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Building Disaster Resilient Communities 1

Earthea Nance
University of New Orleans

Building Disaster Resilient Communities I

Earthea Nance, PhD, PE, CFM
University of New Orleans

New York Times:

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 ”

Associated Press:

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 headlines have in common with Southeast Louisiana?

Susceptibility

- Most states are susceptible to natural hazards such as floods, earthquakes, hurricanes, volcanoes, and tsunamis.
- Most states are also susceptible to technological hazards such as hazardous material spills, levee failure, industrial accidents, etc.
- Proper management of these risks is an essential component of community resilience.

Resilience

- The ability to survive, recover, adapt, and flourish in the face of major change.

Risk Management = Mitigation

- Mitigation = sustained action that reduces or eliminates long-term risk to people and property from environmental hazards
- Structural mitigation = hard infrastructure solutions (typically large scale)
- Non-structural mitigation = soft policy solutions (may involve minor construction)

"Structural" Mitigation of Floods and Surge

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

"Non-Structural" Mitigation of Floods & Surge

- Planning
  - Zoning and Land Use
  - 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 further exacerbate the risk
- Corps' 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.
  - Corps should 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

- Recommendations
  - 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

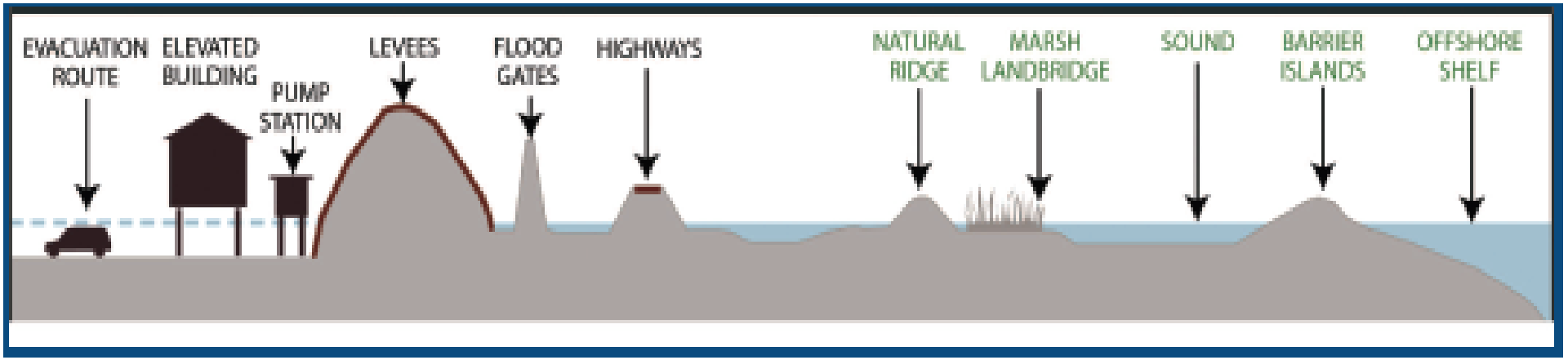
- Acute Risk is immediately perceived because of the high frequency of exposure.
- Chronic Risk is often imperceptible because it results from cumulatively increasing vulnerability over time.
- True resilience strategies MUST address both types of risk.

Resilience

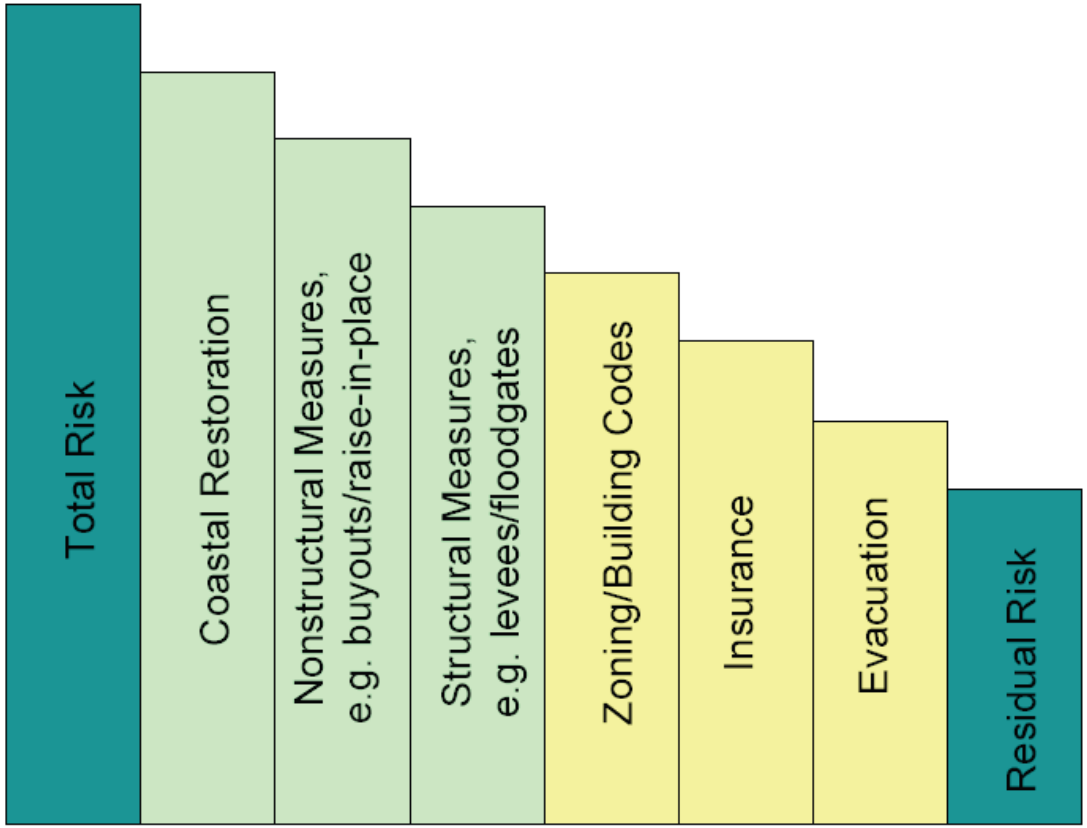
- Achieving resilience requires use of a variety of means to reduce vulnerability and protect life and property from natural and technological hazards, recognizing that short-term solutions can exacerbate long-term consequences.

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.
- 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.
- Resilience needs to be a part of our culture.

Discussion Questions

- What types of resiliency measures are in place in Louisiana?

- What types of resiliency measures does Louisiana still need?