Mitigation Still Saves: A Broader Reexamination of Natural Hazard Mitigation

Building Innovation 2017 Conference
Session TH1A: Keys to Creating Resilient Communities
Keith Porter PE PhD
SPA Risk LLC
FEMA grants 1993-2003
4:1
Total benefit: $14 billion

Total cost: $3.5 billion

- BI & Displacement, $633
- Environmental & Historical, $136
- Casualties, $2,094 (220 deaths, 4,700 injuries)
- Building & Contents, $10,630
Flood benefit: $11,189 million

Casualties, $336
Environmental & Historical, $112
Building & Contents, $10,630
BI & Displacement, $112

Cost: $2.2B
Wind 4:1

Casualties, $895
Building & Contents, $191
BI & Displacement, $382
Environmental & Historical, $-

Wind benefit: $1,468 million
(156 deaths, 1,790 injuries)

Cost: $374M
Quake
1.5:1

Casualties, $863
(67 deaths, 1,399 injuries)

Building &
Contents, $376

BI & Displacement,
$139

Environmental &
Historical, $14

Earthquake
benefit:
$1,392 million

Cost: $947M
What about....
What about...
1. Overall methodology and integration

2. Above minimum requirements
   2B. Employ modern code where not required

3. Retrofit

4. Business continuity planning and disaster recovery

5. Utilities and transportation lifelines

6A. Grants: FEMA, EDA, SBA, HUD

6B. Federal actions: USACE, NOAA, USGS...
Module 2
project objectives

Reasonable BLS design options

Where & under what conditions is BCR > 1?

Who bears & enjoys costs and benefits?
Module 2 leading candidate for earthquake

Strength $C_s$
and stiffness $K$

$x \ 1.25$

$x \ 1.5$

$x \ 2.0$
Module 2 leading candidates for wind

Moore OK
Module 2 leading candidate for flood
Leading candidates for fire
1. Overall BCR like MSv1’s 4:1
2. Peril-specific BCRs like MSv1:
   - Flood $5.00:$1.00
   - Wind $3.90:$1.00
   - Earthquake $1.50:$1.00
3. Contribution to BCRs, e.g., →

Module 6A project objectives
Scientific defensibility
Costs & benefits in terms of 3Ds
Informative for diverse uses

Brief, nontechnical MSv2 vol 1
Detailed, technical MSv2 vol 2
Brief, technical vol 2 exec summary
Option-specific vol 2 ch 6 2-pagers
Presentations like this
<table>
<thead>
<tr>
<th>Property loss</th>
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<tbody>
<tr>
<td>Building repair costs</td>
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<tr>
<td>Content repair costs</td>
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<tr>
<td>Business inventory losses</td>
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</tbody>
</table>
Public health impacts
Business interruption & living expenses

Days loss of use

Direct BI $ (cost to the damaged business)

Indirect BI $ (impacts on the economy as a whole)

Additional living expenses
Psycho-logical trauma

New to disaster BCA
Emergency response (e.g., USAR)

New to Mitigation Saves
Environmental impacts
Historic and cultural loss
Depicting results
Governments & CFOs

Cost: $374M

Casualties, $895
(156 deaths, 1,790 injuries)

BI & Displacement, $382

Building & Contents, $191

Environmental & historical, $-

Wind benefit: $1,468 million
Builders and buyers: total cost of ownership

**Builder**
- Up-front
- Ownership period

**Buyer**
- Property management, maintenance, disaster repair

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Ownership period
Local communities, property owners
Scenario snapshots?

- **Property damage:** $300 billion mostly from flooding
- **Demand surge:** higher labor costs add 20%
- **Lifeline damage:** weeks+ to restore.
- **Lifelines & ag losses:** Ag losses, lifeline repairs, dewatering flooded islands, landslides add $100 billion.
- **BI:** adds $325 billion.
- **Total economic consequences:** $725 billion ~3x a big earthquake
- **Statewide effect:** loss touches every county in the state
(Limitations)
<table>
<thead>
<tr>
<th>Schedule</th>
<th>Complete by</th>
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<tbody>
<tr>
<td>Analysis plan/Report outline, portions drafted</td>
<td>30-Nov-16</td>
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<tr>
<td>Oversight Committee review - Initial web meeting</td>
<td>9-Dec-16</td>
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<tr>
<td>Data collection complete</td>
<td>31-Dec-16</td>
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<td>Analysis plan &amp; report outline, portions drafted</td>
<td>31-Jan-17</td>
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<tr>
<td>Stakeholder &amp; oversight committee workshop</td>
<td>9-Feb-17</td>
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<tr>
<td>Analysis and report development</td>
<td>30-Apr-17</td>
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<td>Oversight Committee review web meeting</td>
<td>May-17</td>
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<td>Analysis and report development</td>
<td>30-Jun-17</td>
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<td>Final Report (draft)</td>
<td>31-Jul-17</td>
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<tr>
<td>Stakeholder &amp; oversight committee final report review web meeting</td>
<td>Aug-17</td>
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<tr>
<td>Final report complete</td>
<td>30-Sep-17</td>
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