

# **Natural Hazard Mitigation Savings:**

## **An Independent Study to Assess the Future Savings from FEMA Mitigation Activities**

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# Congressional Charge

- **“The Committee recognizes that investing in mitigation will yield reductions in future disaster losses, and that mitigation should be strongly promoted.**
- **“However, an analytical assessment is needed to support the degree to which mitigation activities will result in future ‘savings.’**
- **“Therefore, the Committee directs FEMA to fund an independent study to assess the future savings resulting from the various types of mitigation activities.”**

(from Report 106-161, FY 2000 House Appropriations Committee Subcommittee for the Veterans Administration, HUD & Independent Agencies)

- **FEMA turned to the Multihazard Mitigation Council to conduct the independent study.**

# Expert Research Team

## **Project Management Committee (MMC)**

Philip Ganderton, David Godschalk, Anne Kiremidjian, Kathleen Tierney, Carol Taylor West, and Thomas Tobin

## **Research team organized by the Applied Technology Council**

Tomas McLane, Ronald Eguchi, Adam Rose, Elliott Mittler, Craig Taylor, Keith Porter, Corey Barber, Jawhar Bouabid, Linda Bourque, Stephanie Chang, Nicole Dash, James Delahay, Charles Huyck, Christopher Jones, Megumi Kano, Karl Kappler, Lukki Lam, Rebecca Quinn, Christopher Rojahn, Archana More Sharma, Kenneth Strzepek, John Whitehead, Michele Wood, Kathryn Woodell, Bo Yang, Doug Shaw, James McDonald, Bruce Miya

## **Internal project review team**

William Petak, David Brookshire, Stephanie King, Dennis Mileti, Doug Plasencia, Zan Turner

# Study Focus

- **FEMA's 3 major mitigation programs:**
  - Hazard Mitigation Grant Program
  - Flood Mitigation Assistance Program
  - Predisaster mitigation (Project Impact)
  
- **Hazards considered:**
  - Earthquakes
  - Floods
  - Wind (tornadoes, hurricanes, etc.)
  
- **Time period: 1993 to 2003**

# Types of Mitigation

- **Project Mitigation:**

**Activities to avoid or reduce damage resulting from hazard events.**

For example:

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

- **Process Mitigation:**

**Activities that lead to policies, practices & projects that reduce risk.**

For example:

Encouraging individual preparedness  
Strengthening building codes  
Developing community hazard mitigation plans

# BCA Methodology

- State of the art, novel innovations where required and appropriate
- Standard evaluation tool
- Benefit-Cost ratios as well as Return on Investment to Federal Treasury
- Quantitative and Qualitative assessment

# Benefits Considered

- Reduced direct property damage (e.g., buildings, contents, bridges, pipelines)
- Reduced direct business interruption loss (e.g., damaged factory shutdown)
- Reduced indirect business interruption loss (e.g., ordinary multiplier effects)
- Reduced environmental damage (e.g., wetlands, wildlife)
- Reduced other non-market damage (e.g., historic sites)
- Reduced societal losses (casualty, homelessness)
- Reduced emergency response (e.g., ambulance, fire)

# Costs Considered

- Costs from the NEMIS database including both federal share and local match (cross-checked with files)
- FEMA administrative costs assumed to be offset by reduced admin. costs of recovery

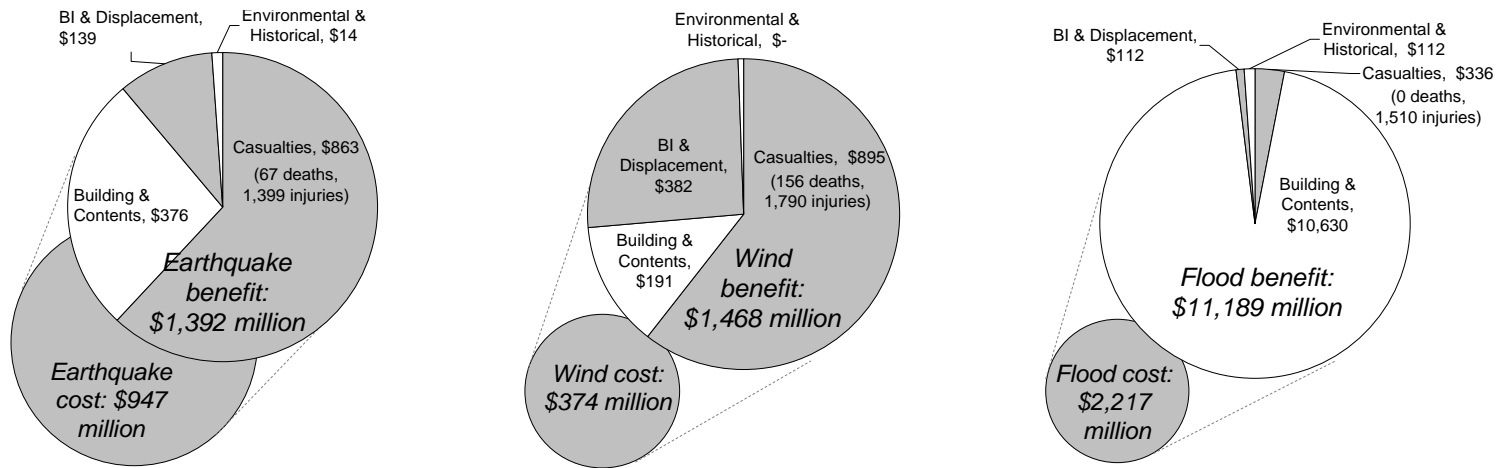
# Loss Estimation

- Benefits defined as losses avoided
- HAZUS-MH used to estimate direct property damage from earthquake & hurricane wind
- Supplemental methods used to assess:
  - Direct property loss from flood and tornado
  - Business interruption loss for utilities
  - Environmental and historic benefits
  - Process mitigation activities

# Findings – 1A

- Overall BCR is approximately 4
- BCRs by category:
  - Earthquake grants = 1.5
  - Wind grants = 3.9
  - Flood grants = 5.0
  - Project grants = 4.1
  - Process grants = 2.0
- BCRs driven by different factors

# Findings – 1B



Federal Treasury return on investment: \$3.65 in recovery spending and future mitigation as well as recouped taxes for every \$1 spent by Fed.

Sensitivity tests indicate results are robust

# Community Study Methods

- Identify individuals, projects, & reports
- Conduct telephone interviews & administer confidential questionnaires
- Visit communities & conduct interviews
- Analyze data
- Identify synergies
- Calculate benefits & costs

# Findings – 2

- Mitigation grants tend to have synergy – creating more mitigation activities beyond those funded by FEMA.
- Interviewees in all 8 communities said:
  - FEMA funding helped reduce community risks
  - FEMA funding increased community capacity to mitigate natural hazards.

# Conclusion

- Study uses solid methods and data
- Findings are defensible and replicable
- Provides support for more mitigation
- Points to need for more data & improved methods for some programs & hazards