"Toward a Well Adapted Future in Puget Sound: A Symposium on Climate Change Adaptation and the Law"

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Climate Adaptation at Seattle Public Utilities

Paul Fleming
Manager, Climate and Sustainability Group
Seattle Public Utilities
Paul.fleming@seattle.gov

Outline

- Seattle context
- SPU’s Climate Program
- US Water Sector adaptation Initiatives
- Federal adaptation initiatives
- Conclusion
Hydrologic and Physical Context

- Sequim - 47"
- Seattle - 37"
- Cedar River Watershed - 100"
- Hoh River Valley - 150-180"

Operating Context

- Seattle Public Utilities
  - Department of City of Seattle
  - Part of Executive Branch
  - Budget/rates approved by City Council
  - Federal statutory requirements
- Four key services
  - water supply
  - drainage/wastewater
  - solid waste
  - environmental services
- Rate-based, enterprise funds
Seattle’s Water Supply and Drainage/Wastewater Systems

- Drivers:
  - Combined Sewer Overflows
  - Stormwater permit compliance
  - Sediment cleanup
  - Urban flooding
  - Spatial variation with precip and topography
  - Climate signal not as clear
  - Spatial and temporal constraints = modeling constraints
  - Clean Water Act compliance

Adaptation and Water Utilities

- Core management responsibility*
- Essential that
  - understand impacts
  - identify adaptation options
  - articulate their storyline
- Requires engagement in
  - technical, policy and political spheres
  - multiple levels of government
  - multiple sectors

*http://waterclimateforum.org/principles.html
SPU’s Approach to Adaptation

- Assess impacts
- Pursue “no regrets” options in multiple realms
- Enhance knowledge
- Build internal capacity
- Collaborate
- Establish strategic partnerships

Areas of Interest
Climate Vulnerability is a function of:

**LOCATION**

- Behavioral & sociological
- Technological
- Technical
- Operational & structural
- Legal & financial
- Political
- Institutional

**CAPACITY TO COPE**

Adaptation in Multiple Realms

- Used cost-benefit analysis “to evaluate a selection of feasible and applicable measures to adapt to the expected risk - spanning infrastructural, technological, behavioral and financial solutions.”

*"Climate changes the water rules" – Cooperative Programme on Water and Climate

*The Economics of Climate Adaptation Working Group
Seattle’s Water Supply Outlook

**Average Daily Demand:**
- 2009: 130 mgd
- 2060: 159 mgd

**Available Supply:**
- 171 mgd can be diverted after meeting instream flows

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**Assessing Impacts**

**Statistical Downscaling – Water Supply**
- 2002-2006: SPU-funded project with UW Climate Impacts Group (UW CIG)
- 2006-2008: Regional study with UW CIG
- 2010-2011: Piloting Utility Modeling Applications (NYC, Portland, SF, Seattle and Tampa)

**Dynamical Downscaling – Urban Drainage**
- 2008: UW CIG study for State of Washington

**Sea Level Rise Mapping**
- Created layers in GIS
- Map inundation, hydraulic grade line
Change in Water Supply with Climate Change Scenarios
Baseline Operations

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Unmitigated impacts - does not include adaptation options

Legend:
- Warm Scenario: GISS ER B1
- Warmer Scenario: Echam5_A2
- Warmest Scenario: IPSL_CM4_A2

Change in Water Supply with Climate Change Scenarios
Baseline Operations plus Tier 1

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Tier 1 (light shade)

Legend:
- Warm Scenario: GISS ER B1
- Warmer Scenario: Echam5_A2
- Warmest Scenario: IPSL_CM4_A2
Water Conservation

- Since mid 80’s population and consumption decoupled
- Historic savings of 44 mgd
- Committed to 15 mgd through 2030
- Delayed impacts of climate change
Urban Drainage and Sea Level Rise
Engagement and Collaboration

Water Utility Climate Alliance (WUCA)

- federal climate research
  - user and shaper
- federal legislation
- federal agency initiatives
- climate modeling
- decision support
- learning alliance

*Wucaonline.org/html/actions.html*
Piloting Utility Modeling Applications (PUMA)

Seattle Public Utilities
Portland Water Bureau
Climate Decision Support Consortium

SF Public Utilities Commission
CA-NV Applications Program

NYC Dept Env Protection
Consortium on Climate Risk
in the Urban NE

Tampa Bay Water
SE Climate Consortium

Water Sector Research

4239 - Climate Change Impacts on the Regulatory Landscape: Evaluating Opportunities for Regulatory Change
4262 - Vulnerability Assessment and Risk Management Tools for Climate Change: Assessing Potential Impacts and Identifying Adaptation Options
4263 - Analysis of Changes in Water Use Under Regional Climate Change Scenarios
4264 - Changing Mindsets to Promote Design of Sustainable Infrastructure
4306 - Analysis of Reservoir Operations under Climate Change
EPA’s Climate Ready Water Utilities Working Group

- Varying capacity in water sector
- Adaptive learning and management framework
- Expanded concept of infrastructure
- Water specific research
- Sector interdependencies
- Implications of “stationarity is dead” on regulatory community

National Climate Assessment

- Synthesizes relevant science and information
- Increases understanding of what is known and not known
- Identifies information needs related to preparing for climate variability and change, and reducing climate impacts and vulnerability
- Evaluates progress of adaptation and mitigation activities
- Informs science priorities
- Builds assessment capacity in regions and sectors

http://www.globalchange.gov/what-we-do/assessment
Wrap Up and Conclusions

• Adaptation is a core utility responsibility
• Requires engagement in multiple spheres, adaptation in multiple realms
• Knowledge enhancement, capacity building
• “Co-production of knowledge”
• Collaborative networks
• The importance of “T”