



Regional Challenges

Overview Paper: Climate Change

Regional Open Space Strategy (ROSS)

CLIMATE CHANGE - PROBLEM STATEMENT AND CONNECTION TO OPEN SPACES

What are the primary challenges facing climate mitigation and adaptation in the Central Puget Sound?

Climate change response strategies typically fall into one of two categories – mitigation or adaptation. Mitigation responses aim to reduce the rate and extent of climatic change caused by greenhouse gas emissions, while adaptation responses address the effects of climate change by increasing resilience and/or decreasing vulnerability. Combined, these two approaches create a comprehensive, integrated strategy for addressing climate change.

The Central Puget Sound, consisting of King, Kitsap, Pierce, and Snohomish counties, is a dynamic region featuring iconic species and habitats, thriving communities and built systems, and vibrant industries, including aerospace, information technology, military, maritime, tourism, and recreation. The region faces many challenges. Climatic changes, coupled with land use changes, population growth, resource extraction, habitat degradation, pollution, and rapid development, all have important implications for the ecosystem services on which approximately 3.8 million people rely (U.S. Census, 2013).

The region's natural and built systems are at risk from the effects of a changing climate, including increased average temperatures, altered precipitation patterns, altered hydrology (e.g., decreased snowpack, flow patterns), altered oceanic and atmospheric circulation, sea level rise, and changes in water chemistry and quality (Snover et al. 2005). These changes are having and will continue to have cascading impacts such as increased disturbances (e.g., fire, insect outbreaks), inundation of low-lying coastal areas, erosion, habitat loss, infrastructure damage, heat-related illnesses, increased vector-borne diseases, and stress on water supplies and quality (Snover et al. 2013); adaptation and mitigation actions can reduce the magnitude of these effects.

The primary challenges facing climate mitigation and adaptation in the Central Puget Sound region are related to:

- Understanding the risks posed by a changing climate and identifying appropriate responses;
- Increasing capacity (financial, institutional) to implement and sustain climate responses across jurisdictions and sectors (e.g., public and private);
- Generating and sustaining interest and political/stakeholder will over time, especially in relation to other pressing issues and priorities (e.g., economic problems, balancing the costs of inaction versus no action)

- Alleviating the disproportionate environmental and health effects of climate change on the most vulnerable citizens (i.e., low-income families, elderly, infants);
- Coordinating existing climate response efforts throughout the region;
- Uncertainty of the timing, magnitude, and in some cases direction of change, and knowing what strategies to pursue and within what time frame; and
- Monitoring the effectiveness of climate responses and adjusting activities and investments if needed.

In general, there is great opportunity to meet and overcome these challenges by building and enhancing multi-sectoral and multi-stakeholder approaches, coordinating information and cost sharing, and enhancing monitoring and evaluation to identify climate-driven changes and to test the effectiveness of different climate response strategies.

What is the relationship of open space to climate mitigation and adaptation?

The Central Puget Sound Regional Open Space Strategy (ROSS) defines open space as:

A diverse spectrum of lands across a rural and urban continuum on large and small scales. Traditionally open space may be imagined as wilderness lands or public parks, but it also encompasses resource lands for agricultural and timber production, wetlands and water bodies, local and regional recreational trail systems, as well as urban green spaces like parkways, rain gardens, and green roofs.

Open space is a key mechanism through which to implement climate mitigation and adaptation, and achieve other environmental, social, and economic benefits, by:

- Mitigating the urban heat island effect (e.g., providing shading and cooling, increasing albedo);
- Conserving habitat and facilitating connectivity (e.g., providing permeable migration corridors to facilitate species range shifts, identifying temporary open space areas that may facilitate climate migration);
- Managing surface water and riverine/coastal flood risk (e.g., increasing permeable surface area, allowing for groundwater recharge, reducing rate and volume of runoff);
- Enhancing water quality (e.g., filtering and removing sediment and pollutants);
- Providing space for regionally-sourced food and fiber (e.g., enhancing food security, providing sustainably managed wood and natural materials to replace high fossil fuel consuming materials such as steel and concrete);
- Sequestering and storing carbon in vegetation and soils (e.g., protecting and restoring forests and coastal wetlands, increasing the carbon content of soils);

- Providing space for the siting of alternative energy sources, such as wind, hydro, and solar power; and
- Reducing the need to travel by car by providing greenways for walking and bicycling, thereby decreasing greenhouse gas emissions.

Climate mitigation and adaptation require a portfolio approach – utilizing a broad suite of options to help incorporate the inherent uncertainty associated with rapid climate change (e.g., what impacts will occur where and to what degree?), and allowing planners to spread risks and resources across a range of opportunities. Creating, enhancing, maintaining, and protecting open space in the Central Puget Sound region may be a powerful tool as part of a climate response portfolio and help achieve a number of positive outcomes to augment overall system resilience. If open space is not preserved and prioritized in the region, there are a number of potential consequences, including:

- Loss/reduction of ecosystem services, including nutrient cycling, flood control, food provision, wildlife habitat, carbon sequestration, and recreational opportunities, among others, which may require increased energy and financial expenditure to provide alternatives for otherwise 'free' services;
- Reliance on more expensive, less flexible adaptation options, such as hard engineering solutions along shorelines to reduce flooding risk; and
- More intense and frequent use of open space (including the conversion of open space to other uses) as regional population and development pressures increase over time.

Key considerations for open space with respect to climate mitigation and adaptation:

- The amount, type, and configuration of open space matters. Within more developed landscapes like the Central Puget Sound region, there are and will continue to be conflicts between residential, commercial, and industrial development and open space. As population growth and density intensifies, existing open spaces will be under increasing pressure to convert to other uses. In addition, because 'open space' has such a broad definition, it is important to identify which areas have the greatest capacity to contribute to climate mitigation and adaptation (e.g., healthy, intact forests will contribute more to reducing vulnerability and absorbing carbon than soccer fields) and prioritize their conservation and management. This is true for both public and private lands.
- Identifying and balancing tradeoffs between open space and its relationship to natural and built systems is key. Some of the components of an open space strategy, such as creating and managing urban forests, may come into conflict with climate impacts. For example, fire may become a regular disturbance event in the Puget Lowlands, so planners will need to manage for the risk of fire and the preservation of urban tree canopy in order to limit the likelihood of significant losses of life, property, and habitat.

- Perceptions of open space may influence conflicts and tradeoffs. Defining what open space means in relation to one or more uses is important for stakeholder understanding and support; for example, utilizing parks as temporary flood storage areas could result in some tensions around the expectations of a public park's intended purpose(s).

Why is a regional approach to open space necessary in advancing objectives for climate mitigation and adaptation?

Although climate change is a global problem, the effects on natural and built systems will vary by region. Regional and local approaches are key to achieving a coordinated and collaborative response, and open space planning needs to explicitly consider the implications of climate change. In fact, this sort of climate-informed spatial planning is the first tenet of climate-informed management —protecting adequate and appropriate space for a changing climate (Hansen and Hoffman 2011). Using a regional approach to identifying and managing open space will allow for:

- Broad stakeholder engagement from multiple jurisdictions (e.g., tribal and local governments, citizens, businesses, etc.);
- Cross-sectoral and multiple use considerations (e.g., natural resources/biodiversity, health, economic development, etc.);
- More effective consideration of non-climatic stressors that interact with and/or exacerbate climate impacts by using a holistic, 'watershed approach';
- Enhanced capacity through the sharing of resources (financial, technological), data, and information;
- Reduced likelihood of development of strategies that are in conflict across the landscape; and
- An integrated approach to identify and enhance existing efforts and close gaps in order to preserve and establish high-quality open spaces.

SUMMARY CLOSING STATEMENT

The Central Puget Sound region is already experiencing the effects of rapid climate change, along with a suite of other challenges. Open space is a key tool to minimize, mitigate, and respond to climate change, while simultaneously achieving additional environmental, social, and economic benefits. A regional strategy for open space can complement and enhance existing local climate initiatives, such as King County's 2012 Strategic Climate Action Plan, Snohomish County's Executive Order on Climate Change and Sustainability, Seattle's climate policies and programs (e.g., Urban Forest Stewardship Plan), and cities that are party to the U.S. Mayor's Climate Protection Agreement to reduce local carbon emissions.¹

¹ Signatories from the Central Puget Sound region include the cities of Auburn, Bainbridge Island, Bellevue, Bremerton, Burien, Carnation, Clyde Hill, Edmonds, Everett, Issaquah, Kirkland, Lake Forest Park, Lynnwood, Pacific, Redmond, Renton, Sammamish, Seattle, Shoreline, Snoqualmie, Tacoma, Tukwila, and Yarrow Point.

REFERENCES

Bagstad, K.J., D.J. Semmens, S. Waage, and R. Winthrop. (2013). A comparative assessment of decision-support tools for ecosystem services quantification and valuation. *Ecosystem Services* 5(2013):e27–e39

Gregg, R.M., L.J. Hansen, K.M. Feifel, J.L. Hitt, J.M. Kershner, A. Score, and J.R. Hoffman. (2011). *The State of Marine and Coastal Adaptation in North America: A Synthesis of Emerging Ideas*. EcoAdapt, Bainbridge Island, WA.

Hansen, L.J. and J.R. Hoffman. (2011). *Climate Savvy: Adapting Conservation and Resource Management to a Changing World*. Island Press, Washington DC.

McKenzie, E., A. Rosenthal, J. Bernhardt, E. Girvetz, K. Kovacs, N. Olwero, and J. Toft. (2012). *Developing Scenarios to Assess Ecosystem Service Tradeoffs: Guidance and Case Studies for InVEST Users*. World Wildlife Fund, Washington, DC
<http://www.naturalcapitalproject.org/pubs/ScenariosGuide.pdf>

Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.
<http://www.maweb.org/documents/document.356.aspx.pdf>

Snover, A. K., P. W. Mote, L. Whitely Binder, A.F. Hamlet, and N. J. Mantua. (2005). *Uncertain Future: Climate Change and its Effects on Puget Sound*. A report for the Puget Sound Action Team by the Climate Impacts Group (Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle).

Snover, A.K, G.S. Mauger, L.C. Whitely Binder, M. Krosby, and I. Tohver. (2013). *Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers*. State of Knowledge Report prepared for the Washington State Department of Ecology. Climate Impacts Group, University of Washington, Seattle.

U.S. Census Bureau 2013 Population Estimates by County,
<http://quickfacts.census.gov/qfd/states/53000.html>.

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