Defining the Threat: Conducting a Successful Hazard Risk Analysis

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American Association of Port Authorities
Agenda

• Evaluating Vulnerability
  • Sensitivity
  • Exposure
  • Adaptive Capacity

• Assessing Risks

• Pivoting To Resilience
FHWA Framework for Vulnerability

- Sensitivity - stressors of interest
- Exposure - impacted assets and business processes
- Adaptive Capacity - how resilient?

Define Scope

- Identify Key Climate Variables
  - Climate Impacts of concern
  - Sensitive assets & thresholds for impacts
- Articulate Objectives
  - Actions motivated by assessment
  - Target audience
  - Products needed
  - Level of detail required
- Select & Characterize Relevant Assets
  - Asset type
  - Existing vs. planned
  - Data availability
  - Further delineate

Assess Vulnerability

- Collect & Integrate Data on Assets
- Develop Climate Inputs
- Develop Information on Asset Sensitivity to Climate
- Assess Asset Criticality
- Incorporate Likelihood & Risk
- Identify & Rate Vulnerabilities
- Integrate into Decision Making
- Develop New Objectives
- Monitor and Review

- Incorporate into Asset Management
- Integrate into Emergency & Risk Management
- Contribute to Long Range Transportation Plan
- Assist in Project Prioritization
- Identify Opportunities for Improving Data Collection, Operations or Designs
- Build Public Support for Adaptation Investment
- Educate & Engage Staff & Decision Makers
Sensitivity - Storm Surge & SLR

- Shifts in frequency increase flooding
- Sea level increases are shifting the distribution of events…
Sensitivity - Increased Precipitation

Observed Change in Total Annual Precipitation Falling in the Heaviest 1% of Events
(1901 - 2016)
Sensitivity- Higher Temperatures

- Change in temperature across the United States.
- Mid-21st Century is 2036-2065
- Late 21st Century is 2071–2100
Exposure- Storm Surge & SLR
Exposure - Precipitation and Stormwater

- Clear signal in data for increased precipitation - e.g. NOAA Atlas 14
- Drainage system capacity limits
- Greater extent, depth, and duration of flooding.
Exposure - Higher Temperatures

- Stress to high value cargo
- Infrastructure impacts (e.g. rail buckling)
- Worker safety and productivity impacts
- Reduced throughput
- Impacts to IT systems
Adaptive Capacity

- Elevation
- Relocation
- Protection
- Accommodation
## Areas of Adaptation Interest by Ports

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<tr>
<th></th>
<th>Los Angeles</th>
<th>Long Beach</th>
<th>Baltimore</th>
<th>MASSPORT</th>
<th>Seattle</th>
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Assessing Risks

- Buildings (Black)
- Appurtenances (Red)
  - cranes, sub-station transformers, truck weight scales
Assessing Risks

1% Annual Chance Event– Building Losses
### Assessing Risks

#### Scenario & Frequency-based Damage and Loss Assessment Results

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Pivoting to Resilience
Questions?