Multihazard Mitigation Council

A public/private partnership designed to reduce the societal and economic costs of natural hazards

MMC is a Council of the National Institute of Building Sciences

Mitigation Saves

An Independent Study to Assess the Future Savings from Mitigation Activities

Conducted by the Multihazard Mitigation Council

with funding from the

Federal Emergency Management Agency

Congressional Directive

“to fund an independent study to assess the future savings resulting from the various types of mitigation activities.”

—from Report 106-161, FY 2000 Senate Appropriations Committee Subcommittee for the Veterans Administration, HUD and Independent Agencies

Independent Study

- Two-year study (after a study design phase)
- Involved experts in wide variety of disciplines
- Transparent
- Conservative
- Quality controlled

Key Study Participants

MMC Project Management Committee

- Philip Ganderton, University of New Mexico
- David Godschalk, University of North Carolina
- Anne Kiremidjian, Stanford University
- Kathleen Tierney, University of Colorado
- Carol Taylor West, University of Florida

MMC Project Management Consultant

- L. Thomas Tobin

Lead Investigators organized by the Applied Technology Council

- Tom McLane, Project Manager
- Ron Eguchi, Technical Director
- Adam Rose, Lead Economist
- Elliott Mittler, Community Case Study Leader

Study Focus

- FEMA's major mitigation programs:
  - Hazard Mitigation Grant Program
  - Flood Mitigation Assistance program
  - Project Impact
- Hazards considered:
  - Earthquakes
  - Floods
  - Wind (tornadoes, hurricanes, etc.)
- During the decade from 1993 to 2003

Types of Mitigation Activities

Project Mitigation activities to avoid or reduce damage resulting from hazard events.

- Strengthening public buildings
- Upgrading utility systems
- Buying out repeatedly flooded homes
- Elevating buildings above flood levels
- Adding hurricane shutters

Process Mitigation activities that lead to policies, practices and projects that reduce risk.

- Awareness efforts
- Encouraging individual preparedness
- Strengthening building codes
- Developing community hazard mitigation plans

Study Components

Benefit-Cost Analysis of Grants

- Statistical sample
- Grants sample included projects for:
  - Each hazard type
  - Each level of risk
  - Both activity types

Community Case Studies

- Purposive sample
- Criteria for inclusion:
  - Received FEMA grants
  - High risk of at least 1 of the 3 hazards
  - Community population (S, M, L)
  - Regional distribution

Benefit-Cost Analysis

- Identify standing
- Identify benefits and costs
- Monetize using efficient prices (as available)
- Discount to present value
- Sensitivity analysis

Benefits Considered

Annualized and discounted reduced losses due to:

- Direct property damage, e.g., buildings, contents, bridges and pipelines
- Direct business interruption loss, e.g., damaged factory shutdown;
- Indirect business interruption loss, e.g., ordinary multiplier effects;
- Non-market losses, e.g., damage to wetlands, parks, wildlife, and historic sites;
- Societal losses, e.g., casualties and homelessness; and
- Emergency response, e.g., ambulance service and fire protection.

The estimated benefits (losses avoided) are $14 billion.

Costs Considered

- Federal share and local match taken from the National Emergency Management Information System (NEMIS) database
- Administrative costs assumed to be offset
- FEMA grants for flood, wind and earthquake mitigation totaled $3.5 billion between 1993 and 2003

Loss Estimation

- HAZUS®MH used to estimate direct property damage from earthquake and hurricane wind.

- Supplemental methods used to estimate:
  - Direct property loss from flood and tornado
  - Business interruption loss for utilities
  - Environmental and historic benefits
  - Process mitigation activities

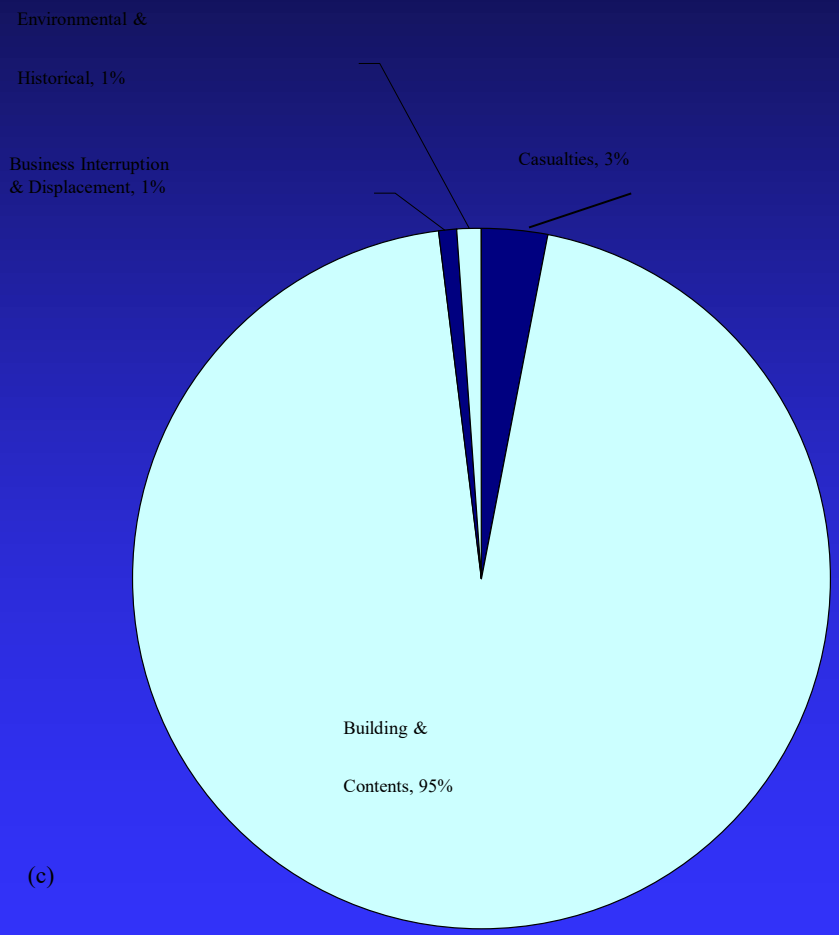
Ratios Vary by Grant Category

- **Grants Have High Benefit-Cost Ratios --** A dollar spent on mitigation saves society an average of $4

  - Earthquake grants = 1.50
  - Wind grants = 3.9
  - Flood grants = 5.0

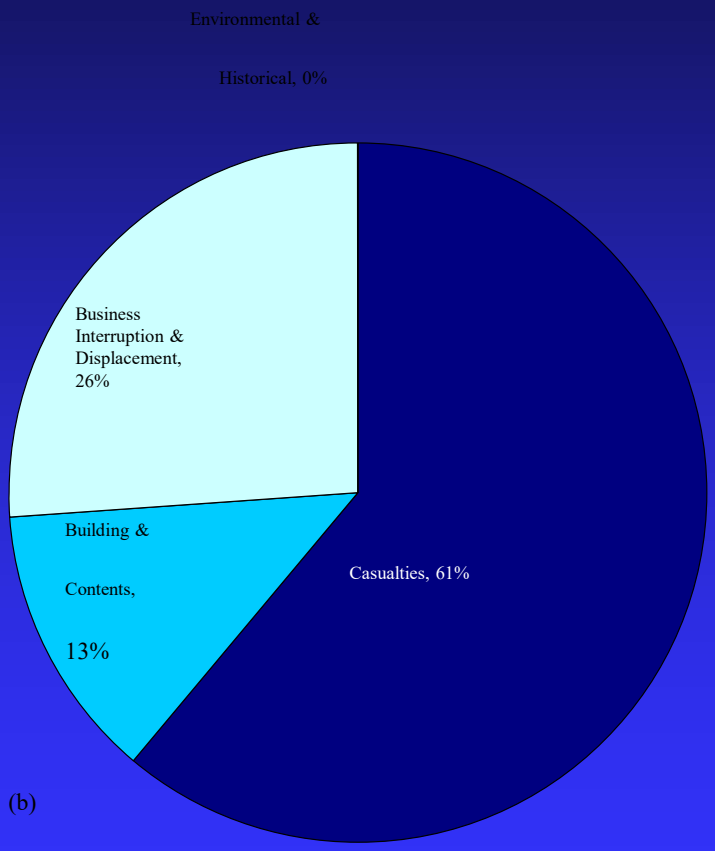
  - Project grants = 4.1
  - Process grants = 2.0

Flood


Environmental &
Historical, 1%
Business Interruption
& Displacement, 1%
Casualties, 3%
Building &
Contents, 95%

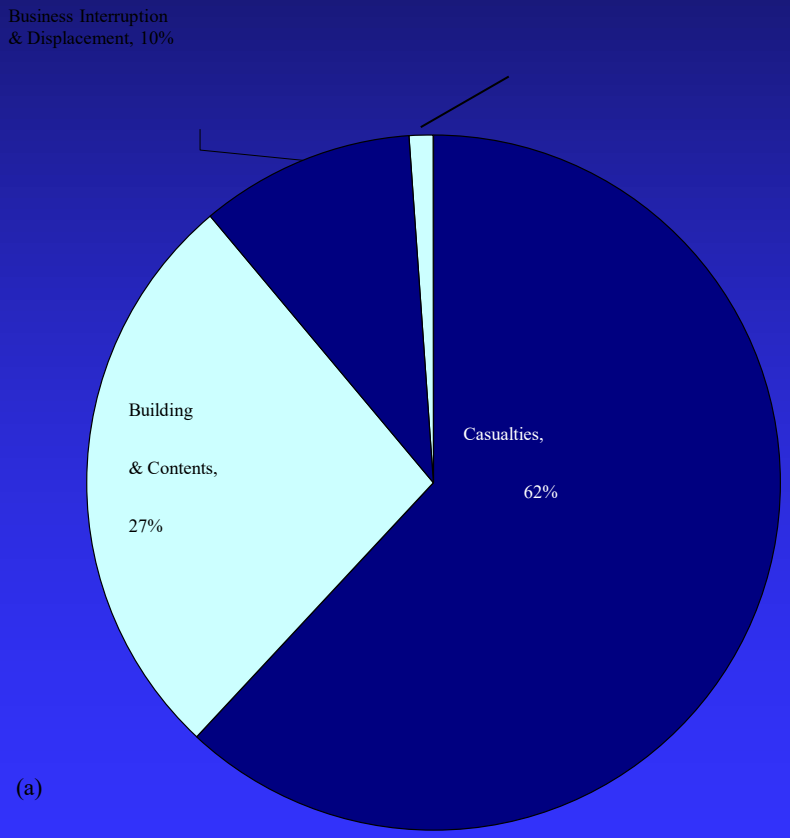
(c)

Wind


Environmental &
Historical, 0%
Business
Interruption &
Displacement,
26%
Building &
Contents,
13%
Casualties, 61%

(b)

Earthquake



(a)

Community Studies

- Representative
- Blind selection
- Consider context

- Freeport, NY
- Hayward, CA
- Horry County, SC
- Jamestown, ND
- Jefferson County, AL
- Multnomah County, OR
- City of Orange, CA
- Tuscola County, MI

Community Study Methods

- Identify individuals, projects, & collect reports
- Conduct telephone interviews & administer confidential questionnaires
- Community visits & interviews
- Analyze data
- Identify synergies
- Calculate benefits & costs

Community Study Findings

- Mitigation grants tend to have synergy – creating more mitigation activities.
- Interviewees in all 8 communities said:
  - FEMA funding helped reduce community risks and
  - Increased community capacity to mitigate natural hazards.
- These findings support the analysis of grants, but eight cases are not enough to generalize.

Savings to Federal Treasury

- Considered avoided relief and recovery costs, and tax revenues foregone because of disaster losses;
- A dollar spent by FEMA for mitigation grants potentially saves the federal treasury about $3.65.

Study Conclusions

- FEMA grants issued between 1993 and 2003 for flood, wind and earthquake mitigation are expected to:

  - reduce future losses by $14 billion, and

  - save 223 lives and avoid 4,699 injuries.

Study Conclusions

- Mitigation is sufficiently cost-effective to warrant federal funding on an on-going basis both before disasters and during post-disaster recovery
- Community context counts—
  Mitigation is most effective when carried out on a comprehensive, community-wide, long-term basis.
- Sensitivity analyses indicate robust results.

MMC Board Recommendations to the Federal Government

Invest in natural hazard mitigation as a matter of policy on an ongoing basis:

- Before disasters occur, and
- Through federally funded disaster recovery and rebuilding activities and programs.

MMC Recommends

Support ongoing evaluation of mitigation

- Develop a structured process to assess the performance of buildings and infrastructure after natural disaster, and
- Measure the benefits that accrue from process mitigation activities.

MMC Recommends

- Support mitigation activities that will increase the resilience of communities by increasing knowledge and promoting institutional commitments to mitigation at the local level.

Additional Information

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