

Coping with Climate Change at a Local Level

Elizabeth Willmott – King County, Washington

The lands of King County, Washington, stretch from urban coastline and Puget Sound in the west to farmland and the snowcapped Cascade Mountains to the east. Natural reservoirs of snowpack lie in the mountains to the north, and to the south, snowpack, lakes, and rivers reside in a patchwork of public and private lands, home to both people and industry.

As the region faces projected climate change impacts, a primary concern has been how to balance long-term distribution of water for human consumption (including drinking water, hydroelectric power, industry, and irrigation) with the needs of the region's salmon species. Sought by tribal, commercial, and sport fishing interests as well as wildlife, the salmon are also protected under the Endangered Species Act.

Experts at the Climate Impacts Group (CIG) at the University of Washington predict warmer winters, with more precipitation falling as rain rather than snow, leading to decreased snowpack and increased flooding. They also predict average streamflows in the

region will decline in late summer and early fall, just when both people and salmon need water the most.

Climate change already has begun to affect the county's physical and political landscape. Flooding in the winters of 2006 and 2008 significantly damaged homes and infrastructure in the county, imperiling

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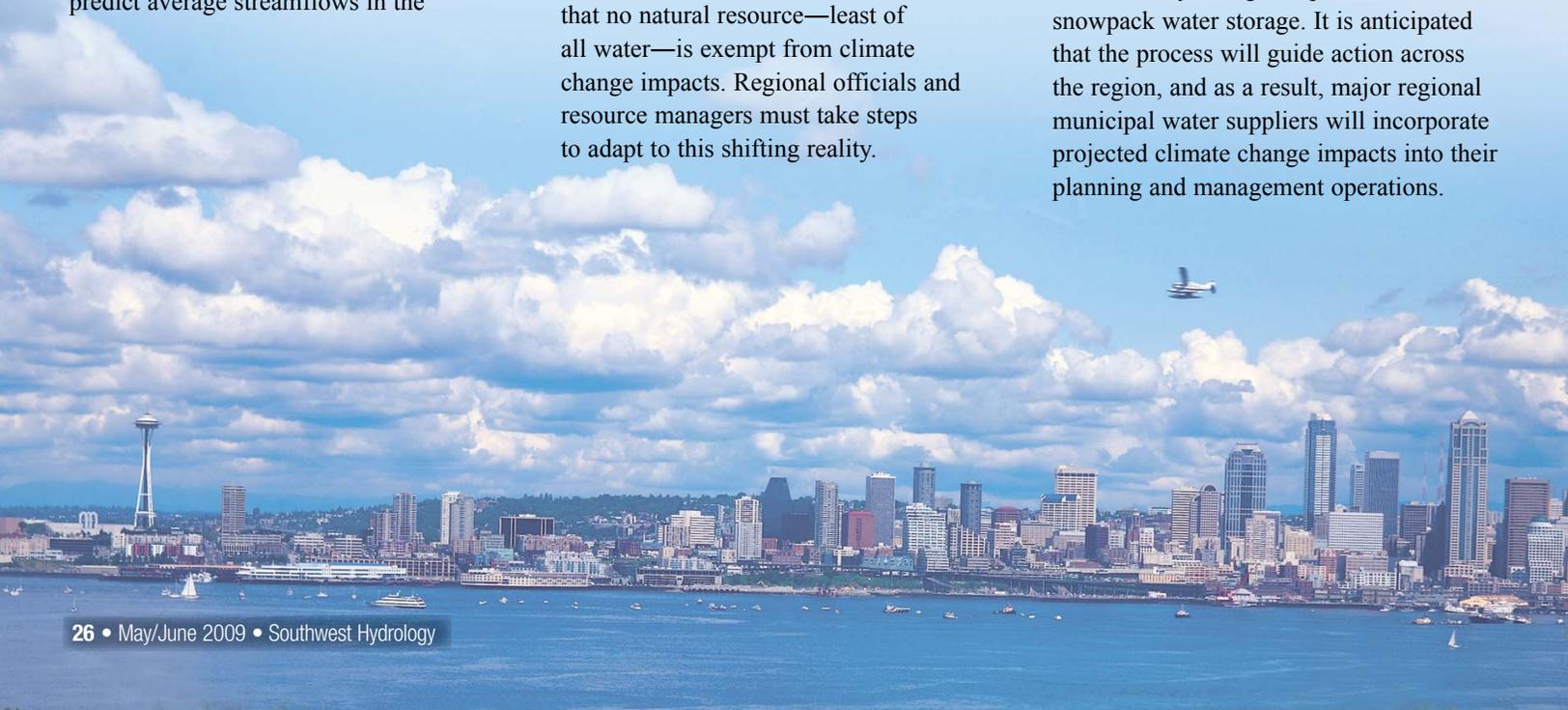
entire neighborhoods built in floodplains. In early 2009, flooding in the Puget Sound region made national headlines, attributed by the *Seattle Post-Intelligencer* to a "triple whammy of development, logging, and climate change."

While King County's climate challenges may differ from those in other parts of the United States, they demonstrate that no natural resource—least of all water—is exempt from climate change impacts. Regional officials and resource managers must take steps to adapt to this shifting reality.

Raising Awareness

In 2005, King County and the CIG held a conference on the impacts of climate change on the region's agriculture, coastal livelihoods, forestry, hydropower, water supply, stormwater, and wastewater-treatment sectors. Participants came from diverse disciplines, sectors, and levels of government, and included researchers, public and tribal officials, business leaders, and citizens.

Later that year, King County convened a multiyear regional water-supply planning process, gathering data and conducting analysis on several technical issues. The planning group represented state agencies, tribes, local governments, public utilities, water and sewer districts, the regional public health agency, and other stakeholders. One task aimed to develop a common picture of climate change impacts on water. The group prepared a "building blocks" report to articulate common expectations for climate change (see sidebar, right), modeled projected changes in temperature and precipitation over the next 75 years, and analyzed associated hydrologic impacts on snowpack water storage. It is anticipated that the process will guide action across the region, and as a result, major regional municipal water suppliers will incorporate projected climate change impacts into their planning and management operations.



In late 2005, acknowledging the future scenarios of change, King County Executive Ron Sims called on his department directors to “plan backward from 2050,” and to take steps today to prepare for climate change by revising policies, plans, and investments. Mitigation or reduction of greenhouse gas emissions had already been a part of King County’s climate action strategies, but climate change adaptation was a new element. King County’s new comprehensive climate plan, published in February 2007, undertook planning for both mitigation and adaptation.

Developing Adaptive Strategies

Since the 2005 conference, King County has employed an array of strategies across natural, built, and human systems to respond to climate change impacts related to flooding, water supply, and wastewater treatment.

Flood control district: Flooding is expected to become more frequent and intense throughout the Pacific Northwest, according to the CIG. Warmer winters are projected to result in higher river flows over longer periods of time, which could damage the levees and structures upon which King County relies to protect citizens, property, transportation corridors, and the prosperity of the entire region.

In response to this projection, King County established a regional flood control district “to provide funding and policy oversight for flood protection projects and programs” in the county, implemented by the Department of Natural Resources and Parks. Knowing the likely economic impacts of flooding helped King County build support for and implement a countywide tax to fund much-needed repairs to its aging system of 500 levees and revetments.

One of the first projects in the plan will be to acquire property that repeatedly floods along the Cedar River in south King County, relocate the residents of a mobile home park, and set back the levee. These actions will reduce flood pressure on a nearby highway, help move floodwater downstream, and restore natural floodplain functions.

Reclaimed water: King County places a priority on making reclaimed water from its wastewater treatment operations widely available for irrigation and industry. Such an approach provides important flexibility for the county to address pressures of climate change and population growth on its water supply, while also reducing effluent discharges and supporting statewide efforts to clean up Puget Sound.

For example, the county’s new wastewater treatment plant, Brightwater, will use state-of-the-art membrane bioreactor technology to treat wastewater. King County is constructing a reclaimed water distribution “backbone” from Brightwater to bring reclaimed water to future customers. This distribution system will ultimately have the capacity to carry 21 million gallons per

day of Class A reclaimed water. Reclaimed water from Brightwater may be used for a variety of purposes such as irrigation and replenishing water in rivers, where it will benefit salmon and other wildlife.

Sea level rise analysis: Finally, King County Wastewater Treatment Division has collaborated closely with the CIG to understand potential effects of sea level rise on wastewater structures. The first phase of this assessment focused on mapping the potential inundation of facilities, resulting in a geographic information systems tool that other government agencies can use to conduct similar studies of their infrastructure. An interdepartmental team of hydraulic and hydrologic modelers, engineers,

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Climate Change Building Blocks	
Temperature	1 Global average temperature increases in the 20th century will continue in the 21st century.
	2 Warming in the Puget Sound region, which increased at a faster rate than the global average in the 20th century, will continue.
	3 Increased surface temperatures in the Pacific Northwest will increase evapotranspiration rates.
Precipitation	4 Global precipitation will increase, although with less certainty in the amount of change with respect to temperature.
	5 The increased occurrence of heavy precipitation events in the 20th century will continue in the 21st century.
Snowpack/ Glaciers	6 Loss of snowpack and glaciers in the Pacific Northwest has been due to increased temperatures in the 20th century.
	7 Projected temperature increases will further reduce snowpack and glaciers in the Pacific Northwest.
Streamflow	8 Winter flows will increase and summer flows in snowmelt-influenced rivers of the Pacific Northwest will decrease.
	9 Frequency of flood events will increase in most western Washington river basins.
	10 Frequency of drought events will increase in the Pacific Northwest.
Sea-Level Rise	11 Global mean sea level will rise in the 21st century.
Salmonid Habitat	12 Temperatures of rivers, streams, lakes, and river-mouth estuaries will increase in the Puget Sound region.
	13 Stream-flow and temperature conditions will occur that negatively impact the freshwater and estuarine habitat of most salmonids in Puget Sound.

The King County Climate Change Technical Subcommittee identified 13 salient conclusions about projected climate change impacts, reflecting projected assumptions and associated changes, to serve as building blocks for planning. Modified from Climate Impacts Group, 2006, Climate Change Building Blocks, cses.washington.edu/db/pdf/palmeretalbuildings546.pdf.

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scientists, geographers, and operations staff plan to build on this initial assessment by modeling the potential hydraulic response of the county's conveyance system and treatment plant outfalls to sea-level rise and storm surges. Outcomes will include data collection, the modeling output, recommendations for specific adaptation techniques, and a tested methodology for assessing the threats of sea-level rise to wastewater conveyance and treatment.

Several factors have been critical to King County's early adoption of these climate change adaptation strategies:

- *Policymakers' awareness of and willingness to use science*—CIG was sharing projections about the region's climate with officials for years and already had a trustworthy reputation in the region. Concurrently, King County officials were willing and able to listen to scientists, were literate in technical models, and were aggressive in championing policies that incorporated science.
- *The scientific capacity to conduct and understand vulnerability assessments*—CIG delivered scenarios that were downscaled from global projections to the regional level, which King County used to develop specific adaptation strategies.
- *A spirit of innovation*—Through the commitment of the Executive Office and Department of Natural Resources and Parks, King County managers and planners created new ways to approach the issues of flooding, water supply, and sea-level rise.

More of the county's lessons in developing and implementing these strategies are captured in the CIG/ King County 2007 guidebook.

Leveraging Partnerships

In the absence of federal action on climate change, many local and regional governments have learned to stand on their own and also work collaboratively with other cities, counties, and states to address the issue. King County

has participated in multiple cross-sector, learning-based partnerships to prepare for climate change:

- The ICLEI Climate Resilient Communities Program, which "assists local governments in enhancing community resiliency to the impacts and costs associated with projected climate change" through a practical, milestone-based approach;
- The Urban Leaders Adaptation Initiative, a consortium of nine partner cities and counties from across the United States, committed to early adoption of adaptation strategies and exchange of lessons learned; and
- The Carpe Diem project (see page 28), which currently is focused on developing a stakeholder process for water decision-making throughout the western United States.

Even now with a new federal administration committed to addressing climate change, the problems remain—as does the imperative for local

and regional governments to work together to take cohesive action.

Climate change will only continue to exacerbate existing stresses on water and related systems. An early leader in addressing these challenges, King County is just beginning the process of preparing for the consequences.

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