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Building Disaster Resilient Communities I

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NYT: In Tsunami, Seawalls Provided No Security – Some were Topped, Others Collapsed

- “the risk of dependence on seawalls was most evident in the crisis at the Daichi and Daini nuclear power plants ”

AP: Nuclear Plant Downplayed Tsunami Risk

- "the people running Japan's now hobbled nuclear power plant dismissed important scientific evidence and all but disregarded 3,000 years of geological history"

- **What do these statements have in common with Southeast Louisiana?**

Mitigation

- Mitigation = sustained action that reduces or eliminates long-term risk to people and property from environmental hazards
- Structural vs. non-structural mitigation

"Structural" Mitigation

- Affects the hazard directly
  - Levees
  - Floodwalls
  - Seawalls
  - Floodgates
  - Surge barriers
  - Pumps

"Non-Structural" Mitigation

- Planning
  - Land Use
  - Zoning
  - Building Codes
- Hazard Mitigation
  - Elevation of Structures in Place
  - Land Swaps, Buyouts, and Relocation of Structures
  - Secondary Levee Systems
  - Flood-proofing of Structures in Place
  - Wetlands Protection and Restoration
- National Flood Insurance Program
  - Maximize Participation by Residents
- Emergency Preparedness
  - Evacuation Procedures
  - Hurricane and Flood Warning Systems

Risk-Based Questions

- What can go wrong?
- How can it happen?
- What is the likelihood?
- What are the consequences?

Risk

- Risk = Frequency x Consequences
- Frequency is the chance of occurrence
- Consequence is the amount of people and property damaged

What Happens Over Time?

- Total US disaster losses have increased 9-fold since the 1980s
- 80% of these losses were the result of climate-related hazards (floods, hurricanes, tornadoes)
- Land use and development patterns can exacerbate the risk
- Risk assessment of the LA coast

National Research Council Recommendations

- Corps should conduct a quantitative risk assessment of the probability of failure of all structural protection systems.
- Take a more aggressive leadership role in promoting nonstructural measures.
- Storm surge protection for dense urban areas should be designed for a 400-1000 year event.

Lake Pontchartrain Basin Foundation Report

- Individual and community decisions have a primary role in determining future risks.
- Structural measures provide the greatest level of risk reduction when removed from the immediate proximity of development.
- Structural measures are not always the best solution.
- Nonstructural measures are a key component for risk reduction.

Structural Mitigation Alone ≠ Resilience

- Structural mitigation alone focuses on reducing frequency, resulting in less risk in the short-term and increased risk in the long-term.
- Why?
- Levees reduce the frequency of flooding, which induces development in the protected area. When a stronger-than-design storm occurs, the consequences are larger because more people and property are in harms way.

What Causes a Stronger-than-Design Storm?

- ✓ Lack of wetlands due to coastal erosion
- ✓ Climate change impacts on storm frequency and strength
- ✓ Climate change impacts on sea level
- ✓ Sinking levees
- ✓ Levees that are poorly designed, constructed, and/or maintained
- ✓ Reduced pumping capacity due to power outage
- ✓ Undersized pumping capacity

Acute vs. Chronic Risk

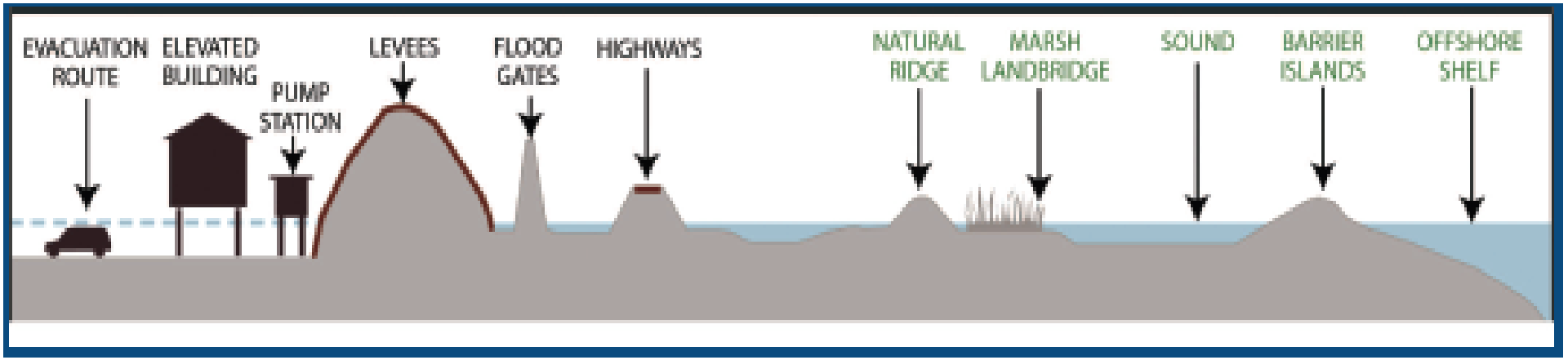
- Acute, immediately perceived risk caused by frequency of exposure
- Chronic, long-term risk caused by cumulative increasing vulnerability
- Resilience strategies address both types of risk

Resilience

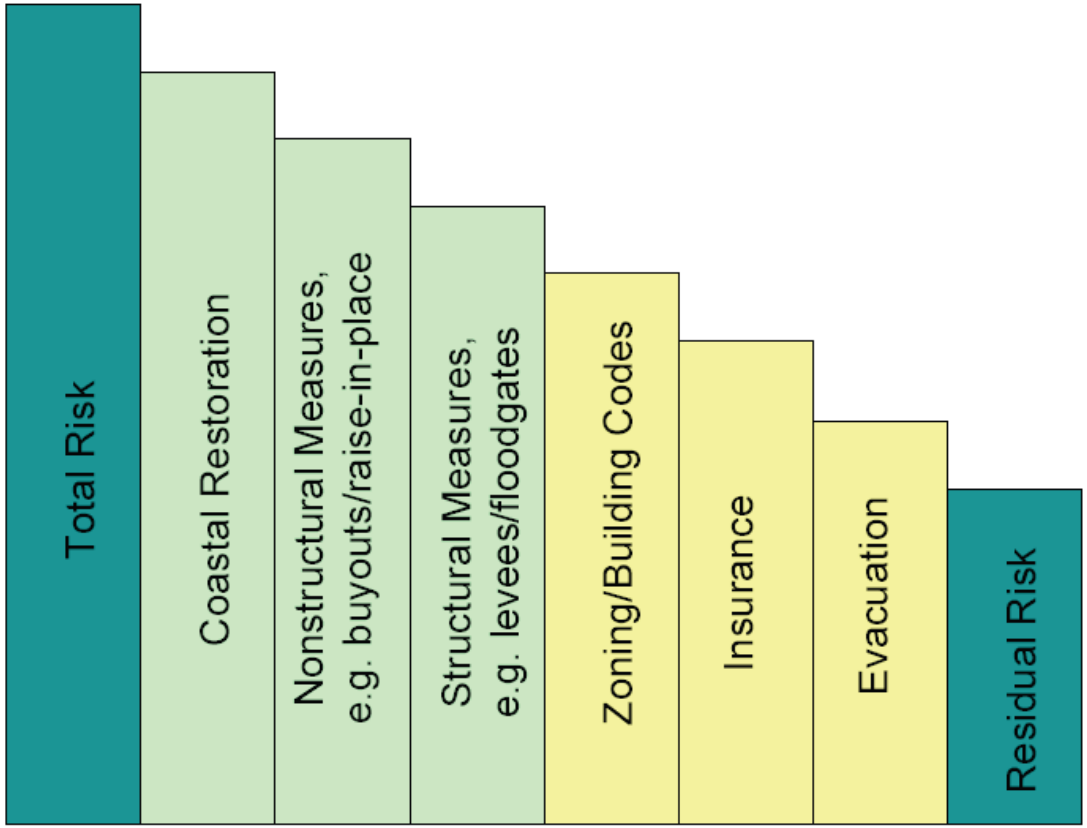
- Resilience = using a variety of means to reduce vulnerability and protect life and property from natural and technological hazards, recognizing that short-term solutions can exacerbate long-term consequences

Multiple Lines of Defense Strategy

(Lake Pontchartrain Basin Association)



Cumulative Reduction of Risk (not in order)



Take Home Points

- Reliance on a single line of defense is unwise.
- Local land use and development decisions can exacerbate the consequences over time and therefore increase risk.
- Resilience requires a multi-pronged approach that includes a mix of structural and non-structural mitigation measures.

Discussion Question

- **What types of resiliency measures are in place in your community?**