four dollars for every dollar in spending.⁶⁸ In 2020, the National Institute of Building Sciences found that the federal government now saves closer to \$6 for every dollar in mitigation spending (as outlined in Figure 1), with certain project types bringing much higher rates of return on investment (13:1 for earthquake retrofits, 8:1 for utility retrofits against flooding).⁶⁹ Notably, in their publication of this data, they noted the need for benefit-cost analysis tools and actuarial tables to be updated to address the degree to which disasters disproportionately affect disadvantaged populations. Existing scholarly analysis of mitigation's value is largely limited to the financial benefits of infrastructure strengthening. Exploration of qualitative and non-financial benefits of mitigation may be needed to make wholistically risk-informed decisions.

⁶⁷ Anne Stauffer, Justin Theal, and Colin Foard, *Natural Disaster Mitigation Spending Not Comprehensively Tracked* (Washington, DC: The Pew Charitable Trusts, 2008), <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2018/09/natural-disaster-mitigation-spending--not-comprehensively-tracked>.

⁶⁸ David R. Godschalk, "Estimating the Value of Foresight: Aggregate Analysis of Natural Hazard Mitigation Benefits and Costs," *Journal of Environmental Planning and Management* 52, no. 6 (2009): 739–56.

⁶⁹ Multi-Hazard Mitigation Council, *Natural Hazard Mitigation Saves*.

3. Gaps in the Literature

The volume of extant research on the value and efficiency of the U.S. government's spending on physical infrastructure investments is justified, given the significant (and rapidly increasing) amount of money routinely dedicated to those efforts. However, a notable amount of federal mitigation funding is spent on planning efforts. The diversion of funding for mitigation action to mitigation planning could have a significant cumulative effect on our resilience to the impacts of natural disasters. The literature fails to sufficiently contemplate the return on those planning investments. This thesis endeavors to address this gap by analyzing the degree to which the recommendations made by state hazard mitigation plans are implemented, when the chance is presented, as a proxy for their actual usefulness and importance to the jurisdictions that adopted them.

D. RESEARCH DESIGN

One of the FEMA approval requirements is that state hazard mitigation plans describe how the state will prioritize projects for mitigation funding. A majority of states meet this requirement by assigning a rank or score to pre-identified mitigation actions. This research will examine the correlation between the stated priorities in State Hazard Mitigation Plans and the types of projects funded by FEMA's Hazard Mitigation Grant Program (HMGP). State plans are generally publicly available online, and information regarding HMGP grants awarded to each state is available via the OpenFEMA public datasets. Many factors influence whether or not a project is selected for funding, but if states are generally successful in implementing the priorities outlined in their plans, the types of projects they prioritize should be the most likely to be funded. Because each state must update and receive federal approval of its plan every five years, the period of review for each state will be the four years following the approval of a recent plan. This assessment will not include territories, protectorates, or federally recognized tribes, even though those groups are eligible to participate in the HMGP program, as the factors affecting implementation in those governments may be fundamentally different.

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II. DATA COLLECTION AND REVIEW

A. STATE HAZARD MITIGATION PLANS

1. Background

a. *Federal Guidance*

The 2015 State Mitigation Plan Review Guide represents FEMA’s official interpretation of the state hazard mitigation planning requirements established in 44 CFR (inclusive of Stafford Act as amended by DMA2000), articulating the criteria by which FEMA will measure the completeness (and thus ability to approve) a state hazard mitigation plan.⁷⁴ It provides a crosswalk of the specific requirements FEMA has identified to meet each of the regulatory planning requirements outlined in the law itself. To ease federal review, many states directly cite these requirements from the guide at the top of the sections of their plans that meet those criteria.

The sections of this guide relevant to this analysis are requirements S8 (“Does the mitigation strategy include goals to reduce long-term vulnerabilities from the identified hazards? [44 CFR §201.4(c)(3)(i)]”) and S9. (“Does the plan prioritize mitigation actions to reduce vulnerabilities identified in the risk assessment? [44 CFR §§201.4(c)(iii) and (iv)]”⁷⁵ Those legal requirements, under a subsection describing mandatory elements of a state hazard mitigation plan, are:

- 44 CFR §201.4(c)(3)(i): “A description of State goals to guide the selection of activities to mitigate and reduce potential losses.”⁷⁶
- 44 CFR §201.4(c)(3)(iii): “An identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy. This

⁷⁴ Federal Emergency Management Agency, *State Mitigation Plan Review Guide*.

⁷⁵ Federal Emergency Management Agency, 18.

⁷⁶ Federal Emergency Management Agency, 18.

section should be linked to local plans, where specific local actions and projects are identified.”⁷⁷

- 44 CFR §201.4(c)(3)(iv): “Identification of current and potential sources of Federal, State, local, or private funding to implement mitigation activities.”⁷⁸

Figure 3 articulates additional detail related to these requirements.

ELEMENT	REQUIREMENTS
S8. Does the mitigation strategy include goals to reduce long-term vulnerabilities from the identified hazards? [44 CFR §201.4(c)(3)(i)⁷⁸] Intent: To guide development and implementation of hazard mitigation actions. Goals are statements of the vision for the future.	a. The plan must identify hazard mitigation goals representing what the state seeks to accomplish through mitigation plan implementation. b. The goals must be consistent with the hazards and vulnerabilities identified in the risk assessment. c. The goals must address reducing the vulnerability of jurisdictions within the state as well as the vulnerability of state-owned or operated buildings, infrastructure, and critical facilities. d. <i>If the state is interested in an increased Federal cost share under the FMA program, the plan must include goals to address RL and SRL properties. (See RL2 in Section 3.8 Repetitive Loss Strategy.)</i> Goals are broad, long-term policy and vision statements that explain what is to be achieved by implementing the mitigation strategy.
S9. Does the plan prioritize mitigation actions to reduce vulnerabilities identified in the risk assessment? [44 CFR §201.4(c)(3)(iii)⁷⁹ and (iv)²⁰] Intent: To establish specific hazard mitigation actions that will be implemented to reduce the vulnerabilities identified in the risk assessment. This is the heart of the mitigation plan, and is essential to leading statewide mitigation programs to reduce risk.	a. The plan must identify actions based on the current risk assessment to reduce the vulnerability of jurisdictions within the state as well as the vulnerability of state-owned or operated buildings, infrastructure, and critical facilities. b. The plan must describe the process used by the state to evaluate and prioritize actions that are cost effective, environmentally sound, and technically feasible. c. The plan must describe how each action contributes to the hazard mitigation goals. d. The plan must describe how the local and tribal, as applicable, mitigation strategies are linked with the state mitigation strategy. e. <i>If the state is interested in an increased Federal cost share under the FMA program, the plan must address RL and SRL properties in the risk assessment. (See RL3 in Section 3.8 Repetitive Loss Strategy.)</i>

Figure 3. Prioritization Requirement in Federal Guidance⁷⁹

⁷⁷ Federal Emergency Management Agency, 18.

⁷⁸ Federal Emergency Management Agency, 18.

⁷⁹ Source: Federal Emergency Management Agency, 18.

b. FEMA Process Recommendations

The 2015 planning guidance argues that the mitigation strategy in the state hazard mitigation plan serves as a clear path to funding, saving states time and effort in decision making when funding is available:

The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment, or in other words the mitigation strategy represents risk-based decisions. Included in the strategy are goals, or the long-term policy statements and global visions that support the mitigation strategy. The Stafford Act directs state mitigation plans to identify hazard mitigation goals and actions and establish a strategy to implement those actions.⁸⁰

In the current iteration of the planning guidance, FEMA does not identify or recommend a specific methodology for prioritizing individual hazard mitigation actions. It simply requires that (1) the plan identifies mitigation actions, and (2) the plan describes the process used to prioritize mitigation actions. It does not directly require that the listed actions be given a quantitative prioritization. However, previous guidance did. For the 2003 planning guide, FEMA developed the “STAPLEE” method, which asks states to “consider in a systematic way the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) opportunities and constraints of implementing a particular mitigation action.”⁸¹ This methodology and associated worksheets encouraged a quantitative approach to prioritizing actions in which each potential action is given a relative level of priority in order to support state decision making. While FEMA has backed away from requiring quantitative prioritization, this is still a common methodology, with 40 of the 50 state plans reviewed for this thesis using STAPLEE or a similar crosswalk process. Ultimately, most states either interpret FEMA planning guidance to mean that quantitative prioritization is necessary, or that it is the clearest way to communicate to FEMA that it has appropriately considered what is most important.

⁸⁰ Federal Emergency Management Agency, 17.

⁸¹ Federal Emergency Management Agency, *Developing the Mitigation Plan*, 2–12.

2. Methodology

For the 40 states that utilized a quantitative approach to prioritizing their mitigation actions, each individual recommended action, along with its associated priority rating, was captured in an excel spreadsheet and assigned to one or more FEMA Project Type Codes. Those 40 states are listed in Appendix A.

a. Action Coding

FEMA uses its Project Type Codes to categorize mitigation actions that are ultimately funded. The master list of codes used in this analysis was pulled from the OpenFEMA datasets of HMGP funded projects that are utilized in the comparative analysis of this thesis.⁸² Those 118 codes were then subdivided into categories for ease of analysis. Those categories were:

- Acquisition, Elevation, and Relocation
- Code Design and Implementation
- Management Costs
- Other
- Planning
- Public Awareness
- Retrofit (non-flood)
- Retrofit (flood)
- Safe Room and Vertical Shelter
- Stabilization and Vegetation Management
- Structural Flood Control

See Appendix B for a complete listing of these codes and the categories into which they were divided.

⁸² “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3.”

b. Priority Coding

The 40 states included in this analysis used a wide variety of methods to rank individual mitigation actions quantitatively. To allow for an apples-to-apples comparison of the priorities outlined in state hazard mitigation plans, each state's priorities were converted to a scale that ranges from 1 (lowest priority) to 5 (highest priority). The following section details how those conversions were made.

By far, the most common methodology was a “High, Medium, Low” or “High, Moderate, Low” ranking system, which was used by 30 of the 40 analyzed states. The following priority points were assigned to the projects in these states' plans:

- Low—1 point
- Medium—3 Points
- High—5 Points

Three states (Massachusetts, Ohio, and Oklahoma) used ranking systems with four levels of priority (either Low/Medium/High/Very High or D/B/C/A).⁸³ The following priority points were assigned to the projects in these states' plans:

- Low / D—1.25 points
- Medium / C—2.5 points
- High / B—3.75 Points
- Very High / A—5 points

⁸³ Executive Office of Energy and Environmental Affairs, Executive Office of Public Safety and Security, and Massachusetts Emergency Management Agency, *Massachusetts State Hazard Mitigation and Climate Adaptation Plan* (Boston: Massachusetts Emergency Management Agency, 2018), <https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan>; Ohio Emergency Management Agency, *State of Ohio Enhanced Hazard Mitigation Plan* (Columbus, OH: Ohio Emergency Management Agency, 2019), <https://ema.ohio.gov/mitigation-recovery/mitigation/mitigation-planning/state-of-ohio-hazard-mitigation-plan/01-state-of-ohio-hazard-mitigation-plan>; and Oklahoma Department of Emergency Management and Homeland Security, *Standard Hazard Mitigation Plan for the Great State of Oklahoma* (Oklahoma City, OK: Oklahoma Department of Emergency Management and Homeland Security, 2019), <https://oklahoma.gov/oem/programs-and-services/mitigation/state-hazard-mitigation-plan.html>.

Two states (Iowa and Vermont) used ranking systems with five levels of priority (Low/Medium-Low/Medium/Medium-High/High).⁸⁴ The following priority points were assigned to the projects in these states' plans:

- Low—1 point
- Medium-Low—2 points
- Medium—3 Points
- Medium-High—4 Points
- High—5 points

Maine gave each project a score out of a possible fifteen points.⁸⁵ For this analysis, each of those scores was divided by three to give a score out of a possible five. The remaining four states prioritized projects individually (numbered 1-*n*). Of the lists of eligible projects from these states, the highest-ranking eligible project was assigned a score of 5, and the lowest-ranking eligible project received a score of 1. The rest of the projects were assigned a proportionate share of the four-point spread, as follows:

- Idaho ranked 18 eligible projects.⁸⁶ The lowest ranking of these projects received one point, and each project further up the rankings received ~0.23529412 points more than the previous, leaving the highest-ranking project with 5 points.

⁸⁴ Iowa Department of Homeland Security and Emergency Management, *Iowa Comprehensive Emergency Plan, Part B: Iowa Hazard Mitigation Plan* (Windsor Heights, IA: Iowa Department of Homeland Security and Emergency Management, 2018), <https://homelandsecurity.iowa.gov/disasters/hazard-mitigation/>; Vermont Emergency Management, *2018 Vermont State Hazard Mitigation Plan* (Waterbury, VT: Vermont Emergency Management, 2018), https://vem.vermont.gov/sites/demhs/files/documents/2018%20Vermont%20State%20Hazard%20Mitigation%20Plan%20-%20Final%20Adopted_Interactive.pdf.

⁸⁵ Maine Emergency Management Agency, *Maine State Hazard Mitigation Plan 2019* (Augusta, ME: Maine Emergency Management Agency, 2019), https://www.maine.gov/mema/sites/maine.gov/mema/files/inline-files/State%20Hazard%20Mitigation%20Plan%202019%20Update_10.8.2019.pdf.

⁸⁶ Idaho Office of Emergency Management, *State of Idaho Hazard Mitigation Plan* (Boise, ID: Idaho Office of Emergency Management, 2018), <https://ioem.idaho.gov/preparedness-and-protection/mitigation/state-hazard-mitigation-plan/>.

- New Hampshire ranked 30 eligible projects.⁸⁷ The lowest ranking of these projects received one point, and each project further up the rankings received ~0.1393103 points more than the previous, leaving the highest-ranking project with 5 points.
- New Mexico also ranked 30 eligible projects.⁸⁸ The lowest ranking of these projects received one point, and each project further up the rankings received ~0.1393103 points more than the previous, leaving the highest-ranking project with 5 points.
- Oregon ranked 23 eligible projects.⁸⁹ The lowest ranking of these projects received one point, and each project further up the rankings received ~0.1818182 points more than the previous, leaving the highest-ranking project with 5 points.

If a goal or action in a plan encompasses multiple projects with distinct project codes, that action was included multiple times, once per relevant project code, with the same level of priority. For example, one of the actions in the Alabama plan was to “Construct five safe houses for district offices and purchase one 5KW generator for each safe house.”⁹⁰ This action was entered in the data twice, once coded as “206.2: Safe Room (Tornado and Severe Wind Shelter)—Public Structures” and once as “601.1: Generators.”

⁸⁷ New Hampshire Homeland Security and Emergency Management, *State of New Hampshire Multi-Hazard Mitigation Plan* (New Hampshire Homeland Security and Emergency Management, 2018), https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf.

⁸⁸ New Mexico Department of Homeland Security and Emergency Management, *New Mexico State Hazard Mitigation Plan* (Santa Fe, NM: New Mexico Department of Homeland Security and Emergency Management, 2018), https://drought.unl.edu/archive/plans/GeneralHazard/state/NM_2018.pdf.

⁸⁹ State Interagency Hazard Mitigation Team, *Oregon Natural Hazards Mitigation Plan* (Department of Land Conservation and Development: Salem, OR, 2015), <https://www.oregon.gov/lcd/NH/Pages/Mitigation-Planning.aspx>.

⁹⁰ Alabama Emergency Management Agency, *Alabama State Hazard Mitigation Plan* (Clanton, AL: Alabama Emergency Management Agency, 2018), https://alabamaema.files.wordpress.com/2018/11/state-of-alabama_state-hazard-mitigation-plan-2018-update_final_07182018.pdf.

c. Additional Plan Information

Several additional pieces of information were captured from each plan to aid in future analysis, including whether the state had achieved “Enhanced” status with the plan. In exchange for meeting a more stringent set of FEMA planning requirements and demonstrating the ability to successfully manage large sums of federal funds, enhanced states receive 33% more funds through the Hazard Mitigation Grant Program for each disaster declaration, so this could potentially be used as a proxy measure for the size and sophistication of the mitigation programs in each state government.⁹¹ This analysis also identified if the plan notes that it was written by a contractor, as is common with grant-funded mitigation plans. This did not include the state university partners who are frequently “contracted” to develop highly technical risk assessments, as they are state agencies and plan stakeholders themselves. The year of plan publication and years in which it is in effect were captured for each state, to constrain funding analysis to years in which the plan in question would have had an input on decision making.

In all states, this analysis only considers projects or efforts that could be considered eligible work under an HMGP-funded project. Many states include a wide variety of risk reduction measures in their plans that would never qualify for HMGP funding, because they are valuable priorities of the community in question. These projects were excluded to focus on those that could potentially be funded with the HMGP program, to align with the datasets being used for this analysis.

⁹¹ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 4.

Table 1. Eligible Mitigation Activities under HMA Programs⁹²

Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-residential Structures	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
5 Percent Initiative Projects	✓		
Miscellaneous/Other ⁽¹⁾	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓

d. Exclusions

This analysis is limited to states and excludes United States protectorates and territories and federally recognized tribal nations, even though those groups can be eligible to serve as grant recipients under HMGP. The relationship between state planning and the execution of hazard mitigation by local governments is central to the question at the heart of this thesis, and those relationships are vastly different for these non-state entities.

⁹² Federal Emergency Management Agency, 33.

Ten states did not provide a qualitative ranking of the actions outlined in their plan, and instead satisfy requirement S9 (“Does the plan prioritize mitigation actions to reduce vulnerabilities identified in the risk assessment?”) by detailing the processes they use to rank and score individual project applications when HMGP funding is available, prioritizing by hazard, or by noting that every project in the plan is of equally high priority. Those states were excluded from this analysis, and are California, Colorado, Florida, Illinois, Kentucky, Louisiana, Minnesota, New York, Texas, and Washington

3. Findings

In general, and perhaps unsurprisingly, the projects included in state hazard mitigation plans were relatively high-ranking, with the average priority by project type ranging from 3.503 to 4.623. There are notably few low-ranking projects included in these state plans, even though they are theoretically listing all the potential types of mitigation action that could be useful in their state, not just the most important ones.

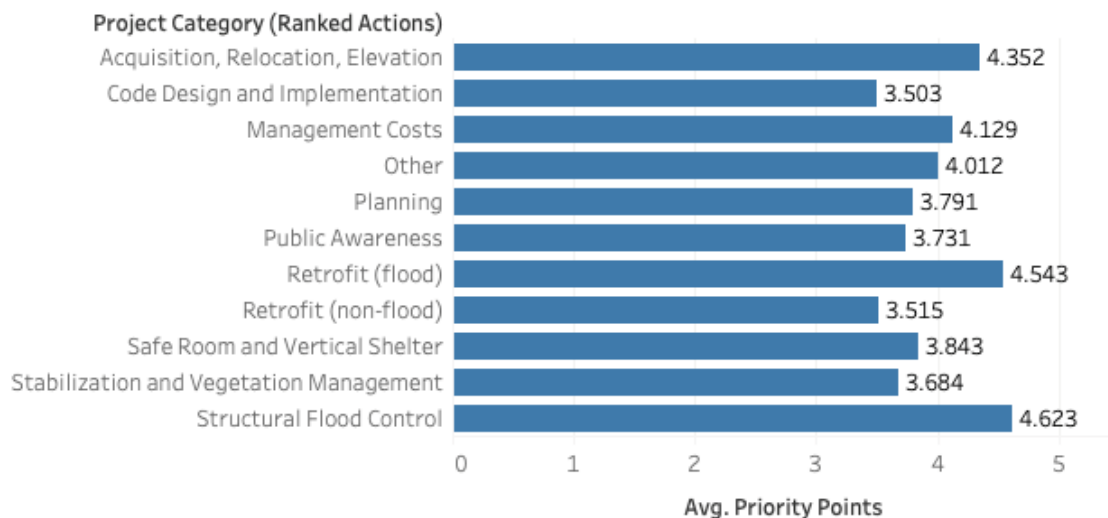


Figure 4. Average Priority Points by Project Category⁹³

⁹³ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

The total priority points assigned to a project category across all analyzed states provides an alternative measure of the amount of attention the states devoted to each type of project in their plans. Far and away, the most-discussed, most-prioritized type of hazard mitigation project is hazard mitigation planning itself, with 1,516 points. This includes “planning related activities” like risk assessment, hazard mapping, and data collection to support mitigation planning. The second most-discussed and prioritized category is public awareness projects. States are limited in their ability to allocate HMGP funding to projects like this for which a benefit-cost analysis is not feasible. States can give only 5% of the funding under each disaster to projects in the Code Design and Implementation and Public Awareness categories, but those two categories represent nearly 25% of the priority points assigned across all plans (and thus, indirectly, the states’ general amount of attention to and interest in those types of projects). These findings are outlined in Figure 5.

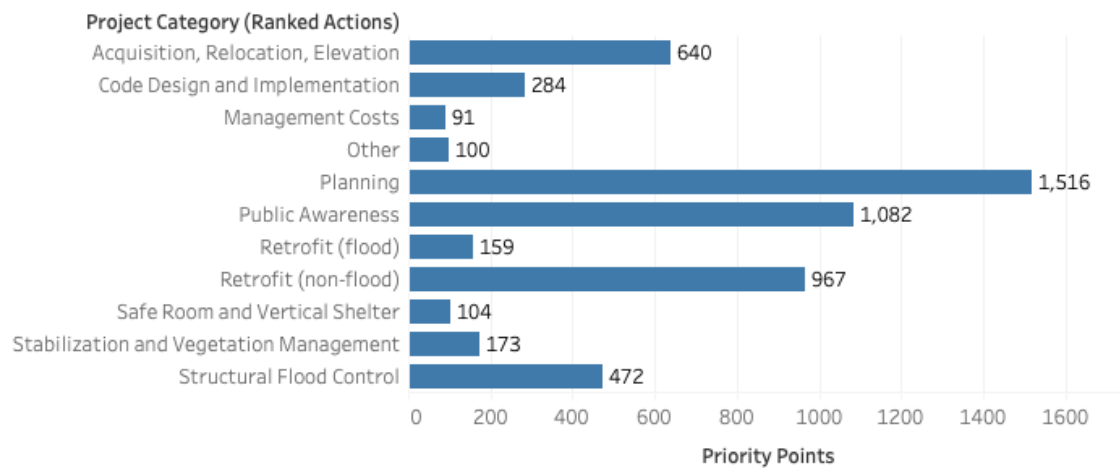


Figure 5. Total Priority Points by Project Category⁹⁴

⁹⁴ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

Public Awareness and Planning (the two green categories in Figure 6) make up almost 50% of the total priority points assigned in state plans. States are evidently spending almost half of their planning energy on projects that do not make direct changes in the country's disaster risk and exposure.

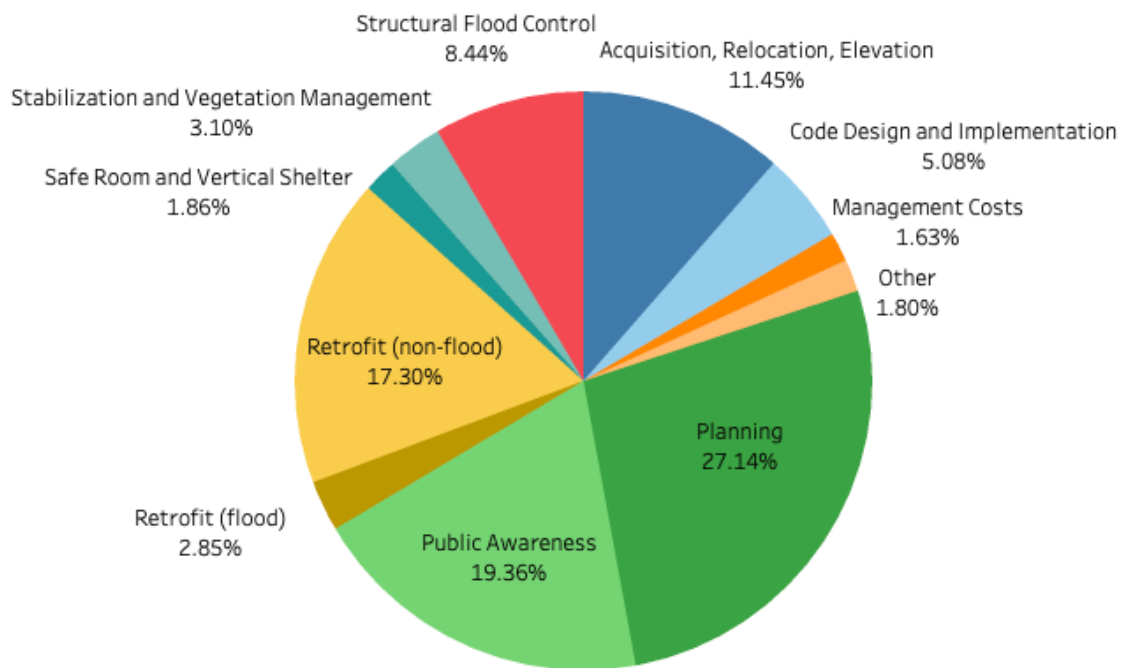


Figure 6. Percentage of Total Priority Points by Project Category⁹⁵

The same pattern occurs when considering the number of actions in each category, with Planning, Public Awareness, and Code Design and Implementation representing significant and disproportionate amounts of page space in state plans overall, as shown in Figure 7.

⁹⁵ Adapted from author's compilation of data from various state plans and openFEMA datasets.

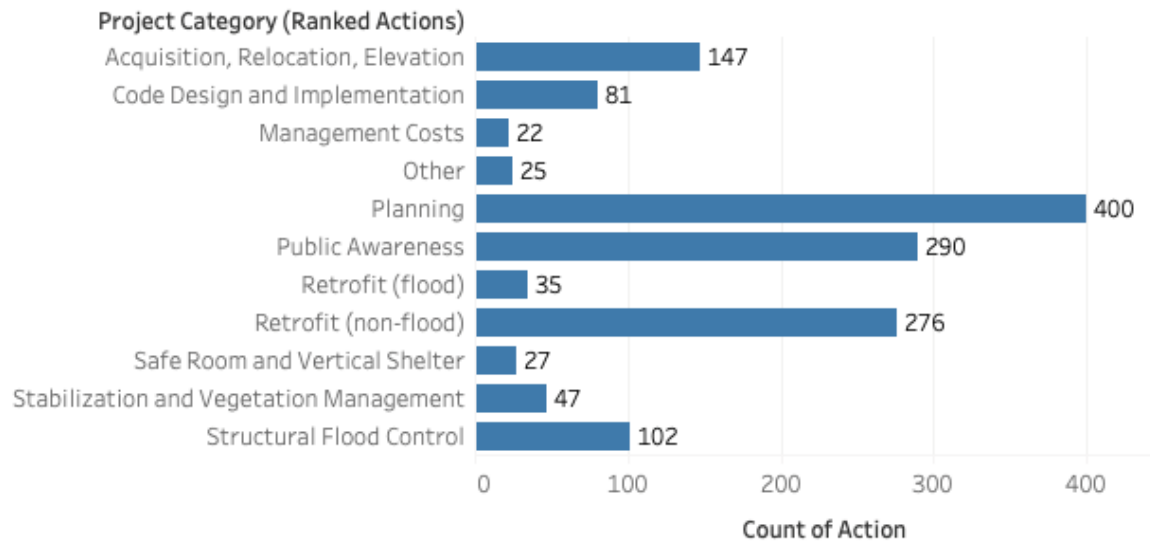


Figure 7. Number of Actions by Project Category⁹⁶

Overall, although physical mitigation measures (retrofits, acquisitions, vegetation management, etc.) lead to the return on investment that mitigation programs are designed to provide, those projects are not contemplated in state plans proportionately to their importance. States' tendency to focus on public information, planning, and technical studies belies their general lack of control over what mitigation actions get funded. As eloquently phrased in the Washington plan,

the philosophy of the State Hazard Mitigation Program is to leverage state resources to support local risk-reduction efforts. Consequently, the mitigation strategies are not prioritized since they consist of individual agency-led mitigation programs and strategies, usually directed at supporting locally led efforts.⁹⁷

The state agencies who put together these plans will never have visibility on every potential mitigation action that could be requested, required, or cost-beneficial, and it is not feasible to attempt to predict the entire universe of potential future projects, so they turn their gaze inward, and focus on the tasks that are within their control: managing the

⁹⁶ Adapted from author's compilation of data from various state plans and openFEMA datasets.

⁹⁷ Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan* (Camp Murray, WA: Washington Emergency Management Division, 2018), 166, <https://mil.wa.gov/enhanced-hazard-mitigation-plan>.

program, approving plans, and the circular and expensive work of maintaining eligibility for funding.

B. HAZARD MITIGATION GRANT PROGRAM FUNDING

1. Background

This section contemplates and analyzes the federal funding obligated from 2017 to 2022 under the Hazard Mitigation Grant Program (HMGP). HMGP is a post-disaster program that provides funding to states that have received a Presidential Major Disaster Declaration, with all the funding under that program committed to the state in question. This means that unlike the other FEMA mitigation programs, HMGP is only competitive within the state, not nationally, and thus provides states with the most straightforward opportunity to implement their stated priorities, as FEMA follows their prioritization recommendations for the available funding, within eligibility limits.

2. Methodology

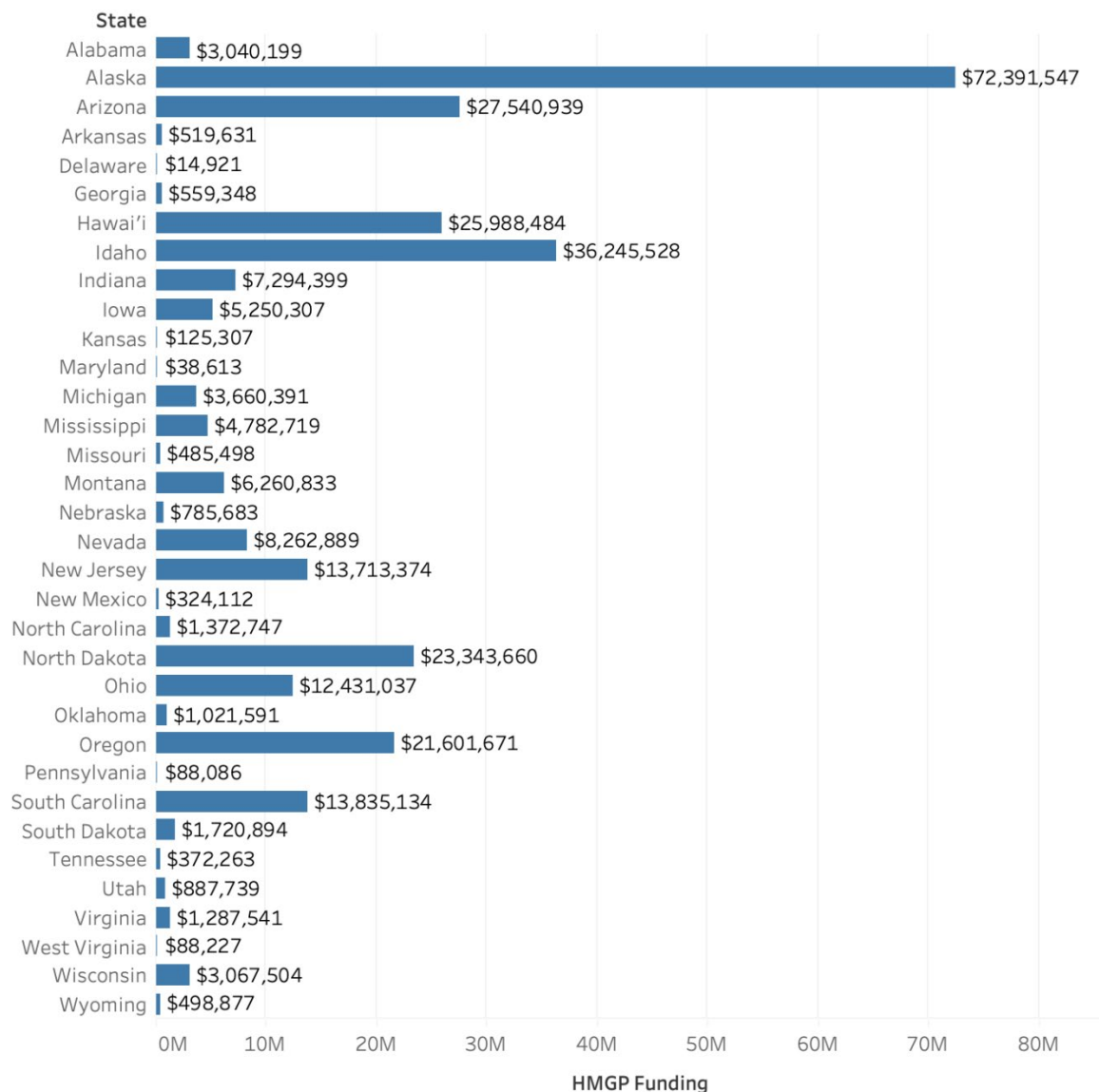
FEMA makes a wide variety of data available to the public, as part of their OpenFEMA government transparency initiative. This analysis is based on a dataset provided under this initiative that includes all FEMA HMA project obligations on record (including HMGP, PDM, FMA, and BRIC). This large dataset was filtered for this analysis to reflect only the HMGP program, and only for grants based on disasters declared from 2017 to the present, reflecting the dates the state plans in question have been in effect. While the comparative analysis in Chapter III will be limited to individual projects that were funded within the effective dates of the specific state plans in question, this section considers the totality of HMGP projects that have been funded for disasters declared from 2017 to 2022 for ease of analysis. This analysis is limited by disaster declaration date, not the date funding was obligated; while HMGP funding decisions get made within a year of the disaster, obligation of funds can take many years due to the complexity of the process.

Many funded projects encompass multiple project codes and are listed as multiple project codes in FEMA's data. In cases where more than one code was used to describe the project, that action was included multiple times in the analysis, once per relevant project

code. The total funding obligated to each project was then divided evenly across the provided codes. For example, FEMA obligated \$67,500 for a project in Orange County, Texas to fund acquisition of properties across the county, some of which were riverine and some of which were coastal. FEMA coded that project as both 200.1: Acquisition of Private Real Property (Structures and Land)—Riverine and 200.2: Acquisition of Private Real Property (Structures and Land)—Coastal. This project is reflected in the data for this analysis as two separate projects, one for each code, with respective federal obligations of \$33,750. This analysis also excludes State Management Costs projects, which are obligated at a defined rate and do not count against the funding made available to states for mitigation work.

3. Limitations

One of the key limitations of working with disaster program data is that it requires there to have been a major disaster. While the state of Maine’s hazard mitigation plan was reviewed for the analysis in Chapter II, for example, they did not have any federally declared disasters in the period in question, so they are not reflected in the FEMA dataset. Northwestern states had a very busy few years with multiple disasters, leading to the availability of lots of federal mitigation funding, so they are extremely well represented in the data. Figure 8 shows the variance in the amount of HMGP funding received by the analyzed states from 2017 to 2022.



For the State of Oregon, the plan analyzed for this thesis was published in 2015. For this state, the figures above also include the year 2016.

Figure 8. HMGP Funding by State, 2017–2022⁹⁸

⁹⁸ Adapted from author's compilation of data from various state plans and openFEMA datasets.

4. Findings

Overall, it would be reasonable to expect to see the state plans' emphasis on planning, public awareness, and codes and engineering reflected here in the number of projects that have been funded. Because these projects do not involve physical work and thus do not require environmental and historic preservation review, they are quicker to fund, so they are likely to be slightly over-represented in this data set representing relatively recent disasters for which all proposed funding may not have been obligated. Figure 9 demonstrates the percentage of funded projects in the review period by category. As previously stated, the Public Awareness and Code Design and Implementation (collectively embodying the "5 percent initiative") are limited by FEMA regulations to 5% of total grant funds per disaster. Predictably, these make up 3.64% of projects obligated to date for the review period. Planning, which represented 27.14% of the total priority points assigned in state plans, represents only 7.67% of projects obligated during the review period. This pattern is again visible when considering the amount of funding obligated by category, as shown in Figure 10, irrespective of the number of obligated projects that comprise that funding. Just under 3% of funding obligated to date is for projects under the 5% initiative, and planning represents 8.44% of the total obligated project costs. Just within the HMGP program, in the span of only the years analyzed here, FEMA has obligated more than \$156 million to the development and continued maintenance of hazard mitigation planning. This is more funding than it spent on stabilization and vegetation management, safe rooms, and flood retrofits combined.

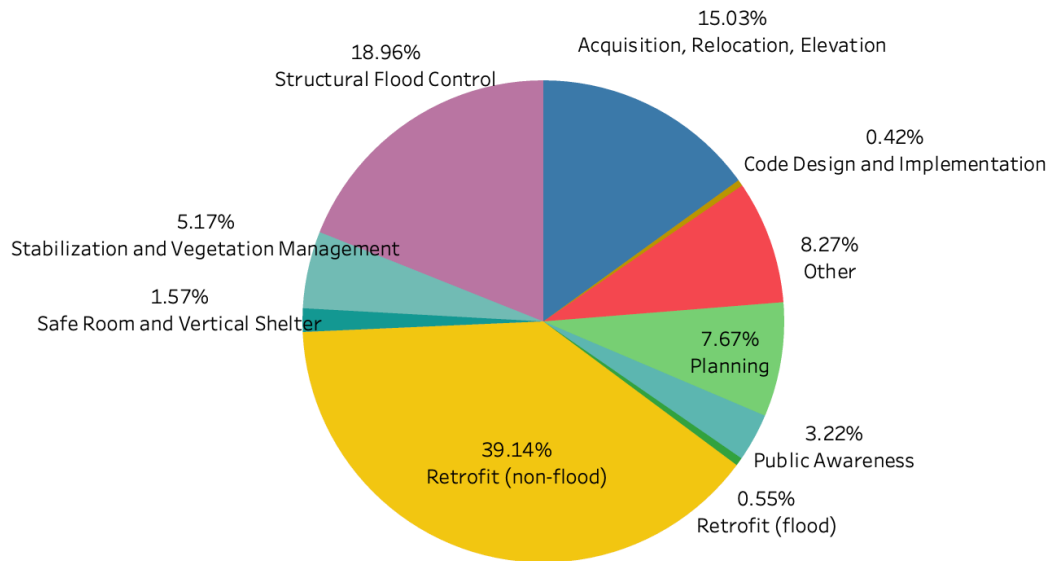


Figure 9. Obligated Projects by Category⁹⁹

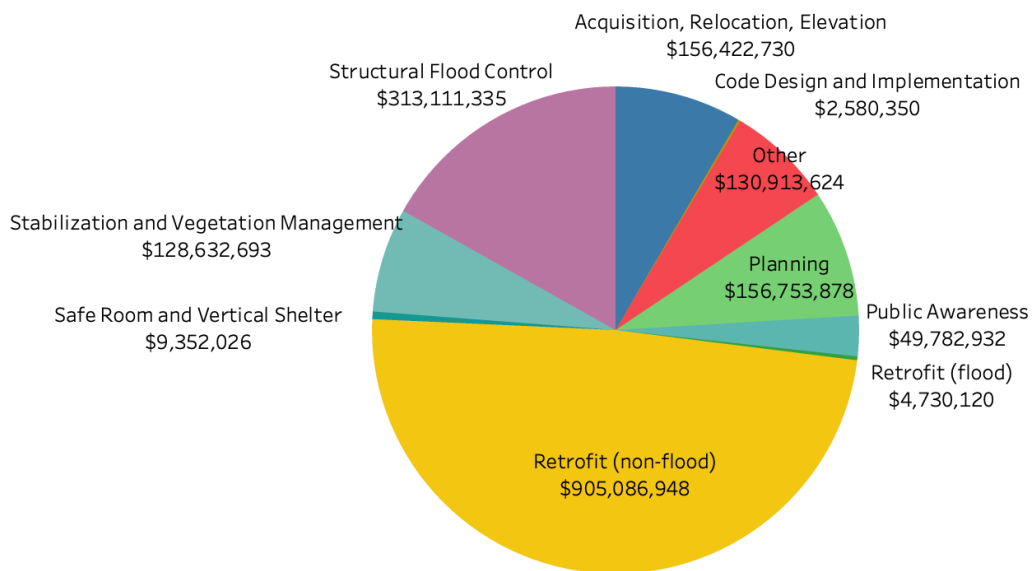


Figure 10. Obligated Funding by Category¹⁰⁰

⁹⁹ Adapted from author's compilation of data from various state plans and openFEMA datasets.

¹⁰⁰ Adapted from author's compilation of data from various state plans and openFEMA datasets.

III. FINDINGS

A. INTRODUCTION

If the state hazard mitigation plan is to serve as the basis for decision making about mitigation funds made available to a state, one would assume that the higher-priority projects are more likely to receive funding allocated by that state. Proving or disproving that null hypothesis is the goal of this chapter, which contains a comparative analysis of the relationship between state mitigation priorities (as articulated in their state hazard mitigation plans) and state mitigation spending (as represented by recent HMGP spending in those states).

This analysis will not determine whether the *specific projects* noted in the state plans are ultimately undertaken. Rather, it will analyze the degree to which the *type of projects* that are prioritized are proportionately more likely to receive funding (for example, if a state highly prioritizes safe rooms and tornado retrofits over all other project types and hazards, the null hypothesis supposes that safe rooms would be more likely than others to receive funding).

Null hypothesis: There is a statistically significant correlation between the total priority points assigned to a project type in a state hazard mitigation plan and the amount of HMGP funding states have provided for that type of project.

This chapter contemplates the correlation between these variables and whether any demographic factors impact that correlation. A discussion of the impacts and significance of these findings is available in Chapter IV.

B. METHODOLOGY

1. Data

In addition to the data sources discussed in Chapter II, this analysis utilized an OpenFEMA Dataset that includes the date of declaration for all presidential Major Disaster

Declarations.¹⁰¹ These dates of declaration were used to limit the projects analyzed in this chapter to those funded under disasters that took place during the relevant plan’s effective period. For many projects, funding is not obligated for years following a declaration due to a variety of process and technical reasons, but because applications (and thus state priority decisions) are due to FEMA within one year of declaration, the declaration date for an HMGP grant remains the best guide to what state plan influenced those choices.¹⁰²

State Hazard Mitigation Plans are effective for five years before they must be updated.¹⁰³ The exact date of plan adoption is not available for every plan, as many of them have a publication date listed that is many months before FEMA approval, or only include the year of the plan, not a specific publication date. To ensure that state plans were only being used to analyze spending they impacted, analysis for each state is limited to the four calendar years following the publication of their plan.

When DMA2000 was passed, it created the same requirement for all states simultaneously. Most states promptly developed an eligible plan, which is why a majority of states are on a similar update cadence. Five states have currently active state hazard mitigation plans that were written in late 2020 or 2021 (Maryland, Nebraska, Oregon, Wisconsin, and Wyoming), which would restrict analysis to 2022.¹⁰⁴ For those five states, the most recent expired plan was used to allow for a full four years of disasters to study. Table 2 provides additional detail about the plans included in the analysis for this chapter.

¹⁰¹ “OpenFEMA Dataset: Hazard Mitigation Grant Program—Disaster Summaries—V2,” accessed February 18, 2023, <https://www.fema.gov/openfema-data-page/hazard-mitigation-grant-program-disaster-summaries-v2>.

¹⁰² Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 104.

¹⁰³ Federal Emergency Management Agency, *State Mitigation Plan Review Guide*, 8.

¹⁰⁴ Maryland Emergency Management Agency, *2021 State Hazard Mitigation Plan* (Reisterstown, MD: Maryland Emergency Management Agency, 2021), <https://mdem.maryland.gov/community/Pages/Mitigation.aspx>; Nebraska Emergency Management Agency, *2021 Nebraska State Hazard Mitigation Plan* (Lincoln, NE: Nebraska Emergency Management Agency, 2021), <https://nema.nebraska.gov/assets/files/hazard-mitigation/hazmitplan2021.pdf>; State Interagency Hazard Mitigation Team, *Oregon Natural Hazards Mitigation Plan* (Salem, OR: Department of Land Conservation and Development, 2020); Wyoming Office of Homeland Security, *Wyoming State Hazard Mitigation Plan* (Cheyenne, WY: Wyoming Office of Homeland Security, 2021); and Wisconsin Emergency Management, *2021 State Hazard Mitigation Plan* (Wisconsin Emergency Management, 2021), <https://wem.wi.gov/state-planning/>.

Table 2. Analyzed Plans by Year

Plan Year	First Year of Analysis	Last Year of Analysis	Number of States
2014	2015	2018	1
2015	2016	2019	1
2016	2017	2020	3
2018	2019	2022	24
2019	2020	2023	11

Overall, there were 1,296 projects funded by HMGP that were covered by one of the 40 reviewed state hazard mitigation plans. The number of projects available for analysis by state varied widely, from four (Georgia) to 124 (New Jersey). Many variables impact these totals, including the number of disasters that have impacted a state. A key contributor to this variety is the number of disasters that have impacted each state. Fundamentally, states in coastal, wildfire-prone, or otherwise vulnerable areas experience more federally declared disasters than others. There is a strong correlation between the number of declared disasters a state has experienced and both the amount of obligated HMGP funding and the number of obligated HMGP projects, as shown in Figure 11.

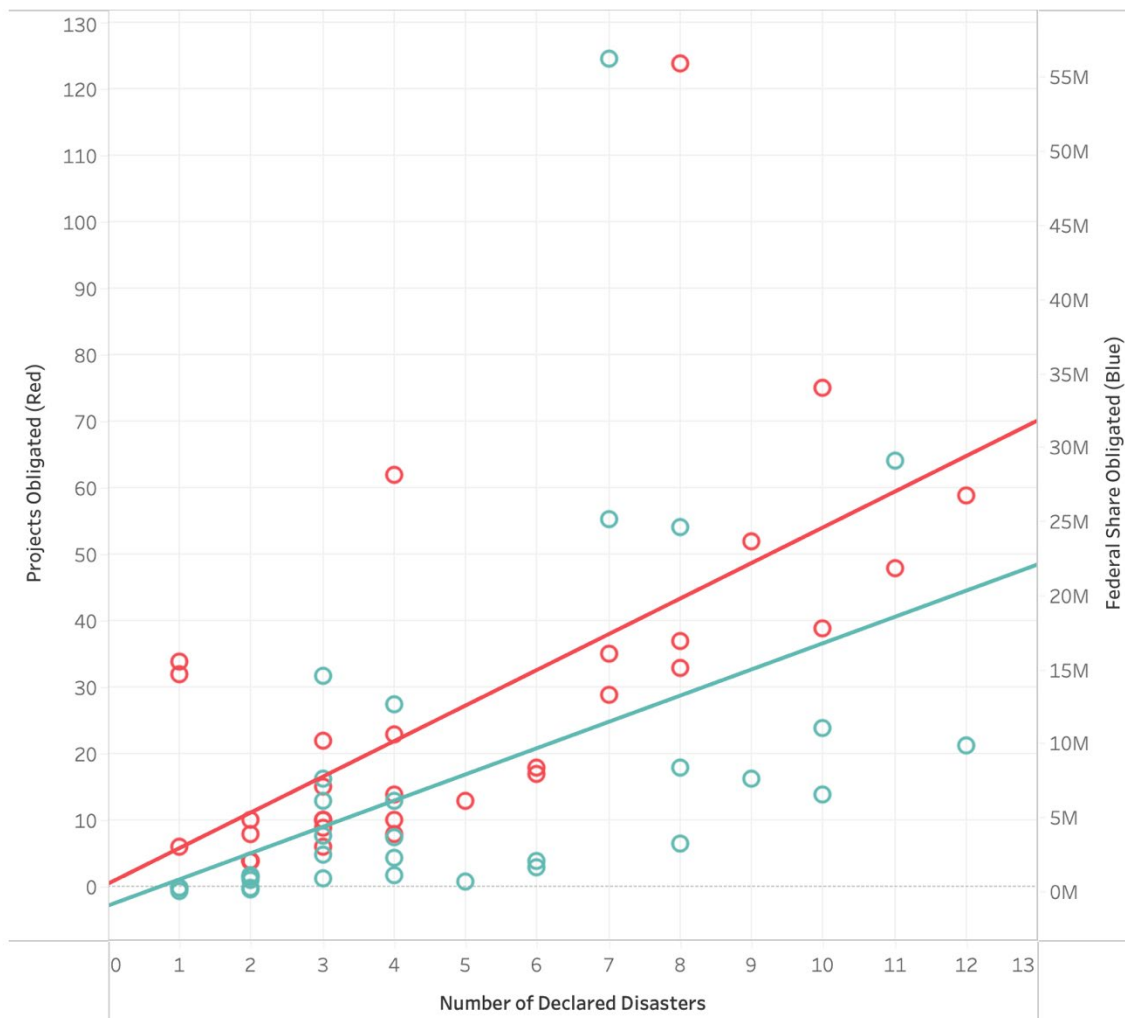


Figure 11. Declared Disasters vs. Obligated Funding and Projects¹⁰⁵

2. Exclusions

The aptly named “5 percent initiative” allows for 5% of the HMGP funding each state receives for a disaster to be spent on projects that provide benefits that are hard to quantify, such as warning systems and public education initiatives.¹⁰⁶ Because FEMA applies a firm limit to the amount of funding spent on this type of project, states’ overall spending on them is not necessarily reflective of their relative importance or priority. These projects were excluded from the analysis in this chapter to protect the validity of the results.

¹⁰⁵ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

¹⁰⁶ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 111–112.

3. Analysis

The data visualizations and analysis in this thesis were completed using the software Tableau. This analytical tool allowed for the direct comparison of project, grant, and disaster data with the data pulled from state plans under review, without direct manipulation of the underlying datasets to preserve data integrity. The visualizations and analytical figures below are limited to projects that FEMA funded in states whose plans were considered in this analysis, within the years that plan was in effect.

4. Limitations

It is impossible to *directly* measure the degree to which states consulted their state hazard mitigation plans in making decisions about which applications to fund. This analysis' consideration of a proxy measure (the degree to which mitigation plans are ultimately implemented) is a fundamental limitation to this study.

Another fundamental limitation of this study is its general assumption that states are responsible for making decisions about how HMGP funding is spent. While states are responsible for prioritizing grant applications, FEMA still approves each individual project for eligibility and compliance with federal law and policy.¹⁰⁷ If states select and submit mitigation projects that FEMA ultimately deems ineligible for funding, their ability to implement their priorities as written decreases. It is possible that states with less capacity and less experience managing these grant programs are more likely to submit ineligible applications, and thus structurally less likely to be able to implement their own priorities as they see fit.

C. RESULTS

1. Overall Trend

A linear regression of the relationship between the priority points assigned to an action in the plan and the amount of funding states assigned to that action shows that there is no statistically significant relationship between these two variables, rejecting the null

¹⁰⁷ Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance*, 74–76.

hypothesis. Worded differently, the types of projects that states identified as more important were not likely to receive more funding than those it listed as low priority ($p=0.95$, $R^2=1.606e^{-5}$), as seen in Figure 12.

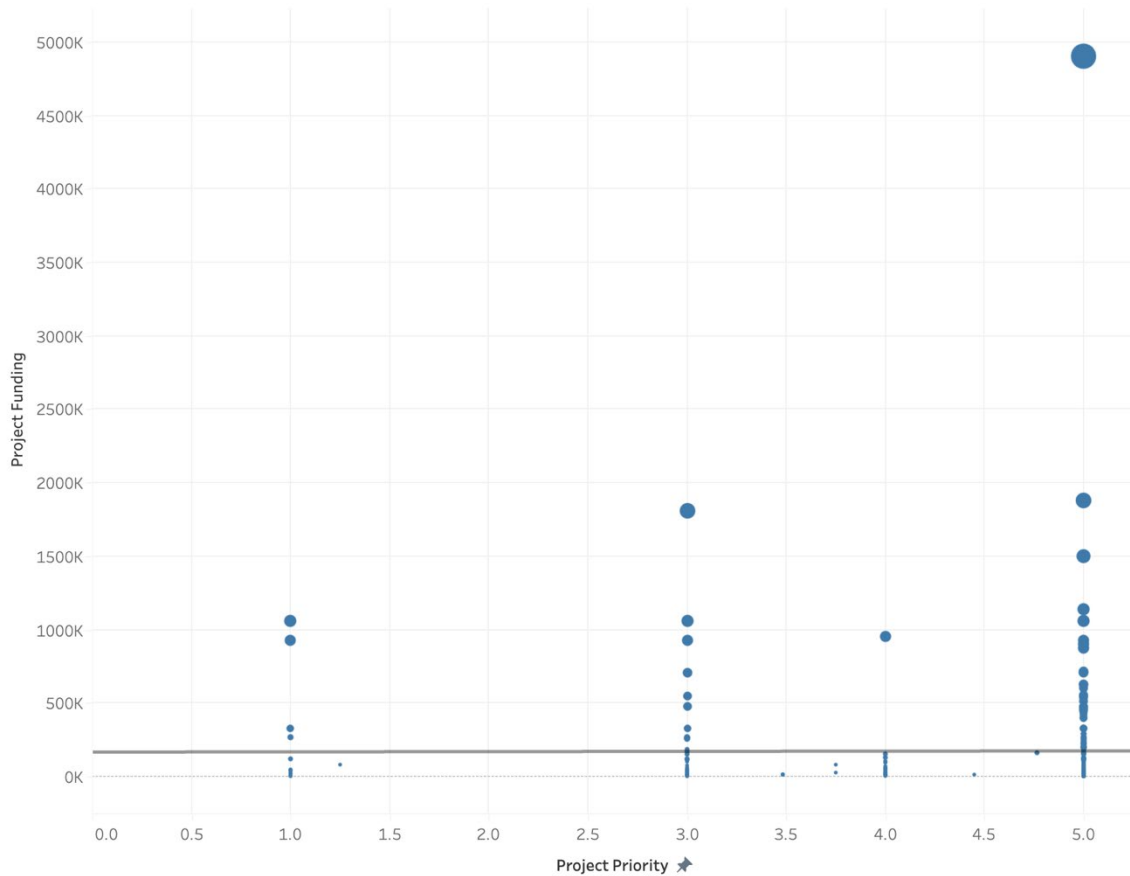


Figure 12. Project Priority vs. Funding¹⁰⁸

The 5% initiative projects excluded from the above figure were discussed extensively in state plans but are limited to a small subset of the overall funding. For these more tightly competitive projects, the null hypothesis would assume that not only would there be a significant correlation between priority and action, but that the relationship may be stronger than for physical work projects due to the increased competition allowing states to cherry-pick the strongest, most highly prioritized projects. The data shows that the

¹⁰⁸ Adapted from author's compilation of data from various state plans and openFEMA datasets.

correlation is stronger, but still fails to be statistically significant ($p=0.629$, $R^2=.0048$), as shown in Figure 13.

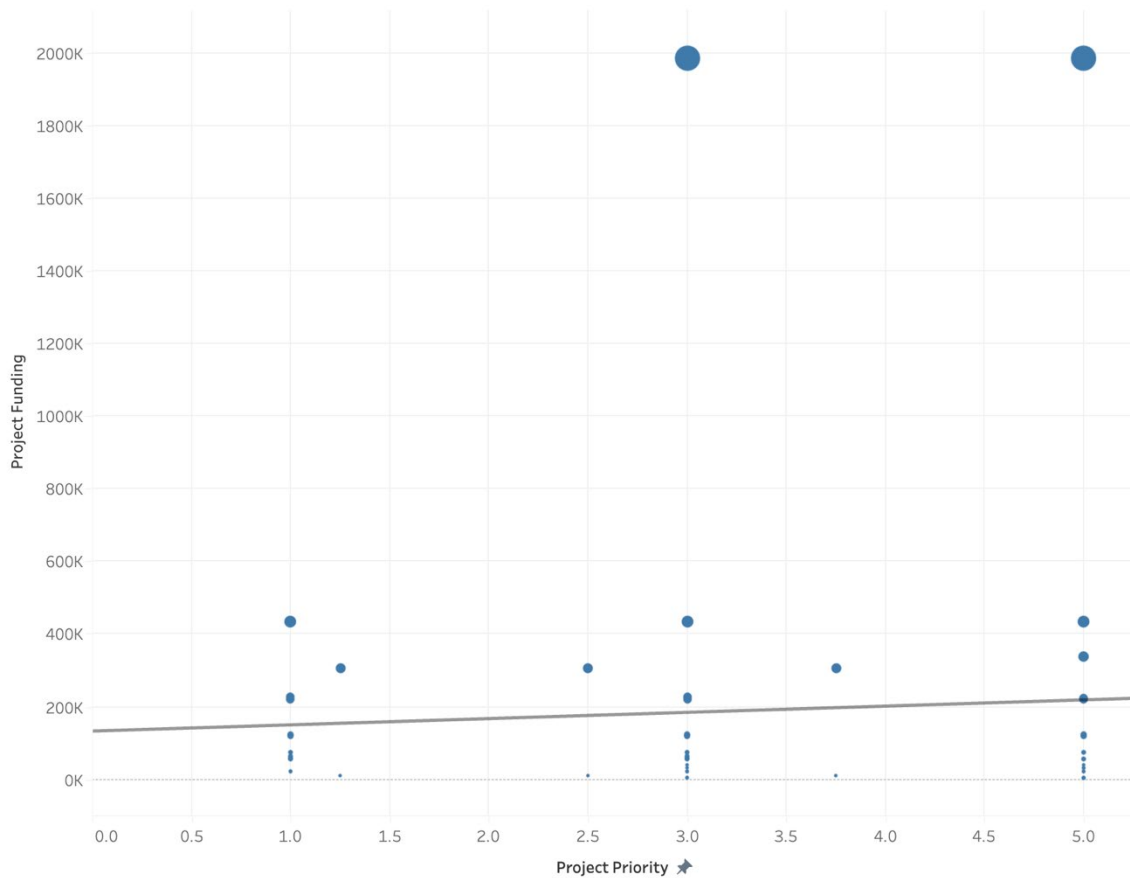


Figure 13. Project Priority vs. Funding—5% Only¹⁰⁹

2. Factors Influencing Correlation

Given that there is not a statistically significant correlation between priority and funding on a national scale, how does that correlation vary from state to state?

a. Enhanced Status

During the plan update approval process, FEMA may award a state “enhanced” status, which it reserves for the states with the most successful mitigation programs, with

¹⁰⁹ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

the most resources and the highest capacity to manage federal funds. Do these states, with what FEMA has agreed are the strongest state programs, do a better job implementing their priorities?

Repeating the same analysis including only enhanced states yields the same result: the correlation is not statistically significant ($p=0.23$, $R^2=0.0142$), as shown in Figure 14.

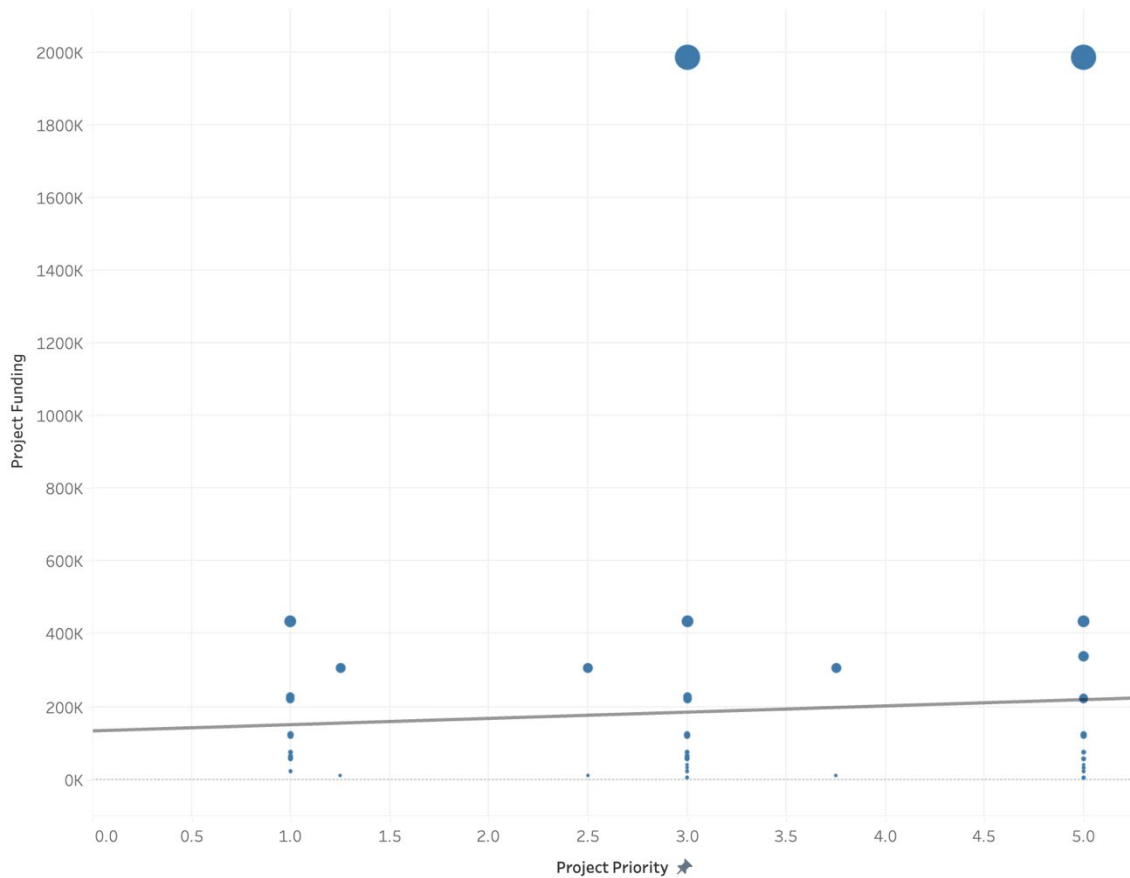


Figure 14. Project Priority vs. Funding—Enhanced States Only¹¹⁰

Despite its lack of statistical significance, the correlation is stronger for enhanced states than for states with standard plans, as seen in Figure 15.

¹¹⁰ Adapted from author's compilation of data from various state plans and openFEMA datasets.

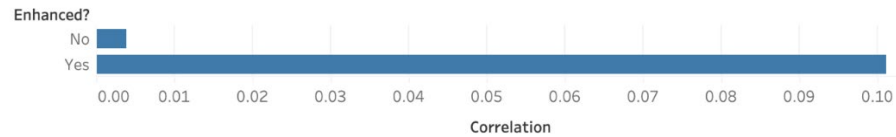


Figure 15. Relative Correlation—Enhanced vs. Standard States¹¹¹

b. Contractors

While planning is an eligible activity under most FEMA mitigation grant programs, using that funding to pay for existing staff to write a plan is not always feasible, particularly in jurisdictions with fewer resources and less expertise to begin with. Communities and states frequently hire consultants using their grant funding to complete the project, allowing them to bring in someone with planning experience and avoid making a temporary hire. Are states that hire contractors more consistent in implementing their priorities?

Repeating the same analysis including only states with contractor-written plans again yields the same result. The correlation is not statistically significant ($p=0.69$, $R^2=0.001$), as shown in Figure 16.

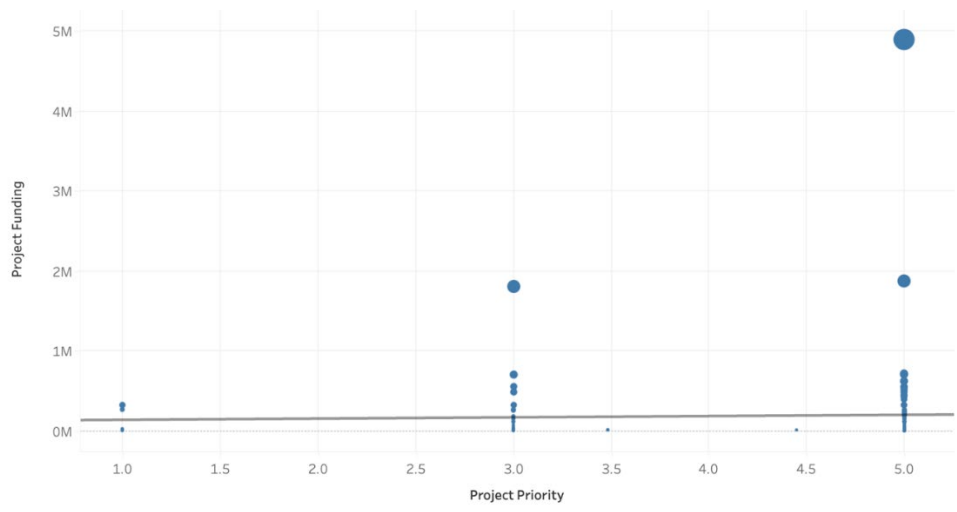


Figure 16. Project Priority vs. Funding—Contractor-Written Plans¹¹²

¹¹¹ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

¹¹² Adapted from author’s compilation of data from various state plans and openFEMA datasets.

Despite its lack of statistical significance, the correlation is nonetheless stronger for contractor-written plans than the plans written by state staff, as seen in Figure 17.

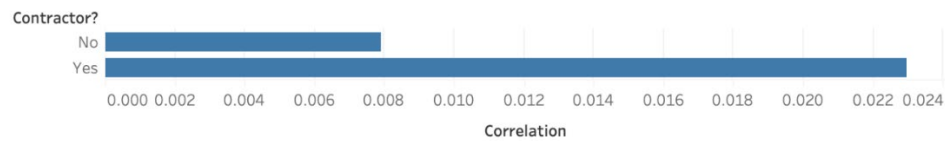


Figure 17. Correlation—Contractor-Written vs. Staff-Written¹¹³

c. *Demographics*

To look for other variables that might affect states’ success in implementing their priorities, this analysis was repeated for a wide variety of demographic factors and other data points from the 2020 census.¹¹⁴ This review found no significant results, indicating that a state’s demographic and socioeconomic report card has no bearing on whether its priorities get implemented. Table 3 shows the correlation between these demographic factors and the degree to which plan priorities were implemented.

Table 3. Effects of Demographics on Correlation

Variable	P-Value	R ²
Income	0.8186	0.0042
Population	0.9989	1.494e ⁻⁷
Density	0.7551	0.0077
Land Area	0.4483	0.0483
Housing Shortage*	0.7299	0.0095
Whiteness	0.3919	0.0569
Broadband Access at Home	0.2978	0.0830

*"Housing Shortage" was calculated by dividing the number of households by the number of housing units.

¹¹³ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

¹¹⁴ “United States,” QuickFacts, July 1, 2022, <https://www.census.gov/quickfacts/fact/table/US/PST045222>.

IV. DISCUSSION AND CONCLUSION

A. DISCUSSION

The data in Chapter III demonstrates conclusively that state governments are systemically failing to implement the priorities outlined in their state hazard mitigation plans. It also documented that the capacity of state mitigation programs, their hands-on involvement in plan development, or the demographic and socioeconomic makeup of a state do not impact the ability to implement the priorities in a state plan. The collective impact of this systemic failure to successfully implement state plans is an inefficient system that, in effect, can make inequality worse than pre-disaster.

1. Disaster Inequity

A variety of researchers have analyzed the degrees to which the impacts of natural disasters are shared unequally across demographic groups, and the ways in which disaster funding shapes and is shaped by these inequities. In a 2021 testimony before the Senate committee on aging, Sue Anne Bell elaborated that:

Disasters are not natural. Hazards such as hurricanes, wildfires, and tornadoes are weather events that occur as natural processes—and we already know that as the impacts of climate change advance, we will see these events become more frequent and more extreme. However, the impact these events have on communities is largely humanmade and influenced by social, economic, geographic, and political processes. Characterizing disasters as natural implies we can't do anything about them, but the truth is we can. Time and again, we see that disasters most often disproportionately affect those populations who are already impacted by policy choices and discourses of inferiority in our society—such as older adults and people with disabilities.¹¹⁵

¹¹⁵ United States Publishing Office, *Inclusive Disaster Management: Improving Preparedness, Response, and Recovery: Hearing before the Special Committee on Aging*, Senate, 117th Cong. 1 (2009), 37, <https://www.hsdl.org/c/abstract/?docid=864489>.

These trends are visible in the way the federal government implements its hazard mitigation programs. In a 2019 analysis of over 40,000 property buyouts funded by FEMA, Mach et al. found that local governments with more resources and funding are more likely to complete buyouts.¹¹⁶ They also found that “within counties with buyouts, however, the bought-out properties are located in relatively poorer, less densely populated areas, also with relatively lower education levels, lower English language proficiency, and greater racial diversity.”¹¹⁷ Elliott, Brown and Loughran built upon this research, hypothesizing that “where buyouts occur is not just a rational process of cost-benefit assessment. It is also inherently a racialized process because residential properties, the ultimate target of the program, are socialized assets, embedded in neighborhoods that have long been segregated and unequally served by government programs, especially in urban areas.”¹¹⁸ They find that three quarters of buyouts happen in urban areas, which tend to be more racially segregated, that majority-white communities get more access to federal buyout funding, and that white people are less likely to accept buyouts due to the availability of more favorable options. Due to the history of systemic racial discrimination in housing in the U.S., people of color are more likely to live in sub-standard housing that is more susceptible to damage, or to live in hazard-prone areas that are less attractive to other residents.¹¹⁹ These factors coalesce to create a system in which buyouts tend to happen in majority non-white neighborhoods of majority-white communities, contributing in complex ways to inequality in local housing markets.

¹¹⁶ Katharine J. Mach et al., “Managed Retreat through Voluntary Buyouts of Flood-Prone Properties,” *Science Advances* 5, no. 10 (October 4, 2019): 1–9, <https://doi.org/10.1126/sciadv.aax8995>.

¹¹⁷ Mach et al., 3.

¹¹⁸ James R. Elliott, Phylcia Lee Brown, and Kevin Loughran, “Racial Inequities in the Federal Buyout of Flood-Prone Homes: A Nationwide Assessment of Environmental Adaptation,” *Socius: Sociological Research for a Dynamic World* 6 (2020): 2, <https://doi.org/10.1177/2378023120905439>.

¹¹⁹ Alice Fothergill, Enrique G. M. Maestas, and JoAnne DeRouen Darlington, “Race, Ethnicity and Disasters in the United States: A Review of the Literature,” *Disasters* 23, no. 2 (June 1999): 161, <https://doi.org/10.1111/1467-7717.00111>.

Indeed, these effects are measurable. In a significant longitudinal study, Howell and Elliott followed a nationally representative cohort of people for 14 years, and found that in communities where disasters have caused increasing damages over time, wealth inequality (vis a vis home ownership, educational attainment, and race) has grown.¹²⁰ Increased FEMA funding (including both the Public Assistance program and assistance FEMA provides to individuals and households) was correlated with increased inequality at the community level, and the authors noted that more research was needed to “better determine the pathways through which natural hazard damages and FEMA aid polarize wealth trajectories along already established lines of inequality.”¹²¹ These findings collectively paint a clear picture of a system that is ultimately not accessible to the most vulnerable communities. While work remains to distribute response and recovery resources and support as widely available as possible. Proactively equitable distribution of hazard mitigation funds would have a corrective impact on this worrying trend.

2. Program Inefficiency

The objective of state hazard mitigation planning is to encourage and support data- and risk-informed decision making when mitigation funding is available. States are uniquely positioned to make risk-informed and strategic decisions at a scale that is impossible for local governments or for FEMA. One straightforward value that state plans provide is their extensive risk assessment sections; it is not uncommon for local governments and counties to start with the state plan’s analysis of risk in their area in developing their own analyses and priorities, and the states’ broad view of how risk is spread across their geographical boundaries is extremely useful to contextualize the risks outlined in a local, multi-jurisdiction, or county hazard mitigation plan. State governments

¹²⁰ Junia Howell and James R. Elliott, “Damages Done: The Longitudinal Impacts of Natural Hazards on Wealth Inequality in the United States,” *Social Problems* 66, no. 3 (August 2018): 448–67, <https://doi.org/10.1093/socpro/spy016>.

¹²¹ Howell and Elliott, 464.

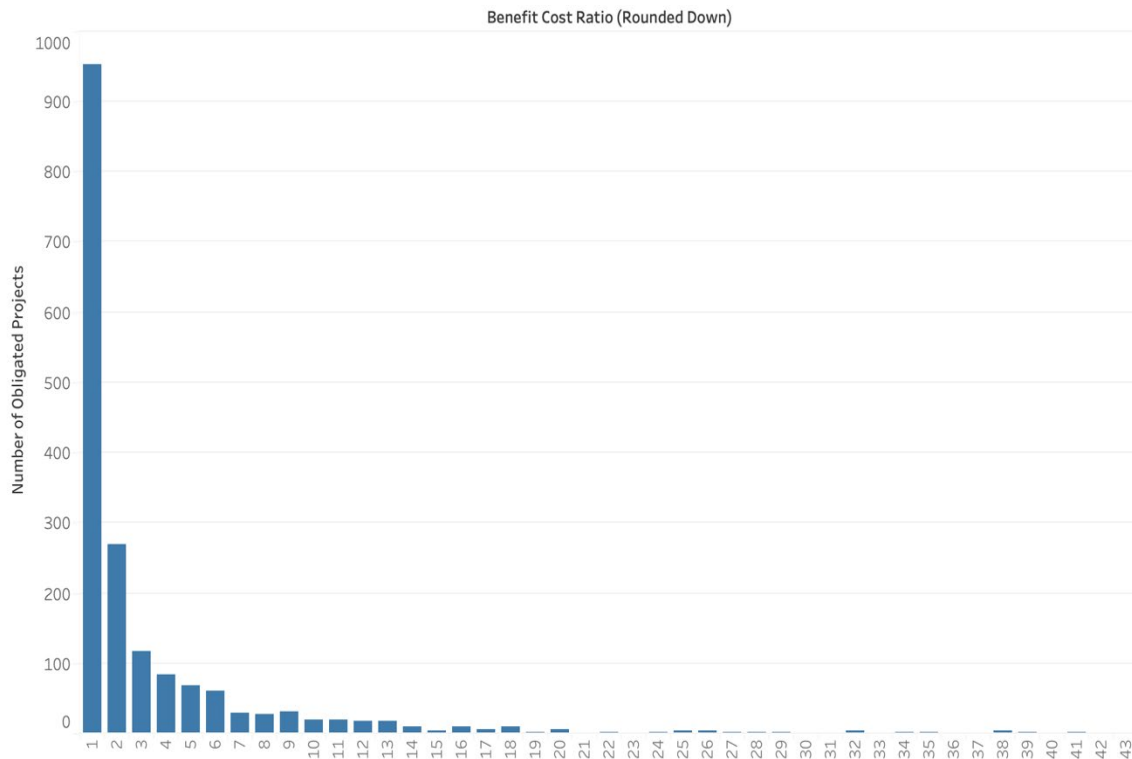
provide a locally informed perspective to conversations about widespread strategic risk management that is not available or possible within a federal organization. FEMA's State Hazard Mitigation Plan Review Guide acknowledges the importance of prioritizing at the state level:

A critical component of updating the state's mitigation strategy is the consideration of and inclusion of the local and tribal, as applicable, mitigation plan strategies. By reviewing, prioritizing, and incorporating the types or categories of actions identified by communities, the state can better understand how it can support investments in local and tribal, as applicable, mitigation efforts. The state is thus pre-positioned to provide the appropriate resources for this support when available, such as post-disaster when recovery and mitigation assistance are authorized.¹²²

FEMA's HMA programs are designed and incentivized to create the greatest possible return on public investment and to prevent as much future damage as possible with the available federal funding. The average BCR of the projects in this analysis was 2.474 (estimating that the federal funding analyzed here will save an average of \$2.45 per dollar in project costs). This represents a positive Return on Investment (ROI), but that ROI pales in comparison to the average BCR of a mitigation project (which the National Institute of Building Sciences estimates at 6.0 overall, and as high as 31.0 for certain project types).¹²³ In general, projects are much more likely to be obligated with a low benefit cost ratio than a high one, as illustrated by Figure 18.

¹²² Federal Emergency Management Agency, *State Mitigation Plan Review Guide*, 17.

¹²³ Multi-Hazard Mitigation Council, *Natural Hazard Mitigation Saves*.

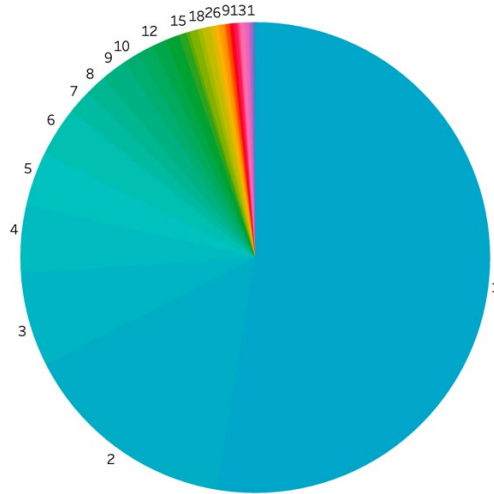


This figure displays the number of projects obligated for each one-point range of benefit-cost ratios. For example, the “1” column reflects the 1,000 projects that have BCRs of at least 1, but less than 2. This is inclusive of all HMGP obligations from 2017 to 2023, and not limited to states included in previous analysis. The x axis of this chart is truncated for ease of viewing and excludes the 25 projects with a BCR of 43 or greater. It also excludes projects for which FEMA does not require a BCA.

Figure 18. Number of Projects by BCR Range¹²⁴

In fact, 953 of the 1,811 HMGP projects obligated between 2017 and 2022 (53%) had a BCR of less than 2, as illustrated in Figure 19. An even higher percentage of the obligated dollars went to projects with BCRs less than 2, as seen in Figure 20.

¹²⁴ Adapted from “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3.”



As in Figure 18, Figures 19 and 20 show the number of projects and dollars obligated in each one-point *range* of benefit-cost ratios. This is inclusive of all HMGP obligations from 2017 to 2022, and not limited to states included in previous analysis. They exclude projects for which FEMA does not require a BCA.

Figure 19. Portion of Obligated Projects, by BCR Range¹²⁵

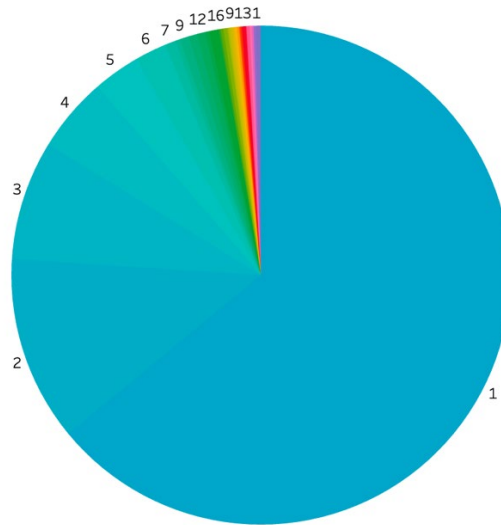


Figure 20. Portion of Obligated Dollars, by BCR Range¹²⁶

¹²⁵ Adapted from “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3.”

¹²⁶ Adapted from “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3.”

It is impossible to discuss BCRs in FEMA-funded mitigation without noting that FEMA’s proprietary BCA tool has been the subject of scrutiny and should not be assumed to be a wholistic and conclusive measure of the benefit society receives from FEMA-funded mitigation.¹²⁷ The FEMA Benefit-Cost Analysis tool, which FEMA prefers that applicants use to calculate the BCR for projects submissions, creates BCRs that are more useful for comparing projects to each other than for accurately reflecting cost savings to the government, as the tool considers the actuarial value of disaster impacts that do not result in physical damage—things like power outages, the time it takes for the whole population to use a detour, the value of one human life, or of an hour without a functional 911 call center—in addition to the direct financial cost of future damages. The actuarial tables that form the basis of this tool are fundamentally arbitrary, and the reductive amalgamation of all types of risk against all types of hazards into one single calculated benefit-cost ratio will inevitably erase some of the nuance in the value these projects provide. Even given these limitations, Figures 18, 19, and 20 demonstrate that the least-cost-beneficial projects get the most money, regardless of what those actual figures ultimately are.

Averages are affected by outliers, and the oft-cited *average* benefit cost ratio of approximately 6.0 disguises the unmistakable fact that a majority of HMGP funds go towards projects with low benefit-cost ratios relative to what we know to be possible. For projects obligated in the review period, the *median* BCR, a much more accurate picture of what *occurs most often* than the average, was only 1.863.¹²⁸ This concerning trend indicates that the HMGP program is providing a lower return on investment than it could be, and that the states are not successfully prioritizing projects with a high return on

¹²⁷ Luke Dodds, “Mitigation Saves? High Discount Rates Undermine FEMA’s Efforts to Promote National Resilience,” *Homeland Security Affairs* 18 (May 2022): 1–30, <https://www.hsaj.org/articles/19529>.

¹²⁸ “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3.”

investment for funding. This trend also underscores the theory that states are funding the projects that communities with funding and resources ask for, regardless of whether or not those projects are lower-value or lower-priority, due to a lack of feasible alternatives. Even a minor increase in the overall long-term benefits provided by HMGP-funded projects would have a profound impact. If the \$1.28 billion in HMGP funding obligated in the review period had an average BCR of 3.0 instead of 2.474, it would represent a total increased long-term cost savings of more than \$675 million.¹²⁹

If we are not consistently implementing our state priorities when funding is available, and we are not receiving a consistently high ROI on our mitigation investments, the current mitigation planning enterprise is not meeting its mission. If enhanced states were more successful in implementing their priorities than standard states, wealthier states more than poorer ones, or states that write their plans themselves more than those that hire contractors to do it for them, it could be argued that states with stronger programs are doing a better job implementing their mitigation plans, and a potential solution to this overall trend is to increase the capacity of the states. However, the weak impact these factors have on that correlation implies that it is not administrative and technical capacity issues at the state level that are preventing states from implementing the priorities established in their plans. Even in the states whose funding most closely matched their planning, there was weak correlation; North Dakota had the highest correlation overall, but only \$11.3 million of the \$59.2 million in HMGP funding obligated over the study period went to projects it had labeled in its plan as high priority.

3. Lack of Choice

If states are systemically failing to implement their priorities regardless of their capacity, is the failure systemic? The consistent pattern of failure nationwide points to a

¹²⁹ “OpenFEMA Dataset: Hazard Mitigation Assistance Projects—V3.”

flaw with the design of the program itself. If states are not basing decisions on how to allocate limited mitigation grant funds on the priorities outlined in their program, how are they doing it? This question erroneously implies the existence of perfect choice. While mitigation projects generally provide long-term financial benefits, they tend to be expensive. States that have been given individual post-disaster grants have often struggled to find enough communities who are able to utilize the mitigation funding made available to them, particularly in the cost-strapped months and years following a major disaster. Many communities are unable to fund the non-federal share of hazard mitigation measures due to budget constraints or a lack of political will, even if that project is expected to represent a cost savings in the long term.¹³⁰ Unless a state that is actively recovering from a major disaster wants (and is able) to provide 25% of project costs, significantly increasing their hefty disaster bill, they will be choosing from a pool of applications that were submitted exclusively by communities with the resources and funding to do so. A significant number of the projects funded in the review period (567 of the 980 analyzed projects) were for project types that were not reflected in that state's plan at all, as demonstrated in Figure 21. This supports the assertion that states are not necessarily selecting projects to fund based on what they think is the most important, but rather based on what they are asked to fund by the partners who can afford to participate.

¹³⁰ Department of Homeland Security, Office of Inspector General, *FEMA Has Not Prioritized Compliance*.

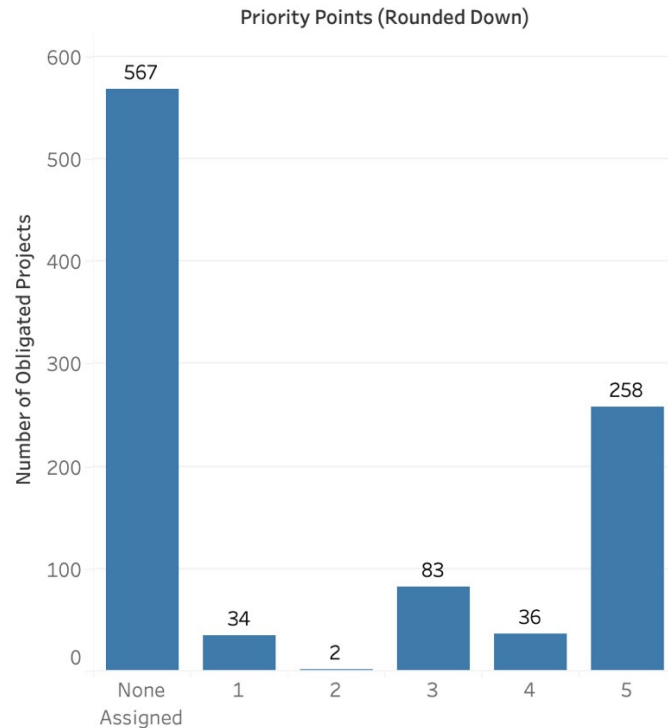


Figure 21 shows the number of projects that were obligated for each *one-point range* of priority points. Obligated projects with a project code that were not mentioned directly in the state in question’s plan are reflected in “none assigned.”

Figure 21. Priority Points vs. Number of Obligated Projects¹³¹

Grant applications thus do not necessarily come from a representative sample of the population. Some state plans acknowledge this directly and admit that they are not actually empowered to make direct and informed choices. Washington’s plan notes that “mitigation strategies are not prioritized since they consist of individual agency-led mitigation programs and strategies, usually directed at supporting locally led efforts . . . This accounts for the reality that most risk-reduction is locally led and that the state’s primary role is that of a regulator and funder. In terms of the notable exceptions, for example with WSDOT transportation strategies, these are long-term commitments captured in, but rarely influenced by, the state mitigation plan.”¹³² The current structure

¹³¹ Adapted from author’s compilation of data from various state plans and openFEMA datasets.

¹³² Washington Emergency Management Division, *Washington State Enhanced Hazard Mitigation Plan*, 166–167.

of the HMGP program invariably limits the pool of applicants for mitigation funding and of communities that can afford to participate. Providing funding only to communities that have the resources required by this complex and expensive processes without support is not risk-informed decision making and represents a significant detriment of the overall value of the HMGP program.

B. RECOMMENDATIONS

1. Remove Non-federal Matching Requirement

Through the Stafford Act, Congress has determined that projects with a 1.0 BCR provide enough ROI to justify the federal government covering 75% of the cost. If Congress were to amend the Stafford Act and remove the cost-sharing requirement, allowing FEMA to use the same funding that would be made available to cover 100% of a smaller number of projects (instead of only 75% of a larger number of projects), a broader pool of communities would be able to take on federally funded hazard mitigation. If cost share was not a barrier to entry, states could approach the communities at risk and work with them directly to access federal funding for the highest priority and most effective projects. States would finally have the opportunity to make risk informed, strategic choices about spending their mitigation funding and implementing the goals outlined in their plans. This increase in accessibility should increase interest in and thus the number of applications for these grants. With a broader pool of projects to choose from, FEMA would be able to fund projects with an even higher average return on investment, while simultaneously reaching a wider and more diverse audience with its grant programs. The analysis in this thesis is limited to the Hazard Mitigation Grant Program, but because the fundamental limitation of cost sharing affects all HMA program grants, this recommendation is applicable to FMA and BRIC as well.

2. Increase Minimum Required BCR

Congress could keep the same total program costs and the same relative benefits for its spending by increasing the minimum BCR of HMA projects to 1.33, a highly

achievable threshold that is well below the average for HMGP-funded projects.

$$0.75 \text{ cost} / 1.0 \text{ BCR} = 1.0 \text{ Cost} / 1.33 \text{ BCR}$$

C. IMPLEMENTATION

1. FEMA

Eliminating the non-federal cost share would reduce the total amount of physical work covered by the program dollar-for-dollar, as FEMA is responsible for validating and approving every item in a scope of work, regardless of the source of funding. This would lead to a reduction in the overall workload of federal staff, which has the potential reduce the operating cost of the program in the long term. The proposed policy changes would align with several of FEMA's current stated strategic goals. Chiefly among them, FEMA is working to be a more inclusive and equitable organization. The number one goal in its current strategic plan is to "instill equity as a foundation of emergency management" (with intentions to "remove barriers to FEMA programs through a people first approach" and "achieve equitable outcomes for those [they] serve."¹³³ This plan discusses at length the ways in which the impacts of disasters are disproportionate, and admits that "FEMA decisions about policy and program implementation must be routinely informed by how they will impact underserved communities."¹³⁴ FEMA is also making an expansive effort to "reduce the complexity of FEMA," recently implementing alternative procedures to streamline disaster recovery, simplifying disaster thresholds, and expanding the "pre-calculated benefits" that allow many communities to skip the BCA process for projects known to be extremely cost beneficial.¹³⁵ The strong alignment of the proposed cost share

¹³³ Federal Emergency Management Agency, *2022–2026 FEMA Strategic Plan: Building the FEMA Our Nation Needs and Deserves* (Washington, DC: Department of Homeland Security, 2022), 8, <https://www.fema.gov/about/strategic-plan>.

¹³⁴ Federal Emergency Management Agency, 12.

¹³⁵ Federal Emergency Management Agency, *2018–2022 FEMA Strategic Plan* (Washington, DC: Department of Homeland Security, 2018), 4, <https://www.fema.gov/about/strategic-plan/2018-2022>; Kayed I. Lakhia, "Update to 'Cost-Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas Using Pre-Calculated Benefits'" (memorandum, Washington, DC: Federal Emergency Management Agency, 2021), https://www.fema.gov/sites/default/files/documents/fema_acquisition-elevation-precaculated-benefits-memo_092021.pdf.

and BCA requirement changes and existing FEMA goals indicates that the limited resources required for implementation are likely to be made available.

FEMA may consider redirecting any cost savings or resources made available by the change towards training, simplification or further development of the BCA tool, or technical assistance to communities, which would all increase access to these funds among underserved communities. It would also help states make stronger decisions; if all communities have equal access to the expertise needed to assemble quality BCAs, it can be a more useful and equitable measure of the relative value of projects that could be funded by HMGP.

2. State

The elimination of cost sharing is expected to increase the number of applications for HMGP grants. In the short term, any increase in application volume would lead to the need for additional staff resources at the state level to support the creation of high-quality projects and application packages for submission to FEMA. In the long term, however, this policy would require minimal (if any) increase in sustained funding, as the total dollar amount of grants being made available would not change, nor would the total amount of physical work to be reviewed and reimbursed. This strategy also places additional emphasis on the value of the BCA as a decision-making tool. Some critics have argued that the BCA process is unnecessarily complex, and that the BCA process itself is a barrier to access for jurisdictions with fewer resources or less technical expertise. A higher percentage of applicants are likely to require support in completing the benefit-cost analysis, and states (who support municipalities and counties in applying for these grants) may require advanced BCA training in order to be able to provide this support. However, states frequently return unspent HMGP management costs to the federal government, so there may be existing funding within disaster allocations to manage this workload.

3. Local

Local governments receiving grants to do mitigation work are, in most cases, the “end user” of the HMGP program. In addition to the obvious benefit of a fully federally funded project, this proposed policy change is likely to reduce the number of withdrawals

from the HMA programs. Many projects that are selected to receive grant awards are never completed, because the municipal or county funding that had been earmarked for cost share was needed for some other purpose during the several years it can take for grant funds to be obligated. Removing financial barriers increases not only the ability for an underserved community to access funding, but also the likelihood that they are able to see the process through to completion, and that their community will benefit from reduced disaster risk.

D. CONCLUSION

Hazard mitigation planning and action are too important (and too expensive) to be inefficient. FEMA and the states collectively spend tens of millions of dollars per year on mitigation planning and hundreds of millions of dollars on mitigation projects, with a goal of creating the greatest possible reduction in risk for the greatest number of people. Limiting that funding to communities with enough funding to participate directly undercuts that goal, and has led to a national pattern of scattershot mitigation action and a structural inability for state strategies to be implemented. An extremely simple change to the calculations, with a minimal impact on workload at all levels of government, would make a profound positive impact on the nation's ability to withstand increasingly frequent and severe disasters.

APPENDIX A. FEMA PROJECT TYPE CODES

Project Category	Code	Project Type
Acquisition, Elevation, and Relocation	200.1	Acquisition of Private Real Property (Structures and Land)—Riverine
	200.1A	RETRO—Acquisition of Private Real Property (Structures and Land)—Riverine
	200.2	Acquisition of Private Real Property (Structures and Land)—Coastal
	200.3	Acquisition of Public Real Property (Structures and Land)—Riverine
	200.4	Acquisition of Public Real Property (Structures and Land)—Coastal
	200.5	Acquisition of Vacant Land
	200.6	Acquisition of Private Real Property (Structures and Land)—Landslide
	200.7	Acquisition of Private Real Property (Structures and Land)—Erosion
	200.8	Acquisition of Private Real Property (Structures and Land)—Snow Avalanche
	201.1	Relocation of Private Structures—Riverine
	201.2	Relocation of Private Structures—Coastal
	201.3	Relocation of Public Structures—Riverine
	201.4	Relocation of Public Structures—Coastal
	201.5	Relocation of Private Structures—Erosion
	201.6	Relocation of Private Structures—Landslide
	201.8	Relocation of Public Structures—Erosion
	201.9	Relocation of Public Structures—Landslide
	202.1	Elevation of Private Structures—Riverine
	202.1A	RETRO—Elevation of Private Structures—Riverine
	202.2	Elevation of Private Structures—Coastal
	202.3	Elevation of Public Structures—Riverine
	202.4	Elevation of Public Structures—Coastal

Project Category	Code	Project Type
	207.1	Mitigation Reconstruction—PILOT
	207.1A	RETRO—Mitigation Reconstruction—PILOT
	207.2	Mitigation Reconstruction
Code Design and Implementation	104.1	Developing, Implementing and Enforcing Codes, Standards, Ordinances and Regulations
	105.1	Applied Research and Development in the Building Sciences
Management Costs	700.1	Management Costs—Salaries
	700.2	Management Costs—Equipment
	700.3	Management Costs—Office Space Rental
	700.4	Management Costs—Supplies
Other	97.1	Expanded Mitigation Strategies—PILOT
	103.1	Feasibility, Engineering and Design Studies
	103.2	Feasibility, Engineering, and Design Studies—Safe Rooms
	106.1	Other Non Construction (Regular Project Only)
	106.2	Other Non Construction
	501.1	Other Major Structural Projects
	800.1	Miscellaneous
	904.1	Advanced Assistance
Planning	90.1	Mitigation Plan—Local Multihazard Mitigation Plan
	90.4	Mitigation Plan—Local Multihazard Mitigation Plan
	90.6	Mitigation Plan—State Multihazard Mitigation Plan
	91.1	Local Multihazard Mitigation Plan
	91.2	Local Multihazard Mitigation Plan—NEW
	91.3	Local Multihazard Mitigation Plan—UPDATE
	91.4	Local Multijurisdictional Multihazard Mitigation Plan—NEW
	91.5	Local Multijurisdictional Multihazard Mitigation Plan—UPDATE

Project Category	Code	Project Type
	92.1	State Multihazard Mitigation Plan
	92.2	State Multihazard Mitigation Plan—UPDATE
	93.1	Tribal (Local) Multihazard Mitigation Plan
	93.2	Tribal Multihazard Mitigation Plan—NEW
	93.3	Tribal Multihazard Mitigation Plan—UPDATE
	93.4	Tribal Multijurisdictional Multihazard Mitigation Plan—NEW
	94.1	Tribal Multihazard Mitigation Plan
	95.2	Planning Related Activities
Public Awareness	100.1	Public Awareness and Education (Brochures, Workshops, Videos, etc.)
	101.1	Professional Education (Building Inspectors, Architects, Engineers, Contractors, etc.)
	600.1	Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)
Retrofit (Flood)	203.1	Wet Floodproofing Private Structures—Riverine
	203.2	Wet Floodproofing Private Structures—Coastal
	203.3	Wet Floodproofing Public Structures—Riverine
	203.4	Wet Floodproofing Public Structures—Coastal
	204.1	Dry Floodproofing Private Structures—Riverine (Commercial)
	204.2	Dry Floodproofing Private Structures—Coastal (Commercial)
	204.3	Dry Floodproofing Public Structures—Riverine
	204.3	Dry Floodproofing Public Structures—Riverine
	204.4	Dry Floodproofing Public Structures—Coastal
Retrofit (non-flood)	205.1	Retrofitting Private Structures—Wildfire
	205.2	Retrofitting Public Structures—Wildfire
	205.3	Non Structural Retrofitting/Rehabilitating Private Structures—Seismic
	205.4	Non Structural Retrofitting/Rehabilitating Public Structures—Seismic

Project Category	Code	Project Type
	205.5	Structural Retrofitting/Rehabilitating Private Structures—Seismic
	205.6	Structural Retrofitting/Rehabilitating Public Structures—Seismic
	205.7	Retrofitting Private Structures—Wind
	205.8	Retrofitting Public Structures—Wind
	205.9	Retrofitting Public Structures—Tsunami
	400.1	Utility Protective Measures (Electric, Gas, etc.)
	400.3	Utility Protective Measures (Wildfire)
	401.1	Water and Sanitary Sewer System Protective Measures
	402.1	Infrastructure Protective Measures (Roads and Bridges)
	601.1	Generators
	601.2	Generators—Regular
	602.1	Other Equipment Purchase and Installation
Safe Room and Vertical Shelter	206.1	Safe Room (Tornado and Severe Wind Shelter)—Private Structures
	206.1A	RETRO—Safe Room (Tornado and Severe Wind Shelter)—Private Structures
	206.2	Safe Room (Tornado and Severe Wind Shelter)—Public Structures
	502.1	Tsunami Vertical Evacuation Shelter
Stabilization and Vegetation Management	300.1	Vegetation Management—Natural Dune Restoration
	300.2	Vegetation Management—Wildfire
	300.3	Vegetation Management—Wind
	300.4	Vegetation Management—Non Coastal Shoreline Stabilization
	300.6	Vegetation Management—Erosion
	300.8	Vegetation Management—Post-wildfire burn area restoration
	301.1	Shoreline Stabilization (Riprap, etc.)
	302.1	Landslide Stabilization—Structural
	302.2	Snow Avalanche Stabilization—Structural

Project Category	Code	Project Type
	302.3	Landslide Stabilization—Post-wildfire non-structural treatments
	304.2	Post Wildfire Reforestation
	402.2	Roads and Bridges—Post-wildfire erosion and flood protection
Structural Flood Control	303.1	Wetland Restoration/Creation
	303.2	Floodplain and Stream Restoration
	303.3	Floodplain and Stream Restoration—Post-wildfire remediation
	403.1	Stormwater Management—Culverts
	403.1A	RETRO—Stormwater Management—Culverts
	403.2	Stormwater Management—Diversions
	403.3	Stormwater Management—Flapgates/Floodgates
	403.3A	RETRO—Stormwater Management—Flapgates/Floodgates
	403.4	Stormwater Management—Detention/Retention Basins
	403.4A	RETRO—Stormwater Management—Detention/Retention Basins
	403.5	Floodwater Storage and Diversion
	403.6	Aquifer Storage and Recovery (ASR)
	403.8	Floodwater and Mudflow diversions—post-wildfire
	404.1	Localized Flood Control System to Protect Critical Facility
	405.1	Other Minor Flood Control
	405.1A	RETRO—Other Minor Flood Control
	500.1	Flood Control—Floodwall
	500.2	Flood Control—Berm, Levee, or Dike
	500.3	Flood Control—Dam

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APPENDIX B. STATES INCLUDED IN ANALYSIS

- Alabama¹³⁶
- Alaska¹³⁷
- Arizona¹³⁸
- Arkansas¹³⁹
- Delaware¹⁴⁰
- Georgia¹⁴¹
- Hawai'i¹⁴²
- Idaho¹⁴³
- Indiana¹⁴⁴
- Iowa¹⁴⁵
- Kansas¹⁴⁶

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- Maryland¹⁴⁷
- Michigan¹⁴⁸
- Mississippi¹⁴⁹
- Missouri¹⁵⁰
- Montana¹⁵¹
- Nebraska¹⁵²
- Nevada¹⁵³
- New Jersey¹⁵⁴
- New Mexico¹⁵⁵
- North Carolina¹⁵⁶
- North Dakota¹⁵⁷

¹⁴⁷ Maryland Emergency Management Agency, *The State of Maryland 2016 Hazard Mitigation Plan* (Reisterstown, MD: Maryland Emergency Management Agency, 2016), https://mdem.maryland.gov/community/Documents/2016_Maryland_Hazard_Mitigation_Plan_final_2.pdf.

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¹⁵⁷ North Dakota Department of Emergency Services, *Enhanced Mitigation Mission Area Operations Plan* (Bismarck, ND: North Dakota Department of Emergency Services, 2018).

- Ohio¹⁵⁸
- Oklahoma¹⁵⁹
- Oregon¹⁶⁰
- Pennsylvania¹⁶¹
- South Carolina¹⁶²
- South Dakota¹⁶³
- Tennessee¹⁶⁴
- Utah¹⁶⁵
- Virginia¹⁶⁶
- West Virginia¹⁶⁷
- Wisconsin¹⁶⁸
- Wyoming¹⁶⁹

¹⁵⁸ Ohio Emergency Management Agency, *State of Ohio Enhanced Hazard Mitigation Plan*.

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¹⁶⁸ Wisconsin Emergency Management, *2021 State Hazard Mitigation Plan*.

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