Building Resilience Into Your Disaster Preparedness and Recovery Strategies

Southeastern Tri-Regional JETS Conference
Society of American Military Engineers
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Agenda

1. Introduction
2. Disasters and Resilience
3. A Resilient Approach
4. Case Studies
5. Conclusion
$1 trillion+
The U.S. sustained 188 disasters with damages exceeding $1 billion over 35 years

NOAA National Centers for Environmental Information

<table>
<thead>
<tr>
<th>Top 5 Most Costly Disaster Events</th>
<th>Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane Katrina (2005)</td>
<td>$153.8</td>
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<tr>
<td>Super Storm Sandy (2012)</td>
<td>$67.6</td>
</tr>
<tr>
<td>Hurricane Andrew (1992)</td>
<td>$46.2</td>
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<tr>
<td>Drought (1998)</td>
<td>$40.4</td>
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<tr>
<td>Midwest Flooding (1993)</td>
<td>$34.9</td>
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</tbody>
</table>
Total Climate Finance in 2014
$391 billion
More money than ever before was invested in low-carbon and climate-resilient growth in 2014.
Hurricane Matthew

• Were you prepared?
• Did you what the impacts would be?
• Could you be doing something different?
2 Disasters and Resilience
Disaster Management Cycle

1. Preparedness
2. Mitigation
3. Response
4. Recovery

Disaster Event
Disaster Management Cycle

- Preparedness
- Mitigation
- Response
- Recovery

RESILIENCE
What is Resilience?

Resilient – Post Super Storm Sandy

“Able to bounce back after change…”

“Build back better, stronger.”

“Ability to adapt…withstand and recover rapidly from disruptions.”

“A framework for guiding investment and actions to reduce vulnerabilities.”
What is Resilience?

Engages community
- Diverse stakeholders
- Promotes Interdisciplinary Interaction

Addresses multiple hazards and stressors
- Current
- Future

Achieves Co-benefits (the Resilience Dividend)
- Leverage / leverage / leverage
- Partners / funding / resources
What is Resilience?
Addressing our community’s need to better **prepare**, **respond**, **recover** from and **mitigate** impacts of:

**Shocks & Stressors**
- Social/economic/environmental
- Organizational
- Natural and man-sponsored (homeland)
A resilient approach
A resilient approach

1. Vulnerability & Risk Assessment

2. Risk Mitigation

3. Resilience Integration & Implementation
1 Vulnerability & Risk Assessment

- Understand:
  - Current and future risks
  - Vulnerabilities
- Prioritize Critical Focus Areas
- Gather and Develop Hazard Data
- Identify mission critical program/facilities
- Identify current/future hazards
- Evaluate probability of hazard
- Calculate consequences (damages)

Risk = Probability x Consequences

Consider
- Direct
- Indirect

A resilient approach
A resilient approach

2 Risk Mitigation

• Identify/assess options
  o STAPLEE
  o Social
  o Technical
  o Administrative
  o Political
  o Environmental
  o Economic -
    ▪ Benefit Cost Analysis (BCA)
• Prioritize

Examples
• Elevate, acquire, flood-proof
• Structural projects (flood walls, levees)
• Building Regulations
• Public Outreach/Risk Communication
A resilient approach

3 Resilience Integration & Implementation

- Co-Benefits
  - Ex. – green infrastructure: absorb water, aesthetically pleasing

- Plan Integration
  - Capital Improvement Plans
  - Comprehensive Plan
  - Emergency Management Plans

- Program Implementation
  - Training/exercises
  - Monitoring/reporting
  - Celebrating

To Achieve Resilient Dividend

- Engage stakeholders
- Seek partners
- Leverage resources
- Consider triple bottom-line
4 Case Studies
Power case study - background

Conditions
• Post Irene- and Superstorm Sandy

Objective
• Identify critical sub-stations
• Identify flooding vulnerability / risks
• Identify mitigation solutions
Power case study

Document vulnerabilities

Tropical Storm Irene – August 2011
- 8.5 feet above base flood elevation

Assets impacted
- 2 substations

Consequences
- Customers impacted
- Down-time (hours)
- Cost of damages/repairs
- Community economic impact
Power case study
Document vulnerabilities

Super Storm Sandy – October 2012
• 10 feet above base flood elevation

Assets impacted
• 8 - substations

Consequences
• Customers impacted
• Down-time
• Cost of damages / repairs
• Community economic impact
## Power case study

### Document vulnerabilities

<table>
<thead>
<tr>
<th>Sub-Stations / Storm Event</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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</table>
Power case study

Document consequences

Select assessment standard
New FEMA +3
New FEMA +2 (based on sea level rise uncertainties)
New FEMA +1
Power case study

Plan integration and implementation

- Revise Standard Operating Procedures (SOP)
- Develop Emergency Action Plans (EAP)
- CIP design / bid / construct
- Engage
  - State regulators / ISO
  - Generation and transmission
  - Community
Building case study

New Street Residences, East Boston, Massachusetts
mixed-use development on East Boston’s waterfront is designed
to rebound after a storm surge event
Conditions:
• Flood prone site of abandoned confectionary plant

Objective
• Economic vitality
• New housing
• Greater open space
• Enhanced resilience
  • Storm surge, sea-level rise, flooding.
Buildings case study - background

Approach:

- Constructing a new building that is nine inches higher than the original
- Siting entrances to avoid flood loss and reinforcing with waterproofing
- Installing cogeneration of heat and power/backed up by emergency generation on the roof

Results

- $9 million-plus in avoided losses, lower insurance premiums
- $150,000 annual energy savings
Building case study

New Street Residences
East Boston, Massachusetts - New site plan
Planning case study - background

Conditions:
• Vulnerable location of critical buildings and infrastructure

Objectives:
• Determine risk to multiple hazards
  • sea level rise, surge, heat, precipitation
  • Current/future
• Assess vulnerability of assets
• Preparedness and future planning

Amtrak Northeast Corridor
Vulnerability Assessment
Wilmington, Delaware
Amtrak Climate Change Vulnerability Assessment

Planning case study

Amtrak Northeast Corridor Climate Change Vulnerability Assessment
Planning case study - background

**Approach:**
- Data collection
- Assess risk
  - GIS analysis
  - FEMA’s Hazus-MH modeling
- Existing flood data coupled with actual sea level trends

**Results**
- $35 million in potential damages (building only)
- Majority of rail and roads inundated
5 Conclusion
**Conclusion**

**A Resilient Approach:**

- Is flexible & scalable
- Enhances the disaster management cycle
- Involves multiple stakeholders and experts
- Promotes innovative thinking
- Enables more viable, livable communities
Questions?

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