

August 1999

# DISASTER ASSISTANCE

## Opportunities to Improve Cost-Effectiveness Determinations for Mitigation Grants



---

---

**Resources, Community, and  
Economic Development Division**

B-281730

August 4, 1999

The Honorable Christopher S. Bond  
ChairmanThe Honorable Barbara A. Mikulski  
Ranking Minority Member  
Subcommittee on VA, HUD, and  
Independent Agencies  
Committee on Appropriations  
United States SenateThe Honorable Tillie K. Fowler  
Chairman, Subcommittee on Oversight,  
Investigations, and Emergency Management  
Committee on Transportation and Infrastructure  
House of Representatives

For a number of years, the Congress has been concerned about the increasing costs of federal disaster assistance. One of the Federal Emergency Management Agency's (FEMA) primary approaches for reducing these costs is to promote mitigation measures that will reduce future damage within communities, thereby potentially decreasing future federal expenditures for disasters. From its inception in fiscal year 1989 through April 30, 1999, FEMA's program for funding state and local measures to mitigate the impact of future disasters—the Hazard Mitigation Grant Program—received over \$2.4 billion. Under FEMA's primary authorizing legislation, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, these measures must be cost-effective, meaning that they will ultimately save money for the federal government. As a condition of receiving a program grant, a state must prepare an administrative plan that establishes its procedures and priorities for identifying and selecting mitigation projects. FEMA, however, has the final authority to approve funding for these projects.

In the Subcommittee's June 12, 1998, report accompanying the fiscal year 1999 appropriations bill and subsequent correspondence, you requested that we review how FEMA, in conjunction with the states, ensures the cost-effectiveness of projects funded under the Hazard Mitigation Grant Program. Specifically, this report

- examines the approaches FEMA and the states use to ensure that program grants are targeted to cost-effective mitigation projects and

- considers whether the approaches ensure that the mitigation measures are cost-effective.

To address these issues, we performed audit work in Florida and in FEMA's Region 6 (for Arkansas, Louisiana, and Texas). We selected Florida because of the sizeable amount of funds obligated for program grants during fiscal year 1998 and the state's role in analyzing projects for cost-effectiveness. We selected the states in Region 6 because they have addressed a wide range of disasters and have thus gained varied experience in hazard mitigation.

---

## Results in Brief

The states and FEMA work together to help ensure that Hazard Mitigation Grant Program grants are awarded for cost-effective projects. The states in our review establish procedures and priorities for identifying and selecting mitigation projects; however, not all of them conduct a formal analysis of a project's cost-effectiveness before submitting an application for the project to FEMA. FEMA uses benefit-cost analysis as its primary approach for ensuring that mitigation projects submitted by the states are cost-effective.<sup>1</sup> However, FEMA also excludes certain types of hazard mitigation projects from benefit-cost analysis, including projects that fund the removal of certain properties from floodways and floodplains, hazard identification or mapping initiatives, and mitigation planning efforts. FEMA officials stress a need for flexibility in assessing these projects, suggesting that benefit-cost analysis does not always apply to all mitigation projects, because of difficulties in quantifying the benefits of some projects and the time needed to gather data for conducting analyses. For these projects, the states are instructed to include a narrative that identifies the benefits of mitigation and establishes a "reasonable expectation" that the projects will reduce or prevent future property damage, injury, or loss of life.

Our review of 55 hazard mitigation projects in four states found that 41 projects were judged as cost-effective on the basis of the benefit-cost analyses conducted. These 41 projects account for \$11.7 million, or 58 percent of the \$20.1 million in project funding we reviewed. However, the officials conducting benefit-cost analyses for some of the projects designed to mitigate future damage from flooding did not always use the best available information—such as flood damage information available from past insurance claims and updated information on flood hazards—in

---

<sup>1</sup>Benefit-cost analysis—an approach recommended by the Office of Management and Budget—is used to determine how the anticipated dollar savings gained through implementing a project compare with its cost. To be considered cost-effective under benefit-cost analysis, a project must return more money over its life than it cost.

---

conducting their analyses. Our review also found that 14 projects, accounting for \$8.4 million, or 42 percent, of the funding reviewed, were exempt from benefit-cost analysis. These projects included property acquisitions, emergency alert systems, and a public awareness campaign. While FEMA has explained its rationale for exempting these types of mitigation projects from benefit-cost analysis, factors such as the lack of an established analytical basis supporting the exemption limit the agency's ability to demonstrate that some of these mitigation measures are cost-effective. This report includes recommendations designed to improve determinations of cost-effectiveness made under the Hazard Mitigation Grant Program.

---

## Background

FEMA has made disaster mitigation a primary goal in its efforts to reduce the long-term costs of disasters. According to FEMA's September 1997 strategic plan, the agency is concentrating its activities on reducing disaster costs through mitigation because no other approach is as effective over the long term. Mitigation activities are undertaken to reduce losses from disasters or to prevent such losses from occurring. To help mitigate hazards, the agency provides grants and training for state and local governments, funding for preventing damage to public facilities and for purchasing and converting flood-prone properties to open space, and federal flood insurance. It also supports the development of land-use plans and zoning ordinances to discourage building in hazardous areas and funds programs designed to reduce the loss of life and property from earthquakes and fires. While a number of FEMA programs and initiatives provide funding for hazard mitigation assistance, our review focused on hazard mitigation measures funded under the Hazard Mitigation Grant Program.

---

## Hazard Mitigation Grant Program

Up to 15 percent of the total grant funds spent on a disaster may be spent under the Hazard Mitigation Grant Program for hazard mitigation measures. Subject to certain dollar limits, the Stafford Act generally allows federal funding of up to 75 percent of the cost of hazard mitigation measures within communities that have been affected by a disaster (the state or local government pays the remaining portion of the costs).<sup>2</sup> In

---

<sup>2</sup>In an Oct. 10, 1997, Federal Register notice, FEMA announced that for disasters declared after Apr. 6, 1997, eligibility for program funding would be statewide rather than limited to the communities affected by the disaster. FEMA was attempting to give the states enhanced flexibility in using the funding for high-priority projects across the states and to close out the funding from older disasters as soon as possible.

---

fiscal year 1998, FEMA approved and obligated over \$415 million in Hazard Mitigation Grant Program grants.

---

## Requirements That Projects Be Cost-Effective

The legislation authorizing FEMA's use of funding for the Hazard Mitigation Grant Program—the Stafford Act (P.L. 93-288), as amended—states that the funding can be used for hazard mitigation measures that have been determined to be “cost-effective and which substantially reduce the risk of future damage, hardship, loss, or suffering in any area affected by a major disaster.” The Office of Management and Budget's (OMB) guidelines, contained in OMB Circular A-94, recommend the use of benefit-cost analysis for determining cost-effectiveness. FEMA's regulations for administering the Hazard Mitigation Grant Program include eligibility requirements that contain minimum criteria for projects, such as documenting that a project “. . . will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur. Both costs and benefits will be computed on a net present value basis.” Benefit-cost analysis is used to determine “net present value.” Additionally, FEMA's guidance for determining the cost-effectiveness of hazard mitigation projects states that “a key criterion for mitigation projects to be eligible for funding is that they must be cost-effective” and that “benefit-cost analysis is used for all cost-effectiveness determinations.”<sup>3</sup>

---

## The States and FEMA Work Together in Using Different Approaches to Ensure That Grants Are Awarded for Cost-Effective Projects

The states in our review establish procedures and priorities for identifying and selecting mitigation projects; however, not all of them conduct a formal analysis of a project's cost-effectiveness before submitting an application for the project to FEMA. FEMA uses benefit-cost analysis—an approach recommended by OMB—as its primary approach for ensuring that mitigation projects are cost-effective. However, FEMA also exempts certain categories of projects from benefit-cost analysis for a number of reasons, including the fact that some projects do not have proven or clearly measurable benefits. To demonstrate the cost-effectiveness of such projects, FEMA asks the states to provide a narrative identifying the benefits of mitigation and establishing a “reasonable expectation” that future property damage, injury, or loss of life will be reduced or prevented.

---

<sup>3</sup>How to Determine Cost-Effectiveness of Hazard Mitigation Projects: A New Process for Expediting Application Reviews, Interim Edition (Dec. 1996).

---

## States Identify and Select Mitigation Projects

The state administrative plans we reviewed exhibited a broad range of approaches for identifying and selecting mitigation projects. In general, the states screen their projects using various criteria, such as the overall cost of a project, its potential environmental effects, and its cost-effectiveness. For example, Louisiana calculates an initial benefit-cost ratio for projects, which it uses as a part of its criteria for evaluating and scoring them. The state's scoresheet consists of three components—engineering (50 points), effectiveness (100 points), and environmental impact (50 points)—which combine to produce a total possible score of 200 points. Projects that receive the highest scores are then given priority for funding.

Several FEMA officials noted that the agency is initiating changes to improve the states' planning efforts. For example, FEMA has developed a checklist of elements for a model state plan, which will be used to assess how well a state is doing in addressing the suggested elements. Some of the elements will help the states identify cost-effective projects. For instance, the checklist addresses whether a state plan ranks projects on the basis of the "greatest opportunity for loss reduction." Additionally, some states, such as Florida, are providing incentives for localities to develop their own mitigation plans, hoping to improve the quality of the mitigation projects submitted in the future.

---

## FEMA Uses Benefit-Cost Analysis as the Preferred Approach for Determining Cost-Effectiveness

FEMA uses benefit-cost analysis to assess whether the expected costs of investing in a hazard mitigation project are justified.<sup>4</sup> That is, to what extent will the project help avoid the costs of damage expected from future disasters (the benefits)? FEMA generally conducts the benefit-cost analysis for the projects that states submit for approval.<sup>5</sup> FEMA's guidance describes four main elements of a benefit-cost analysis:

- an estimate of damage and loss before mitigation,
- an estimate of damage and loss after mitigation,
- an estimate of the frequency and severity of the hazard causing the damage (such as the risk of flooding), and

---

<sup>4</sup>The benefit-cost analysis is used to determine a benefit-cost ratio—the ratio of the expected benefits divided by the expected costs. If the expected benefits are greater than the expected costs, the ratio is greater than 1.0 and the project is considered cost-effective. If the expected benefits are less than the expected costs, the ratio is less than 1.0 and the project is not considered cost-effective.

<sup>5</sup>As participants in a pilot program called the "managing state concept," three states (Florida, North Dakota, and Ohio) typically conduct benefit-cost analyses for projects from their communities and submit summaries of the analyses for FEMA's review.

- 
- economic factors used in the analysis (the project's expected life span, for example).

After all of these elements are considered, along with the project's expected costs, the project's cost-effectiveness can be determined. However, factors outside the benefit-cost analysis, such as the project's potential impact on environmental conditions, can also influence whether the project is approved for funding.

FEMA developed several computer programs (known as modules) to simplify the calculations needed to determine a project's benefit-cost ratio. Each module employs established economic principles, OMB guidance, and risk calculations to determine a proposed project's benefits (discounted to present-day dollars) over its expected life. FEMA has provided these computer programs to regional, state, and local mitigation staff and trained them in how to use the modules.

---

### Certain Categories of Mitigation Projects Are Exempted From Benefit-Cost Analysis

While the Stafford Act requires that projects funded through the Hazard Mitigation Grant Program be cost-effective, the act does not define how to make this determination. FEMA's regulations and other guidance establish that benefit-cost analysis is the preferred approach for determining cost-effectiveness. However, since September 1996, FEMA has exempted four categories of Hazard Mitigation Grant Program projects from benefit-cost analysis. Table 1 summarizes information on the four categories of projects.

**Table 1: Types of Exemptions and Potential Funds Available, by Project Category, From Fiscal Year 1989 Through April 30, 1999**

Dollars in millions

Type of exemption	Potential funds available	Intent of policy	Support for cost-effectiveness	Basis for cost-effectiveness approach	Exemption policy time frames
Property acquisition (substantially damaged structures)		<sup>a</sup> To identify structures in floodways and floodplains as strong candidates for funding	Located in 100-year floodplain and ≥50 percent substantially damaged	Follows National Flood Insurance Program policy	September 1996 to present
5-percent initiative (includes a variety of projects)	\$113.5	To give states discretionary funds	Narrative justification	Difficult to evaluate against traditional criteria for cost-effectiveness	September 1996 to present
Tornado-related projects	\$56.5	To provide additional funds for warning systems	Narrative justification	Difficult to evaluate against traditional criteria for cost-effectiveness	August 1998 to present
Planning projects	\$88.3	To expedite the closeout of older disasters	No support required	Considered cost-effective	October 1997 to present

<sup>a</sup>Because FEMA cannot break out the funds available for this category, the specific amount is unknown.

FEMA's rationale for the exemptions varies, although the agency's policy guidance indicates that two of the exemptions were established because some mitigation projects were often difficult to evaluate against traditional quantitative criteria for determining cost-effectiveness and eligibility criteria. FEMA officials stress a need for flexibility in assessing these projects, suggesting that benefit-cost analysis models do not always apply to all mitigation projects.

## Projects Involving the Purchase of Substantially Damaged Structures

Through policy guidance established in September 1996, FEMA exempted projects that involved purchasing structures located in floodways and floodplains if the cost of restoring the damaged structures equaled or exceeded 50 percent of the structures' market value and the structures were located in a 100-year floodplain. A senior FEMA mitigation official explained that under the National Flood Insurance Program, these substantially damaged structures had to be either elevated or relocated. Thus, the Hazard Mitigation Grant Program was simply following the policy already established by the flood insurance program. According to the official, however, the flood insurance program does not require that

---

mitigation measures be cost-effective. The official also stated that the exemption was intended to speed the delivery of hazard mitigation grants to the states. This particular exemption has been criticized by FEMA's Inspector General. In a March 1998 report,<sup>6</sup> the Inspector General noted the lack of analytical data supporting the exemption's contention that acquisition projects involving substantially damaged properties in a 100-year floodplain are cost-effective. While FEMA officials have begun to retroactively analyze some of the acquisition projects exempted under this policy and agency officials expect to complete this analysis by the end of August 1999,<sup>7</sup> the agency is currently unable to provide data that would support the exemption of all substantially damaged structures in a 100-year floodplain. Without this analytical basis, it is difficult for FEMA to demonstrate that the exempted acquisition projects it is funding are cost-effective.

---

## The 5-Percent Initiatives

In September 1996, FEMA established another policy that exempted projects from benefit-cost analysis. Known as the "5 percent Hazard Mitigation Grant Program initiatives," this policy allows the states to use up to 5 percent of their Hazard Mitigation Grant Program project funding for a variety of hazard mitigation projects.

Projects eligible for funding under this initiative can have benefits that are not proven or not clearly measurable, making it difficult to evaluate the projects under traditional criteria for determining cost-effectiveness and eligibility. FEMA's policy memorandum for this exemption explained that evaluating the need for funding certain mitigation measures required a large amount of time at the state and federal levels, although it was generally recognized that such measures reduced the potential losses from a future disaster. Examples cited in the memorandum included

- new, unproven mitigation techniques and technologies;
- disaster warning equipment and systems;
- hazard identification or mapping efforts; and
- studies or plans to reduce disaster losses.

To be eligible, a project type had to be identified in the state's hazard mitigation plan and reduce or prevent future property damage, injury, or the loss of life. The policy's intent was to provide the states with discretion

---

<sup>6</sup>Improvements Are Needed in the Hazard Mitigation Buyout Program, FEMA OIG, Inspection Report I-01-98 (Mar. 1998).

<sup>7</sup>The officials explained that FEMA would be reviewing acquisition projects in communities within three states. These projects encompass thousands of individual properties.

---

in deciding which mitigation measures to fund, as well as make them responsible for providing the rationale for the cost-effectiveness of the projects. FEMA officials explained that the policy was meant to spur creativity and avoid the time and expense involved in conducting benefit-cost analyses.

FEMA's guidance instructs prospective grantees to apply for 5-percent funding if a project was previously denied funding because of difficulty in measuring its cost-effectiveness. However, projects denied funding for other reasons may also be submitted under the 5-percent funding policy. For example, a project to retrofit a homeless assistance center with items such as shutters, a generator, a well, and a storage tank was originally denied funding by FEMA because it was submitted more than 2 years past the agency's deadline for submitting projects. However, after the project was resubmitted under the 5-percent initiative, it was approved for over \$220,000 in federal funding.

The 5-percent initiative policy states that instead of conducting a benefit-cost analysis, the states are to include a narrative that identifies the project's mitigation benefits and establishes a reasonable expectation that future property damage, injury, or loss of life will be reduced or prevented. While FEMA's guidance instructs the states to identify a project's benefits, it does not specifically suggest any comparison of the benefits with the project's costs or with the benefits and costs of competing alternative projects. Without any measurement and subsequent comparison of a project's expected benefits and expected costs, the criteria the agency is using to determine cost-effectiveness are unclear. Additionally, the 5-percent initiative allows for funding projects that were difficult to evaluate against traditional program eligibility criteria, thus providing the appearance that any project could be funded under the 5-percent initiative. For example, a mitigation project to develop a "Hurricane Information Center/Partnership in Education" was denied funding three times by FEMA. FEMA initially ruled that because the project was an "education and awareness campaign," it did not meet the Hazard Mitigation Grant Program's eligibility requirements and was thus ineligible for funding. However, after the project was submitted for funding under the 5-percent initiative, it was approved for \$4,700 in federal funding.

---

## Tornado-Related Projects

In August 1998, FEMA announced a policy that temporarily exempted certain projects from benefit-cost analysis. In essence, FEMA extended its 5-percent set-aside by another 5 percent to fund tornado-related projects.

---

The agency noted an increase in tornado activity that it associated with the 1997-98 El Nino weather pattern and suggested that the additional funding was needed to provide warning systems that could not be funded through existing programs. The additional 5 percent in Hazard Mitigation Grant Program funding was available only to states in which a disaster involving tornadoes had been declared by the President. Furthermore, in the interest of using the funding remaining from older disasters, FEMA applied the exemption to all disasters with unobligated funds that were declared before fiscal year 1998, as well as all fiscal year 1998 and future declarations in which tornadoes or high winds played a role.

In announcing this exemption, FEMA noted that tornado mitigation projects, such as warning systems, were often difficult to evaluate against traditional quantitative criteria for determining cost-effectiveness and eligibility. According to FEMA, it is difficult to measure the risk of tornadoes as well as the dollar value of benefits associated with tornado-related projects, such as tornado warning systems and public education. The policy memorandum stated that in lieu of conducting a benefit-cost analysis, FEMA would allow the states to include a narrative that identified a project's mitigation benefits and established an expectation that the project would reduce or prevent future property damage, injury, or loss of life. To receive funding, a project had to be identified in a state's hazard mitigation plan and needed to reduce or prevent future damage to property, injury, or loss of life from tornadoes. Additionally, among other requirements, states had to develop a comprehensive plan for warning citizens that included a public education component. This policy will remain in effect until FEMA adopts proposed regulatory changes stating that warning systems will be funded only from the original 5-percent set-aside. FEMA officials expect that the regulatory changes will be made final in August 1999.

---

## Hazard Mitigation Planning Projects for Older Disasters

In October 1997, FEMA exempted hazard mitigation planning projects associated with older disasters from benefit-cost analysis. FEMA decided that in the interest of expediting the closeout of funding for disasters that occurred on or before June 10, 1993, the agency would make program funds remaining from these disasters available for hazard mitigation planning purposes.<sup>8</sup> The states were invited to submit applications for funding that would help them develop plans for mitigating multiple

---

<sup>8</sup>When the Hazard Mitigation Grant Program was established, it provided federal matching grants on a cost-share basis of up to 50 percent for a project. Thus, FEMA refers to these mitigation projects as "50/50 planning" projects. With the 1993 amendments to the Stafford Act, the federal cost share was changed from up to 50 percent to up to 75 percent.

---

hazards. The policy memorandum stated that planning projects would be considered cost-effective measures. For example, the initial phase of a stormwater management project included developing a comprehensive stormwater study for two counties. Under the policy memorandum, this study was considered cost-effective. One senior FEMA mitigation official noted that under the agency's deadlines limiting the timetables for funding projects, the funding available for any additional planning projects is decreasing.

---

### Quantifying the Projects Exempted From Benefit-Cost Analysis

For a number of reasons, FEMA is unable to quantify the actual number and dollar amount of the projects it has exempted from benefit-cost analysis. FEMA officials explain that, to present accurate data, headquarters would need to make a special effort to gather the information directly from project files in the regions. However, FEMA officials estimate that the maximum amount that has been or could be spent for three categories of exempt projects is approximately \$258 million. This \$258 million estimate includes \$113.5 million for exempt 5-percent initiative projects, \$56.5 million for exempt tornado-related projects, and \$88.3 million for planning projects using funding from older disasters. FEMA does not know the maximum potential funding for the fourth category of exempt projects—acquisitions of substantially damaged properties—though agency officials state that some portion of an estimated \$1.6 billion<sup>9</sup> in Hazard Mitigation Grant Program funding will be spent on these projects.

FEMA officials have expressed reservations about the accuracy of certain data fields within the Hazard Mitigation Grant Program database, explaining that they are currently undertaking a review to correct inaccurate information and to fill in data gaps. The officials also said they expect to have better data for managing the program as they continue to implement changes that correspond with FEMA's new management information system—the National Emergency Management Information System.

---

<sup>9</sup>FEMA's estimate of \$1.6 billion is based on total program funds (i.e., \$2.5 billion) minus (1) \$626 million for two large projects that underwent benefit-cost analysis and (2) \$258 million in potential funding for projects in the other exempted categories—5-percent initiative, tornado-related, and planning.

---

## FEMA's Approaches Do Not Always Ensure That Mitigation Projects Are Cost-Effective

FEMA's use of benefit-cost analysis appears to demonstrate that certain hazard mitigation projects are cost-effective, although the agency could provide better information to the officials conducting benefit-cost analyses for some projects. However, several factors are limiting the agency's ability to demonstrate the cost-effectiveness of projects that are exempt from benefit-cost analysis. For example, our review of \$20.1 million in hazard mitigation project funding in two FEMA regions found that over one-third of the funding was exempt from benefit-cost analysis, even though the majority of this project funding lacked an established analytical basis supporting the exemption. Establishing the basis for exempting these acquisition projects and reviewing the cost-effectiveness of other exempt projects after they are implemented would help FEMA better ensure that these mitigation projects are cost-effective.

---

## FEMA's Use of Benefit-Cost Analysis Appears to Demonstrate Projects' Cost-Effectiveness, Although the Best Available Data Are Not Always Used

Forty-one (75 percent) of the 55 projects we reviewed were evaluated using benefit-cost analysis. The projects included wind retrofits (shutter projects), drainage improvements, seismic retrofits of buildings, and the installation of gas shut-off valves in structures. For example, the wind retrofit projects included installing hurricane shutters on schools that were to be used as hurricane shelters and on buildings such as water treatment and wastewater treatment plants, fire departments, and emergency medical facilities (all of which are considered "critical" community facilities). These projects, which accounted for 58 percent of the funding we reviewed (\$11.7 million of \$20.1 million), were judged as cost-effective. However, we also found that the best available data for estimating the benefits of acquisition projects were not always used in benefit-cost analyses because the best data were not readily available.

For example, in determining flood hazard data—which establish the probability and severity of a flood event—FEMA's guidance suggests using the flood insurance rate maps available through the National Flood Insurance Program. The flood hazard data are found in flood insurance studies, which sometimes accompany the flood insurance rate maps.<sup>10</sup> This information helps to establish the number of times a flood is expected to occur in a given area (the frequency of future flooding) and the level of flooding (its severity). The quality of this information can influence the outcome of a benefit-cost analysis because overestimating the frequency or severity of a flood can inflate the estimated benefits attributed to an acquisition project. We found little evidence that this information was used in the benefit-cost analyses we reviewed. According to FEMA officials,

---

<sup>10</sup>FEMA officials told us that the flood insurance rate maps do not always include the studies.

---

the availability of the information is a concern because many of the agency's maps are out of date or incomplete. As a result, analysts must rely on evidence from local officials or residents to establish flood levels.

In an internal policy paper outlining fiscal year 1998 objectives for modernizing its flood hazard mapping program, FEMA discussed the possibility of evaluating and possibly revising its flood hazard maps as part of its standard response to a presidentially declared flooding disaster. Conducting a postdisaster evaluation or verification of flood hazard maps could provide needed data on the availability of accurate flood insurance rate maps for use in analyzing proposed hazard mitigation projects. One FEMA headquarters official told us that this type of evaluation was conducted after a flood in Georgia, noting that the postdisaster flood hazard verification provided valuable information for directing future mitigation efforts.

We also found that the officials conducting benefit-cost analyses may not always use the best available data on damage claims from past flooding. The quality of this information can affect the outcome of an analysis because overestimating the damage from a previous flood event can inflate the estimated benefits attributed to an acquisition project. FEMA officials told us that information on flood claims available from the National Flood Insurance Program was not always used, suggesting that information supplied by project applicants was used instead.<sup>11</sup> We also found that the officials conducting benefit-cost analyses do not always validate the damage claims information submitted by the applicants. As a result, an analysis may rely on testimonial evidence from the applicant—the individual most likely to benefit from the acquisition project.

FEMA officials have stated that the agency can provide damage claims information from the National Flood Insurance Program to regional officials conducting benefit-cost analyses. While acknowledging some concerns about the accuracy of the data, several senior FEMA officials stated that this is the best information available. Currently, only general information on a community's flood damage claims can be provided easily through FEMA's on-line computer system, though regional officials can request a special report that includes information on specific addresses. FEMA officials stated that it would not be difficult to modify the information to give regional staff better access to claims information on individual properties. FEMA officials were interested in attempting to use

---

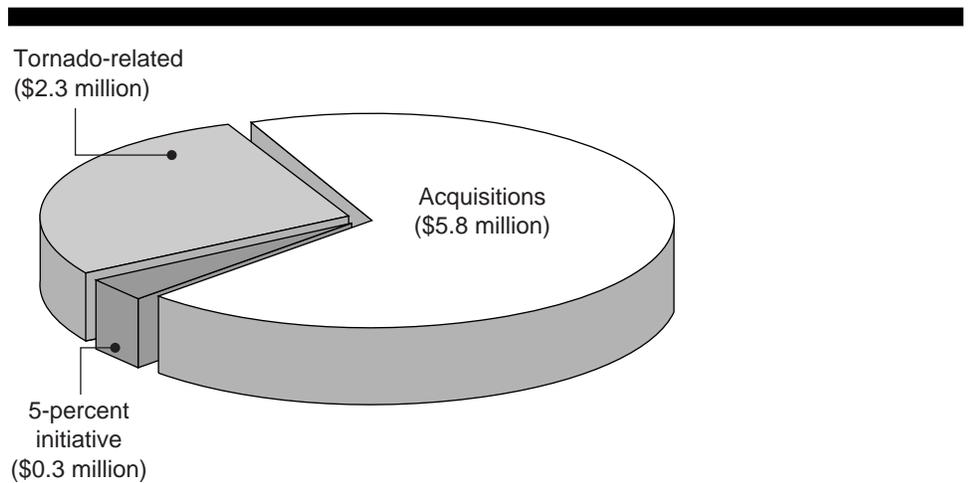
<sup>11</sup>Since the National Flood Insurance Program's damage claims information originates from insurance claims submitted by residents in participating communities, nonparticipating communities would not produce any insurance claims data.

the claims information on a trial basis, including looking into the possibility of allowing regional access to the information through FEMA's on-line computer system.

### Several Factors Are Limiting FEMA's Ability to Demonstrate the Cost-Effectiveness of Projects Exempt From Benefit-Cost Analysis

While FEMA has explained its reasons for exempting four types of mitigation projects, there are factors limiting its ability to demonstrate that these mitigation measures are, in fact, cost-effective. Of the 55 projects we reviewed, 14 underwent no benefit-cost analysis. Certain factors, such as the lack of an analytical basis supporting the exemption for acquisition projects and a broad approach for determining cost-effectiveness, limit FEMA's ability to demonstrate cost-effectiveness. The 14 projects account for \$8.4 million (42 percent) of the funding, and they include funding for emergency satellite communications, all-weather radios, emergency alert systems, a public awareness campaign, and property acquisitions. Figure 1 shows the breakout of the \$8.4 million in funding for these exempt projects.

Figure 1: Breakout of the \$8.4 Million in Funding for Exempt Mitigation Projects Reviewed by GAO



Note: This figure does not include a category for exempt planning projects because the 55 projects we selected did not include any such projects.

As figure 1 shows, the majority (\$5.8 million of the \$8.4 million, or 69 percent) of the funding for exempt projects in our review went for property acquisition projects. FEMA's Inspector General reported in

---

March 1998 that FEMA had not produced the data or analysis to demonstrate the cost-effectiveness of buying out substantially damaged structures in a 100-year floodplain, adding that the agency lacked an analytical basis for exempting such projects from benefit-cost analysis. While FEMA officials have begun initiating efforts to address this concern, over a year has passed since the Inspector General's report was issued, and the analytical basis has still not been established.

For two other categories of exempt projects—the 5-percent initiative and tornado-related projects—the states are asked to provide a narrative that identifies their potential mitigation benefits and establishes a reasonable expectation that the projects will reduce or prevent future property damage, injury, or loss of life. For example, one of the exempt projects involved the development of a tornado warning network and a tornado mitigation demonstration project. The demonstration project, which was approved for \$2.3 million in Hazard Mitigation Grant Program funding, was expected to reduce storm-related damages. Another exempt project involved \$45,000 in funding for the development of a public awareness campaign and a brochure, which were intended to educate residents about the hazards of living in a floodplain. While these projects may be cost-effective—because they could reasonably be expected to reduce or prevent future property damage, injury, or loss of life—it is difficult to determine their cost-effectiveness. In fact, given such a broad approach for determining a project's cost-effectiveness, it is difficult to provide an example of a project that would not be considered cost-effective.

FEMA also exempted planning projects associated with older disasters, although the agency has not demonstrated that such projects are cost-effective. While we agree that it is difficult to determine the cost-effectiveness of planning projects and that certain planning projects could prove to be cost-effective, exempting all planning projects allows for a wide range of project approvals.

One means of determining the cost-effectiveness of exempt projects would be to conduct periodic reviews of selected projects after they had been implemented. For example, FEMA could undertake targeted reviews of projects that funded local efforts to establish mitigation strategies or plans. These reviews could be used to demonstrate the value of the projects—whether they enabled the localities to better identify future mitigation projects or helped reduce potential disaster-related damage by alerting residents to certain hazards. To the extent that the reviews

---

demonstrated the cost-effectiveness of the projects, they would establish a basis for exempting similar projects in the future.

---

## Conclusions

The majority of the projects that underwent benefit-cost analysis appeared to be cost-effective, though we also found that the best available information—such as flood hazard information from flood insurance studies and flood damage information from past insurance claims—was not always used in analyzing projects designed to mitigate future damage from flooding. FEMA could assist the officials performing the analysis by conducting postdisaster reviews of flood hazards that could be used to update flood hazard information and by making information on past insurance claims more readily accessible.

While FEMA has explained its rationale for exempting certain types of projects from benefit-cost analysis, it is limited in its ability to demonstrate their cost-effectiveness because it lacks an analytical basis for exempting acquisitions of certain floodplain properties, uses a broad approach to determine the cost-effectiveness of other projects, and seldom reviews the cost-effectiveness of projects after they have been implemented. FEMA estimates that approximately \$258 million could be spent on exempt projects, not counting the funding for exempt acquisition projects. Our review of \$20.1 million in funding for 55 mitigation projects found that \$5.8 million, or 29 percent of the funding, was for acquisition projects that FEMA had exempted from benefit-cost analysis. Until FEMA establishes an analytical basis supporting the cost-effectiveness of these projects, it cannot ensure that it has allocated this funding cost-effectively. Although FEMA officials have begun initiating efforts to address this concern, over a year has passed since the Inspector General questioned the cost-effectiveness of exempt acquisition projects, and an analytical basis remains to be established.

---

## Recommendations

To ensure that only cost-effective projects are funded through the Hazard Mitigation Grant Program, the Director of FEMA should establish an analytical basis supporting the cost-effectiveness of acquiring substantially damaged properties in floodplains. Also, to better ensure the cost-effectiveness of other types of projects exempted from benefit-cost analysis, the Director should conduct periodic reviews of the projects after they have been implemented to determine whether they were cost-effective.

---

Additionally, to provide the best available data for analyzing the cost-effectiveness of proposed flood hazard mitigation projects, the Director of FEMA should

- conduct postdisaster verifications of flood hazards for use in evaluating and possibly revising flood hazard map information and
- make the agency's information on past insurance claims more readily available for FEMA staff conducting benefit-cost analyses.

---

## Agency Comments

We provided the Federal Emergency Management Agency with a draft copy of this report for review and comment. The agency agreed with the report's recommendations and noted that they complement activities already under way at the agency. For example, FEMA agrees that the agency should periodically review and evaluate its policies for determining the cost-effectiveness of hazard mitigation projects, citing an agency evaluation of the benefits and costs of acquiring or relocating substantially damaged structures in a floodplain. We note this effort in our report and agree that the evaluation complements our first recommendation, since it represents an initial effort by FEMA to establish an analytical basis for the cost-effectiveness of acquiring substantially damaged properties. Our report also notes preliminary interest by the agency in providing the best available data for analyzing the cost-effectiveness of proposed flood hazard mitigation projects—our final recommendation. However, FEMA has no activities under way to complement our second recommendation for periodic reviews of other types of hazard mitigation projects exempted from benefit-cost analysis. Therefore, we made no changes to our report because either FEMA's activities do not fully address our recommendations or no complementary activities are under way.

The agency also commented that our report is focused on the use of benefit-cost analysis in determining the cost-effectiveness of hazard mitigation projects, although cost-effectiveness determinations do not always equate to the use of benefit-cost analysis. The agency noted that the decisions it makes in approving a project cannot always be reduced to a single economic analysis, because determining a project's eligibility also involves considering issues such as its environmental and social benefits and the uncertainty associated with the analytical methods used. While our report acknowledges that the Stafford Act does not define how to determine cost-effectiveness, it mentions that OMB's guidelines, as well as the agency's regulations and guidance, suggest that benefit-cost analysis is the primary approach for ensuring that mitigation projects are

cost-effective. We agree that there are difficulties inherent in using benefit-cost analysis to determine the cost-effectiveness of some hazard mitigation projects—such as the inability to estimate the value of the benefits of some projects or the difficulties in considering public policy issues—and that alternative approaches for determining the cost-effectiveness of these projects can be used. However, as discussed in our recommendations, we believe that to ensure the cost-effectiveness of hazard mitigation projects, either a sound analytical basis must be established for the alternative approaches before they are used, or the cost-effectiveness of the approaches must be validated through periodic reviews of projects after they are implemented. FEMA’s written comments appear in appendix I.

## Scope and Methodology

To determine the approaches FEMA and the states use to ensure that hazard mitigation grants are targeted to cost-effective mitigation measures, we examined

- FEMA’s regulations, policy guidance, and handbooks on identifying and approving Hazard Mitigation Grant Program projects for funding, focusing particularly on the requirements for cost-effectiveness determinations;
- state policy and guidance papers, state hazard mitigation plans, and state Hazard Mitigation Grant Program administrative plans focusing on the states’ procedures for determining the cost-effectiveness of proposed projects; and
- studies of the Hazard Mitigation Grant Program conducted by groups such as a university and a nonprofit organization.

To determine whether the approaches used by FEMA and the states ensure that mitigation measures are cost-effective, we interviewed officials from FEMA’s Mitigation Directorate; regional offices in Atlanta, Georgia (Region 4), and Denton, Texas (Region 6); and Office of the Inspector General. We also interviewed Florida officials because of their role in analyzing projects for cost-effectiveness. We reviewed 55 hazard mitigation projects that were submitted to FEMA’s regions 4 and 6 to document the extent to which formal benefit-cost analyses were conducted and the degree to which the data used in these analyses were validated. Thirty-six of these projects were Florida projects reviewed by Florida officials under a May 1998 memorandum of understanding between Florida and FEMA as part of a pilot program called the “managing state concept.” We chose Florida because it was the first state authorized to conduct its own benefit-cost analyses under this program and was responsible for over 8 percent

---

(\$34.2 million) of the Hazard Mitigation Grant Program funds obligated in fiscal year 1998. We reviewed 19 hazard mitigation projects submitted to FEMA Region 6 by Arkansas, Louisiana, and Texas. The other two states in Region 6—New Mexico and Oklahoma—submitted no new projects during this period. The 19 projects were those received by the region since March 1997, when the staff began using FEMA’s computerized benefit-cost analysis modules. We selected Region 6 because of the wide range of disaster types represented and the states’ experience in hazard mitigation.

Furthermore, to determine the adequacy of the support provided to establish the cost-effectiveness of projects exempted from formal benefit-cost analysis, we judgmentally selected 20 additional Florida projects that, from their descriptions, appeared to meet the criteria for exemption. We then requested and reviewed selected information from FEMA’s disaster management database and the project application and cost-effectiveness narratives contained in Region 4’s project files. Through our review of the documentation provided, we identified 10 projects that were exempt from benefit-cost analysis.

We performed our work from December 1998 through June 1999 in accordance with generally accepted government auditing standards.

---

We are sending copies of this report to the appropriate congressional committees; the Honorable James Lee Witt, Director of the Federal Emergency Management Agency; and the Honorable Jacob J. Lew, Director of the Office of Management and Budget. We will also make copies available to others on request.

---

If you have any questions about this report, please contact me or Pat Moore at (202) 512-7631. Key contributors to this assignment were R. Tim Baden, Thom Barger, and John McGrail.

A handwritten signature in black ink that reads "Stanley J. Czerwinski". The signature is written in a cursive style with a large initial 'S' and 'C'.

Stanley J. Czerwinski  
Associate Director, Housing and  
Community Development Issues

---

---

# Comments From the Federal Emergency Management Agency



Federal Emergency Management Agency

Washington, D.C. 20472

JUL 2 1999

Stanley J. Czerwinski  
Associate Director, Housing and  
Community Development Issues  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Czerwinski:

Thank you for the opportunity to review and provide comments on the General Accounting Office's (GAO) draft report entitled Opportunities to Improve Cost-Effectiveness Determinations Under the Hazard Mitigation Grant Program dated June 24, 1999. My staff and I appreciate the cooperative manner in which the GAO conducted the evaluation and provided extensive opportunities for input and feedback.

The stated intent of the GAO review is to determine whether practices under FEMA's Hazard Mitigation Grant Program (HMGP) satisfy the requirement of cost effectiveness. However, the thrust of the GAO report relates to benefit-cost analysis and the need to evaluate projects when analysis using economically based mathematical methodologies is not applied. We agree that it is worthwhile to pursue this specific evaluation, and in fact have already begun the process.

We maintain, however, that cost effectiveness, required by law, does not always equate to benefit-cost analysis. While we generally follow standard practice in our analysis, not every type of project can be subjected to "classic" benefit-cost analysis procedures (the methodologies and software do not exist), nor can all decisions related to project approval be reduced to economic analysis. In determining project eligibility, managers must also consider issues of public policy, environmental and social benefits, uncertainty in analytical methods, compliance with Executive Orders, and logic. These competing priorities are not easily reconciled. Given FEMA's mission to move rapidly in the aftermath of disasters and Congressional expectations for quick allocation of dollars, flexibility and a broad perspective are essential for decision-makers. This is especially true as we move toward States undertaking more responsibility for managing the Hazard Mitigation Grant Program (HMGP), including ensuring the cost effectiveness of projects.

We have developed eight state-of-the-art computer programs for benefit-cost analysis of projects intended to mitigate the effects of five different natural hazards. The programs were subjected to intensive technical review and testing, and have evolved along with the HMGP. They now run on a standard software platform. A formal training program was completed late in 1998, and an intermediate training program for the most widely used software will be tested and deployed in Fall 1999. Training is field-delivered to

**Appendix I  
Comments From the Federal Emergency  
Management Agency**

disaster staff and also offered at the Emergency Management Institute twice a year. We are also in the process of editing our technical manuals, and are working to refine our guidance and methodology in several specific areas related to cost effectiveness.

Nonetheless, there are areas where adequate methodologies do not exist. By design, the Hazard Mitigation Grant Program is based in part on what we believe is sound public policy. Continual feedback from the State and local level give us invaluable insight into the effects of our policies.

We agree with the GAO recommendation that we should periodically review and evaluate these policies. To that end, some time ago FEMA undertook a review of the benefits and costs of all acquisition projects. A more recent evaluation has been focused on a subset of this, the benefits and costs of acquiring or relocating substantially damaged structures in the floodplain.

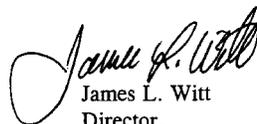
Currently, FEMA, under the National Flood Insurance Program (NFIP), requires over 18,000 communities to enforce elevation or relocation of substantially damaged structures in the floodplain. It would appear to be irrational for the same Federal government enforcing this standard to tell communities that these same structures are ineligible for mitigation grants under the HMGP unless they pass an inflexible benefit-cost analysis, as opposed to the real standard of cost effectiveness.

As the GAO points out, the substantial damage exemption policy was based on years of empirical knowledge about floods. Since that time, FEMA has undertaken a broad study of structures that meet the policy's criteria, to determine if it is in fact cost beneficial to purchase or relocate them. The study started some months ago, and early results are encouraging. Nearly all the structures studied were in fact cost beneficial to acquire, but the sample size was small. An expanded second phase of the project started recently, with the goal of obtaining a large enough sample to make the results generally representative.

In summary, we accept the recommendations of the report, which complement activities already underway.

Please contact Michael J. Armstrong, Associate Director for Mitigation, for questions or follow up.

Sincerely,



James L. Witt  
Director,  
Federal Emergency Management Agency

---

# Related GAO Products

---

Disaster Assistance: Information on the Cost-Effectiveness of Hazard Mitigation Projects (GAO/T-RCED-99-106, Mar. 4, 1999).

Disaster Assistance: Information on Federal Costs and Approaches for Reducing Them (GAO/T-RCED-98-139, Mar. 26, 1998).

Disaster Assistance: Information on Federal Disaster Mitigation Efforts (GAO/T-RCED-98-67, Jan. 28, 1998).

Disaster Assistance: Information on Expenditures and Proposals to Improve Effectiveness and Reduce Future Costs (GAO/T-RCED-95-140, Mar. 16, 1995).

GAO Work on Disaster Assistance (GAO/RCED-94-293R, Aug. 31, 1994).

---

## Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. VISA and MasterCard credit cards are accepted, also. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

### Orders by mail:

U.S. General Accounting Office  
P.O. Box 37050  
Washington, DC 20013

### or visit:

Room 1100  
700 4th St. NW (corner of 4th and G Sts. NW)  
U.S. General Accounting Office  
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (202) 512-6061, or TDD (202) 512-2537.

Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (202) 512-6000 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.

For information on how to access GAO reports on the INTERNET, send an e-mail message with "info" in the body to:

[info@www.gao.gov](mailto:info@www.gao.gov)

or visit GAO's World Wide Web Home Page at:

<http://www.gao.gov>

---

**United States  
General Accounting Office  
Washington, D.C. 20548-0001**

**Bulk Rate  
Postage & Fees Paid  
GAO  
Permit No. G100**

**Official Business  
Penalty for Private Use \$300**

**Address Correction Requested**

---

