Washington State & Rising Tides

Washington State APA Conference 2013
Bobbak Talebi
Department of Ecology

Brief History

West Coast Governors Alliance on Ocean Health 2006
Vision for the health of our West Coast coastal and ocean resources, including clean coastal waters and economically and environmentally sustainable communities.

Executive Order 07-02
Basis for creating the Climate Advisory Team required the execution of greenhouse gases. It also directed the state to assess climate-related proclivities for the impacts of climate change on water supply, public health, agriculture, fisheries, and communities.

Executive Order 09-05
Executive Order 09-05 mandates the state, among other strategies, prepare for rising sea levels and the risk to water supplies caused by climate impacts.

Preventing for Climate Change: A Guidebook for Local, Regional, and State Governments 2007
Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments 2007

Sea Level Rise in the Coastal Waters of Washington 2008
King County and cities of the Washington State Department of Ecology

The Washington Climate Change Impacts Assessment 2009
University of Washington Climate Impacts Group

The Response of the Salish Sea to Rising Sea Levels: A Geomorphic Perspective 2009
University of Washington Department of Geology

Sea Level Rise on the Coasts of California, Oregon, and Washington 2011
National Academy of Sciences National Research Council

Washington State Department of Ecology

Adaptation Planning

San Francisco Bay Conservation and Development Commission (BCDC): Adapting to Rising Tides (ART) Project

Planning & Regulatory Approaches

Climate Action Plans
Shoreline Master Programs
Comprehensive Plans
Hazard Mitigation Plans
Flood Plans

Shoreline Management

Shoreline Management Act has been in effect now for over 30 years... Responding to a voter initiative, the State Legislature adopted an alternative proposal that took effect June 1971.
The West Coast Governors’ Agreement on Ocean Health recognizes that Washington, Oregon, and California can achieve more by working together on issues important to all of us.

**Ecology Efforts**

Regional Support

- **Climate Change Action Coordination Team**
  - 2009 National Academy of Sciences’ National Research Council on the effects of Sea Level Rise on the West Coast
  - 2012 West Coast Coastal Hazards and Sea Level Rise Workshops
  - Next Steps:
    - A total of 34 Action Coordination Team (ACT) members and partners convened for a strategic planning workshop in Santa Cruz, July 2013.
    - ACT members are currently developing a new work plan, including new roles, goals, and activities.

**State Guidance**

- Characterize and disseminate sea level rise information and resources to local governments
- Improve efficiency in the planning process and application of adaptation tools at the local scale
- Enhance local capacity

**State Guidance**

- The Shoreline Management Act (SMA) and the Shoreline Master Program (SMP) Guidelines currently contain no explicit references to climate change or sea level rise. However, the Guidelines require local governments use “the most current, accurate and complete scientific and technical information available” (WAC 173-26-201(2)(c)).

ROW 90.58.100 (1)(e): Consider all plans, studies, surveys, inventories, and systems of classification made or being made by federal, state, regional, or local agencies, by private individuals, or by organizations dealing with pertinent shorelines of the state.
Education

The Coastal Training Program (CTP) provides practical, science-based training to professionals who make decisions about coastal management in Washington State.

Past Efforts & New Directions:
- 2009 Planning for Climate Change
- Climate Adaptation Needs Assessment
- Climate Adaptation Series, Spring 2014
- Climate Change Integration into all CTP Classes
- Incorporation of Climate Change into CTP Official “Purpose” Statement

Conclusion

3,447 miles of marine shoreline in Washington State

Good Governance:
Ensure the safety, health and welfare of communities now and into the future.

Questions

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

Bob Freitag, Director
Institute for Hazards Mitigation Planning and Research

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

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
- 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
Two final open house meetings provided the opportunity for communities to discuss the preliminary vertical evacuation strategy and to comment about vertical evacuation typologies: berms, towers, and buildings. Participants used interactive visualizations to explore ideas and identify potential locations for vertical evacuation in Grays Harbor County. This project addresses three of the most vulnerable coastal communities in Grays Harbor County. This project addresses three of the most vulnerable coastal communities in Grays Harbor County. A magnitude 9+ Cascadia earthquake and tsunami — last experienced in 1700 AD — will endanger the low-lying coastal areas. Grays Harbor's vulnerability to a tsunami combined with the difficulty of typical horizontal evacuation spurred interest in vertical evacuation strategies. 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Begin by determining a focal point: Resilience for whom

1. Remembering
2. Revolt
3. Feedback
4. Tipping Point
5. Transformability

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.

Questions:

https://www.facebook.com/ProjectSafeHaven
Protecting Ecosystem Function with Sea Level Rise and Cumulative Effects Management Tools: Case Study from San Juan County

Funded by an EPA/WDFW *Improving Regulatory Effectiveness* National Estuary Program Grant. Match funding from the Bullitt Foundation.
San Juan County SLR Project

Project Partners:
Friends of the San Juans, Coastal Geologic Services, Salish Sea Biological, the Washington Department of Fish and Wildlife.

Technical Team:
Why Worry About Sea Level Rise (SLR)?

- Fish, shellfish and human communities depend on beaches
- Modified shorelines are less resilient to the impacts of SLR
- Impacts to beach spawning forage fish habitat are likely to be early and significant
- Significant private & public infrastructure is vulnerable
Project Rationale

- Long-term protection of habitat will require a deliberate SLR adaptation approach by informed managers and an aware public.
- The alternative is greatly increased demand for shoreline armoring.
- San Juan County has over 400 miles of marine shoreline, diverse shoreline types and significant remaining intact habitat and processes as well as undeveloped shoreline property- providing an excellent place to develop and test new tools and management strategies.
- Improved information/processes are needed to catalyze adaptation efforts.
San Juan County SLR Project

Primary Project Elements:

• Regulatory Review (local, state and federal)

• Sea Level Rise Vulnerability Assessment for San Juan County (erosion and/or inundation hazard areas- ranked low, moderate and high risk for habitat, structures, and roads)

• Stakeholder Interviews (planners, scientists, managers, elected officials, regulators)

• Management Recommendations (improving effectiveness of existing regulations, regulatory reform, non-regulatory options)

• Outreach and Engagement (land managers, tribes, at risk communities/property owners)

• Application of Results (Shoreline Master Program, regulatory reform, land conservation)
<table>
<thead>
<tr>
<th>Federal Law</th>
<th>State &amp; Local Law</th>
<th>Other Legal Authority</th>
<th>Non-legal Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Zone Mgmt Act (1972)</td>
<td>Growth Mgmt Act (1990) and Critical Areas Ordinances</td>
<td>Rolling Easements/Reliction – as waters rise, public lands should be allowed to migrate inland</td>
<td>Tax incentives for retaining natural shoreline s</td>
</tr>
</tbody>
</table>
San Juan County SLR vulnerability assessment

Objectives:

Develop a GIS tool that integrates erosion with inundation to better understand future conditions

Use results to assess habitat, structures and infrastructure vulnerable to erosion and inundation

Link vulnerable areas with appropriate management strategies
Implications of SLR & CC on Coastal Areas

Increase bluff recession rates via erosion caused by + precip & waves
Increase in high water events storms and el ninos
Habitat loss via coastal squeeze bedrock and armored

Risk Dependant on:
Shoretype
Upland topography and bathymetry
Geology
Sediment supply
Space and ability of shoreline to transgress
San Juan County SLR vulnerability assessment

General Approach:
Integrate background erosion rates with inundation model

Create polygons of areas of vulnerability from which infrastructure would be selected
SJC Preliminary Results – Vulnerable Roads
SJC Preliminary Results – Vulnerable Roads

Legend

Horizon

- 2009
- 2050Mod
- 2050High
- 2100Mod
- 2100High

Shaw Island
Integrate uncertainty into maps
Expand research of background erosion rate by shoretype
Set up long-term monitoring stations to assess changing conditions
Perform outreach to most vulnerable areas to initiate proactive management approaches
Apply greater setbacks to development in vulnerable areas
Public infrastructure provides an opportunity to initiate adaptation conversation with the community
Develop risk specific (flood/erosion and habitat/structure/roads decision trees to illustrate cost/benefit of various management responses
Stakeholder Interviews- Key Findings

Top recommended actions from interviews with 28 local and regional shoreline scientists, regulators, planners and managers: (not in order)

• Broad support for stronger implementation/enforcement of existing shoreline armoring regulations.
• Improvements hydraulic code - a top recommendation - split between enhancing existing rules or major regulatory reform.
• Support for expanded education, but associated with the acknowledgement that outreach alone will not be successful.
• Require planning for sea level rise in Shoreline Master Program updates.
• Provide tax incentives for managed retreat.
SJC SLR Assessment - Next Steps

Final review of sea level rise model uncertainty assessment

Final management recommendations developed by project partners and full technical team

Meetings with managers

Develop decision trees

Community outreach and engagement strategies

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Sea Level Rise and Coastal Hazard Resilience in Washington

Jamie Mooney
Coastal Resources Specialist
Washington Sea Grant
October 3, 2013

Planning for Sea Level Rise

Presentation Overview
- Climate Adaptation Survey
- Coastal Hazard Resilience Network
- Witness King Tides
- Shoreline and Coastal Planners Group

Climate Change Adaptation Survey
- Conducted in August 2012
- Sent to 339 coastal practitioners in the Coastal and Shoreline Planners Group
- 98 responses
- Elected officials
- Document in review, to be published this year
- Part of a larger National Effort

Identified Climate Risks
- 31/87 responses listed sea level rise as the first risk associated with a changing climate that comes to mind
- 35% identify adaptation as a top priority to dealing with the projected impacts of climate change (36% medium priority)

Climate Adaptation Planning

Understanding Planning Implementing

Hurdles to the Adaptation Process

- Lack of Urgency
- Lack of Agreement in Selecting Solution Options
- Lack of Public Support
- Lack of Leadership
- Lack of Access to Scientific Information
- Opposition from Other Coastal Stakeholders
- Opposition from Coastal Development Interests
- Lack of Data/Information

- Low Priority
- Medium Priority
- High Priority
- Not on the Agenda

- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
- Percent of Respondents

- Explicit Opposition from Other Coastal Stakeholders
- Lack of Agreement in Selecting Solution Options
- Lack of Public Support
- Lack of Leadership
- Lack of Access to Scientific Information
- Opposition from Other Coastal Stakeholders
- Opposition from Coastal Development Interests
- Lack of Data/Information

- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
- Percent of Respondents
Coastal Hazard Resilience Network

- Sea level rise through coastal hazard lens
- NOAA Coastal Services Center CREST (Coastal Resilience Networks) Competition
- Funding October 2013 - September 2015
- WA State: 2 primary objectives
  1. State Level Coordination to assist local communities
  2. Pilot studies: Pacific and Grays Harbor Counties
- OR: a similar but different initiative
- Resilience Plan as an end goal

Goal: Integrated Hazard Maps

- Coastal Erosion + Tsunami Inundation + SLR
- Funding from CSC grant as part of pilot project
- PMEL liaison
- Use new information for more accurate Vertical Evacuation planning

Sea Level Rise

Tsunami Inundation

Green: 0-.5 m, Yellow: .5-2 m, Orange: 2-5m, Seattle Fault Scenario

Witness King Tides

- King Tides are extreme high tides that occur during times of the year when the moon is closest to the Earth
- Can visualize what future SLR will look like by taking pictures and sharing
- Kingtides.wordpress.com
- WA King Tide Photo Initiative: Flickr Page
King Tides
- Visualize Sea Level Rise! June 2013: Alki

United States King Tides Initiatives

Resource Available – WA Sea Grant – Shoreline and Coastal Planners Group
- For coastal practitioners and shoreline planners
  - Variety of coastal management issues
  - Geographic scope: WA coastlines
    - November 2012: SLR workshops
    - March 2013: Net pen Aquaculture
    - July 2013: Elwha Dam Removal

Questions?
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Our Coastal Communities: How Can We Address Rising Tides?
Nicole Faghin
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WA APA Fall Conference October 2, 2013

Topics
- Sea Level Rise and Coastal Hazards
- Implications for Built Environment
- Adaptation vs. Mitigation
- Resilience vs. Adaptation Planning
- What are the barriers to adaptation?

Sea Level Rise Predictions
National Research Council 2012 Global Sea Level Rise Predictions (relative to yr. 2000 as baseline) for West Coast:
- 2030: 3-9 in.
- 2050: 7-19 in.
- 2100: 20-55 in.


Washington State Implications
- Tectonic Shifts
- Land Subsidence
- Earthquakes

That’s why it’s important to address Hazards and Sea Level Rise from Climate Change

Ore. Climate Assessment Report 2010

Coasts and the Environment
Interface of water, sky and land
- Climate (atmosphere)
- Storms
- Convergence zones
- Frequency
- Water (hydrosphere)
- Waves and Tides
- Sediments
- Storm Surges
- Land (lithosphere)
- Tectonic plates and volcanoes
- Stormwater Runoff
- Beaches, Barrier Islands and Sand Spits

Sea Level Rise can be Gradual or Sudden:
- Gradual:
  - Regular Inundation
  - Increased erosion
- Sudden:
  - Higher Storm Surges
  - Flooding
  - Wave forces
Impacts on Built Environment
- Flooding
- Erosion

Mitigation vs. Adaptation
- **Mitigation** is...
  An intervention to reduce greenhouse gas sources and emissions.
- **Adaptation** is...
  Changes in response to actual and expected impacts from Climate Change.
- Caveat...
  FEMA uses the term Mitigation in different way...take action now to reduce risk.

Resilience vs. Adaptation
- **Adaptation:**
  - Protect
  - Accommodate
  - Retreat
- **Resilience:**

What are Barriers to Adaptation?
- Property Rights Issues
- Challenge to get people’s attention
- Does it take a crisis to make people change e.g. Super Storm Sandy?
- Requires Political Will
What’s Happening in Washington

- Bobbak Talebi, Shoreline Planning Guidance
- Jamie Mooney, Coastal Resilience Network
- Bob Freitag, Staged Retreat
- Linda Lyshall, San Juan Sea Level Rise Initiative

Our Coastal Communities: How Can We Address Rising Tides?

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October 2, 2013