Natural Hazard Mitigation Saves: What Can Business Continuity Planners Learn from this Nationwide Benefit-Cost Analysis?

Rocky Mountain Chapter of the Association of Continuity Professionals
Via webinar April 17, 2020
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Multihazard Mitigation Council

About the Council

The Multihazard Mitigation Council (MMC) serves a vital national need by establishing a body of experts in a multitude of related building sciences that can address the challenges associated with the identification and implementation of effective hazard mitigation practices. The Council is an independent entity that informs mitigation decisions in ways that lead to:

- Promoting disaster resilience
- Becoming a focal point of credible information
- Promoting the MMC recognizes that these goals, while worthy, present a unique set of challenges that will require collaboration among property owners, researchers, the public sector, and many others in order to be achieved. The MMC currently envisions:

This presentation:
https://bit.ly/3cq3HbL
America’s growing disaster liability
Increasing frequency of natural disasters
U.S. natural hazard losses are approaching a tipping point

- Adds $1.3T/year of buildings
- Average loss = $100B/yr = 8% of construction
- 2017 loss $300B = 25%
- 6% annual growth = 13-year doubling period, 10x faster than population
Why? Movement toward coasts and WUI...

Toward hurricanes: 127 million people exposed (39% of US population)

Toward wildfire: 59 million people exposed (18% of US population)
... bigger new buildings

1973 average: 1,500 sf

2018 average: 2,500 sf
... & adding more new than removing old

+ 2,500  
+ 2,500  
+ 2,500

- 1,500
$2.2 trillion+ current liability

$16 billion/year added with new construction

($13 billion/year previously removed by code adoption)

$6 billion/year removed by public-sector mitigation

$4 billion/year (?) removed by demolition of older buildings
What can be done?
“Money spent on reducing the risk of natural hazards is a sound investment. On average, a dollar spent by FEMA on hazard mitigation provides the nation about $4 in future benefits.”
Natural disasters are growing in frequency and strength. Thankfully, there are measures that communities, local governments, land owners, developers, and tenants can take to reduce the impact of these hazards.

Mitigation protects lives, improves safety, prevents property loss, and decreases disruption of daily life.

The Natural Hazard Mitigation Saves: 2019 Report represents the most exhaustive benefit-cost analysis of natural hazard mitigation, from adopting up-to-date building codes and exceeding codes to addressing the retrofit of existing buildings and utility and transportation infrastructure. It was funded by the U.S. Department of Housing and Urban Development (HUD). Earlier editions of the report were funded by the Federal Emergency Management Agency.
Fact sheets

www.nibs.org/page/mitigationsaves

Look for overview & other fact sheets
Natural Hazard Mitigation Saves

$2 million USD
7 U.S. government & nonprofit sponsors
130 participants, 70 organizations
20 peer reviewers
600-page report
25 fact sheets & personal stories
Natural Hazard Mitigation Saves 2019

Existing buildings  Codes  Utilities  Public buildings
Benefit sources

- Property damage
- DBI, IBI, & ALE
- Deaths & injuries
- PTSD
- Insurance overhead & profit
- Environmental
- Jobs
- Savings to the federal treasury

Omitted: pets, peace of mind, memorabilia, culture, vulnerable populations

Images: Pamela Andrade (DBI, etc.), Timothy Faust (PTSD), Nick Youngson (insurance)
<table>
<thead>
<tr>
<th>Disaster Type</th>
<th>Overall Benefit-Cost Ratio</th>
<th>ADOPT CODE</th>
<th>ABOVE CODE</th>
<th>BUILDING RETROFIT</th>
<th>LIFELINE RETROFIT</th>
<th>FEDERAL GRANTS</th>
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<tr>
<td></td>
<td></td>
<td>Cost ($ billion)</td>
<td>$1/year</td>
<td>$4/year</td>
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<td>Benefit ($ billion)</td>
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<td>Earthquake</td>
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<tr>
<td>Wildland-Urban Interface Fire</td>
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How to build better or upgrade

Higher foundation

Stronger & stiffer

Defensible, fire-resistive

Connections, shutters
Optimal resilience

Cost vs. Strength graph showing:
- Total cost of ownership decreasing with increasing strength
- First cost increasing with increasing strength
- Future loss increasing with increasing strength

Least TCO point is where the total cost of ownership is minimized.
✓ Adopt or exceed building codes
✓ Retrofit buildings
✓ Retrofit lifelines
✓ Federal grants since 2005
✓ Other perils: wildfire, coastal flood

Business continuity planning & disaster recovery

Costly commercial retrofit, e.g., pre-Northridge steel
Build back better (repair to exceed code)
Exceed lifeline design guidelines
Adopt or exceed building codes

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**Illustration: IBC - A Member of the International Code Family**

**International Building Code**
Adopt building code BCR = 6:1 for flood

BENEFIT: $550 million per year ($18/sf)
- 87% - Property: $470
- 7% - Additional living expenses and direct business interruption: $40
- 3% - Indirect business interruption: $20
- 3% - Insurance: $20

COST: $90 million ($3/sf)
Really only $3/sf?

Freeboard adds 1.3% (±0.5%) to construction cost

1.3% x $230/sf ≈ $3.00/sf
Exceed building code BCR = 5:1 for flood

BENEFIT: $4.2 billion per year

- 36% - Property: $6.7 billion
- 24% - Casualties & PTSD - $1.0 billion
- 22% - Additional Living Expenses & Direct Business Interruption: $0.93 billion
- 11% - Indirect Business Interruption $0.47 billion
- 7% - Insurance: $0.30 billion

COST: $0.9 billion per year
Retrofit buildings and other infrastructure
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Acquisitions of flood-prone dwellings

**Benefit: $1,160 billion**
- 77% – Property: $890
- 14% – Additional living expenses: $170
- 7% – Indirect business interruption: $80
- 2% – Deaths & PTSD: $20

Billions 2018 USD

**Cost: $180 billion**
Elevations

$65-75/sf for raised houses
$100/sf for slab-on-grade

But repetitive losses can still make this cost effective

**Benefit: $84 billion**
- 88% – Property: $74 billion
- 7% – Additional living expenses: $6 billion
- 4% – Indirect business interruption: $3 billion
- 1% – PTSD: $1 billion

Billions 2018 USD

**Cost: $43 billion**
Wet floodproofing BCR = 2:1
Elevate HVAC equipment
BCR = 2:1
Retrofit utilities

Protecting Greenville, NC’s water and wastewater treatment plants cost $6.8 million, saves $212 million; BCR = 31:1
Benefit: $2,500 million
- 8% – Property: $200
- 13% – Additional living expenses and direct business interruption: $320
- 38% – Indirect business interruption: $950
- 39% – Casualties & PTSD: $980
- 2% – Environment: $50
Millions 2018 USD

Cost: $590 million

EDA-funded utility and transportation retrofit BCR = 4:1
What’s missing?
Older steel and concrete buildings
Resilient lifeline design
Warning systems
Vulnerable populations
Build back better
Mitigation saves everyone

**ABOVE CODE**

**MEET CODE**
Unfair cost allocation

BCR = ∞

Benefit (Exceed I-Code flood provisions; BCR = 5:1)
Incentivization

BCR = \infty

Benefit

Insurance

BCR = 2.5:1

Cost

Property

BCR = \infty

Benefit

Loan discount

Cost

Property

Rent premium

BCR = 5:1

Death, injury, & PTSD

ALE, Direct BI

Indirect BI

Tax incentives

(Exceed I-Code flood provisions; BCR = 5:1)
Fairly reallocated costs

(Exceed I-Code flood provisions; BCR = 5:1)
What could most help Colorado BCP/DR professionals & Colorado businesses?
BCP/DR benefit-cost analysis
Disaster planning scenarios
Trained SAP evaluators
Code adoption and enforcement
Resilient design of new infrastructure
Thanks

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