Case Study in Resilience:
When In-place Community Recovery Is Not an Option

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Case Studies in Resiliency

Discussions of resilience are in vogue, and is resilience always possible?

• Resilience is the capacity of a community to absorb change from an event and reorganize so as to retain the ability to provide goods and services necessary for human well-being.
Ocean Shores Case Study

Event scenario
1. Ground shaking
2. Subsidence – 0 seconds
3. Damage -- minutes
4. Water rushes in -- minutes
5. Tsunami – 45 minute
6. Islands form – 24 hrs.

PGA with 2-Percent Probability of Exceedance in 50 Years, Northwest Region

http://www.youtube.com/watch?v=ZS80KMb89jw
Tsunamis

Resilience Strategy:

• Purchase Flood Insurance and
• Provide Tsunami Safe Havens

http://www.youtube.com/watch?v=kTyIVb1Bwws
Strategy: Purchase Flood Insurance and provide Tsunami Safe Havens

1. Berm

2. Tower

3. Berm-Tower

4. Building
Quinault Tribal Nation
A magnitude 9+ Cascadia earthquake and tsunami — last experienced in 1700 AD — will endanger the low-lying communities along the Washington coast. Grays Harbor County’s vulnerability to a tsunami combined with the difficulty of typical horizontal evacuation spurred interest in the exploration of alternative evacuation methods. A University of Washington research team, with support from county, tribal and state emergency management officials, created a community-driven process to identify potential locations for vertical evacuation in Grays Harbor County. This project addresses three of the most vulnerable coastal communities in Grays Harbor County.

Project Approach

1. Steering Committee assembled to guide project
2. Site visit to identify opportunities for vertical evacuation
3. Conversation Café public meeting to solicit ideas and comments about vertical evacuation typologies: berms, towers, and buildings. Participants used interactive hazard maps to discuss conceptual locations for the structures, and the pros and cons of each structure type.
4. Strengths and Weaknesses public meeting to present the preliminary vertical evacuation strategy and to discuss the strengths and weaknesses. Ultimately, a preferred strategy emerged for each community.
5. Community design charrettes conducted to identify site specific design constraints and opportunities. Day-to-day functions and uses of each proposed site/structure were also explored and identified.
6. Two final open house meetings

Vertical Evacuation Typologies

1. Berm

Berm structures are artificial mounds comprised of earth, rock and steel components. Berms are generally accessed by means of a sloped walkway or ramp incorporated into the berm structure. Berms can be incorporated as natural features such as land forms in less developed areas; as viewing and seating areas for athletic fields, as play areas and parks, as visitor attractions and event facilities or as noise barriers near airports and industrial areas.

2. Tower

Tower structures are elevated safe zone platforms with the height greater than the width, supported by vertical structural members. Towers have a smaller footprint than berm structures for the same number of people and can be accessed by stairs, ramps, mechanical vertical assists, and manual vertical assists. Access to tower structures can be restrictive to physically challenged and aged people if stairs are the only access provided. Towers can accommodate a wide variety of alternative uses: visitor centers, in which the at-grade level acts as sacrificial office or display areas; viewing platforms for scenic and/or wildlife areas, in conjunction with community water towers; festival entry structures; elevated pedestrian bridges; and other uses.

3. Berm-Tower

Berm-tower combinations present opportunities to reduce the physical and visual impacts of larger tower structures with partial or complete sacrificial berm amendments. They also can reduce the overall footprint for a large berm structure. Berm-tower structures can provide access to tower structures if space permits, increasing access capabilities for physically challenged persons.

4. Building

Building designs can incorporate safe havens into an entire building or a building component. Hardening an entire building structure can be cost prohibitive for smaller communities, thus the recommendation for building components. Examples of complete building safe havens include fire stations, public works garages and other basic building structures.
Resilience within the context of the four phases of emergency management

Mitigation possible in any phase
Resilience within the context of the four phases of emergency management

Mitigation possible in any phase
Phases of Emergency Management

- Change
- Before
- During
- After
- Mitigation

Preparedness -- Protection/Prevention
Resilience within the context of the four phases of emergency management

Mitigation possible in any phase
Begin by determining a focal point: Resilience for whom

1. Remembering
2. Revolt
3. Feedback
4. Tipping Point
5. Transformability
6. Collapse
Begin with a Focal point: Resilience for whom

1. **Remembering.** This occurs when the potential for recovery is accumulated and stored.
2. **Revolt.** This occurs when forces or events overwhelm recovery.
3. **Feedback.** Resilient communities have self-organizing feedback mechanisms.
4. **Tipping Point.** This is a point at which a relatively small change in external conditions causes a rapid change.
5. **Transformability:** This is the capacity to create a fundamentally new system when conditions make the existing system untenable—where organizations are capable of exploiting new opportunities.
6. **Collapse:** Occurs when a community is no longer sustainable. Cannot self-organize
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Questions: