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A Context for Viewing Climate Change in the Northwest

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"No challenge poses a greater threat to our future and future generations than a changing climate."
President Obama, August 3, 2015[i]

The Third National Climate Assessment (NCA3),[ii] the most comprehensive source of scientific information to date about U.S. climate change impacts, was released in 2014. VNF Partner TC Richmond served as the vice chair of the federal advisory committee that authored the NCA3 and was a lead author of the water resources chapter. This article provides highlights of the NCA3 focused on the Northwest and proposes a framework for viewing current societal actions and future proposed actions related to climate change.

Highlights of the NCA3

Climate change, once considered an issue for a distant future, has moved firmly into the present. Summers are longer and hotter, and winters are generally shorter and warmer. The hotter, drier weather and earlier snow melt means that wildfires start earlier in the spring, last later into the fall, and burn more acreage.[iii]

In the Northwest, we can already observe changes in the timing of streamflow related to changing snowmelt. According to the NCA3, by 2050, annual snowmelt is projected to shift three to four weeks earlier than the 20th century average, with substantially lower summer flows. The reduced summer flows will present added challenges with summer increases in electric power demand for cooling and additional water consumption by crops and forests. Preservation of in-stream flow targets for fish in the Columbia River basin could require reductions in hydropower production of as much as 20% by the 2080s, with **s**pringtime irrigation diversions expected to continue to increase as earlier snowmelt leads to reduced spring soil moisture.[iv]

Projected heavy winter downpours could increase flood risk in mixed rain-snow and rain-dominant basins, and could also increase stormwater management challenges in urban areas. Region-wide summer temperature increases and, in certain basins, increased river flooding and winter flows and decreased summer flows will threaten many freshwater species, particularly salmon, steelhead, and trout.[v]

Global sea levels have risen about 8 inches since 1880 and according to the NCA3, are projected to rise another 1 to 4 feet by 2100.[vi] In Washington and Oregon, more than 140,000 acres of coastal lands lie within 3.3 feet in elevation of high tide. As sea levels continue to rise, sea water will inundated these areas more frequently. Inundation would harm species such as shorebirds and forage fish (small fish eaten by larger fish, birds, or mammals) and combined with weather variability, put coastal infrastructure and communities at greater risk from coastal storms.[vii]

Scientists who study climate change confirm that these observations are consistent with significant changes in the earth's climatic trends. While they continue to refine projections for the future, these observations unequivocally show that the climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of greenhouse gases. These emissions come mainly from burning coal, oil and gas, with contributions from forest clearing and some agricultural practices.[viii]

While some of these changes in climate can result in short-term benefits, such as a longer growing season in some regions, most prove detrimental, largely because the U.S. economy and society was

designed for the climate that the country had, not the rapidly changing climate it now has and can expect in the future.

Organizing Framework

As communities across the nation find themselves coping with evolving climate change impacts, federal, state, local decision-makers in both the public and private sectors must increasingly confront proposed legislation, plans, studies, and actions intended to address either the causes or the impacts of climate change. The following categories provide an organizing framework for viewing and tracking these numerous activities.

1. **Assessments.** Assessments of the effects of climate change, such as the NCA3 and the upcoming NCA4, the United Nations Intergovernmental Panel on Climate Change (IPCC),[ix] the Washington State Integrated Climate Change Response Strategy,[x] and EPA's Climate Impacts of the Northwest,[xi] are intended to inform decisions by synthesizing the state of knowledge about physical climate science and impacts.

2. **Mitigation.** Mitigation refers to actions that reduce the human contribution to the greenhouse gas emissions. Mitigation actions include lowering emissions of greenhouse gases ("GHG") like carbon dioxide (CO_2) and methane, and particles like black carbon (soot) that have a warming effect. Primary mitigation actions that the reader may read or hear about include:

   - **Efforts to Limit GHG Emissions through International Treaties.** The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty negotiated in Rio de Janeiro in 1992. The parties to the UNFCC have met annually from 1995 in Conferences of the Parties (COP) to assess progress in dealing with climate change. In 1997, the Kyoto Protocol established legally binding obligations for developed countries to reduce their GHG emissions. The 2010 Cancun agreements state that future global warming should be limited to below 2.0°C (3.6°F) relative to the pre-industrial level. The next meeting is in Paris in December 2015.

   - **Efforts to Limit GHG Emissions through Regulation**. On August 3, 2015 EPA issued the Clean Power Plan Final Rule, the final Carbon Pollution Standards for new, modified, and reconstructed power plants, and a proposed Federal Plan and model rule to assist states in implementing the Clean Power Plan.[xii] In Washington State, on July 28, 2015, Gov. Inslee directed Ecology to step up enforcement of state pollution laws and develop a regulatory cap on carbon emissions.[xiii]

   - **Efforts to Reduce Emissions through Market Forces.**

     - **Emissions trading, called "cap and trade,"** works by setting a quantitative limit on the emissions produced by emitters and allowing carbon pollution market program for emissions. HB 1314, Washington State Legislative session 2015-16 would have required, if enacted, the department of ecology to implement a carbon pollution market program.[xiv]

     - **Carbon taxes** are levied on the carbon content of fuels. In Washington State, under Initiative-732, if it makes it onto the ballot, would call for other tax cuts by charging a $25-per-ton tax on fossil fuels that add carbon dioxide to the atmosphere.[xv]

   - **Voluntary reductions**. Many local agencies and institutions are committing to voluntary actions to mitigate GHG emissions. For example, college and university presidents have committed to setting target dates and interim milestones for becoming climate neutral and to take immediate steps to reduce greenhouse gas emissions.[xvi] These institutions often depend on cost savings gained through energy efficiency retrofits to fund these steps.

- **Carbon capture and sequestration.** Carbon capture and sequestration (CCS) is a set of technologies that reduces CO_2 emissions from new and existing coal- and gas-fired power plants and large industrial sources through the transport of the captured and compressed CO_2 and underground injection and geologic sequestration (also referred to as storage) of the CO_2 into deep underground rock formations.[xvii]

3. **Adaptation and Increasing Resilience.** Adaptation efforts are intended to reduce the vulnerability of society to climate change impacts. Resilience refers to the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.

   - The NCA3 explains adaptation and resilience through numerous examples: building codes and landscaping ordinances will likely need to be updated not only for energy efficiency but also to conserve water supplies, protect against disease vectors, reduce susceptibility to heat stress, and improve protection against extreme events.[xviii]

   - Efforts to prepare for climate change are underway in the Northwest. Many local and regional groups are already taking actions to adapt to projected declines in snowpack, streamflow changes, and sea level rise. The following is a sampling of adaptive actions, designed to increase the resilience of a community:

     - Municipalities have developed climate change action plans in an effort to study and prepare for impact on their cities and counties. [xix]

     - Seattle Public Utilities (SPU) has developed tools to help visualize and evaluate impacts of sea-level rise scenarios.[xx] Water levels associated with storm surges and "king tides" (annually occurring extreme events) today will eventually become monthly, even daily events.

     - Seattle's RainWatch program uses an early warning precipitation forecasting tool to help inform decisions about issues such as drainage operations.[xxi]

     - The City of Portland, Oregon updated its code to require that, with limited exceptions, stormwater generated from private property be managed on private property, in privately maintained facilities. [xxii]

     - The Swinomish Climate Adaptation Action Plan proposes strategies to address risks associated with forest fires and to inundation of coastal resources. Strategies included improvements to forest management policies and practices and a variety of options for protecting costal structures or requiring development to occur farther away from the coast.[xxiii]

4. ***Environmental Evaluation of Proposed Actions*** Like the National Environmental Policy Act (NEPA) on the federal level[xxiv], the Washington State Environmental Policy Act (SEPA) directs local and state agencies to identify and evaluate the environmental impacts of proposals before making a decision whether or not to go forward with or approve the action. SEPA is intended to result in informed decision making and better environmental outcomes. *The Department of Ecology's* guidance on Greenhouse Gas Emissions and SEPA is intended to guide Ecology staff to determine when project proponents should disclose greenhouse gas emissions, what types of emissions that should be disclosed, and the level of detail necessary.[xxv] Both King County and the City of Seattle also have adopted guidance on consideration of GHG emissions under SEPA.[xxvi]

The SEPA guidance straddles the categories of Mitigation and Adaptation. In addition to requiring consideration of a proposal's GHG Emissions and potential mitigation measures, the Guidance requires consideration of the vulnerability of the proposed action to the impacts of climate change and potential adaption measures.

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Conclusion

Decisions will be made in the near future to simultaneously limit GHG Emissions (Mitigation) and to prepare for ongoing and inevitable impacts of climate change (Adaptation). Climate Change Assessments and environmental processes such as NEPA and SEPA will inform the process and choices. The organizing framework presented above will become filled with examples of decisions made through consideration of the risks, consequences, and economics of climate change.

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[i] President Obama's speech of August 3, 2015 https://www.whitehouse.gov/climate-change

[ii] Melillo, J.M., Terese (T.C.) Richmond and G.W. Yohe, Eds., *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program, 113-129, doi:10.7930/J0BG2KWD. (http://nca2014.globalchange.gov/) The report is web-based so that source studies and interactive graphics are easily accessed. For information on how the NCA is being sustained or to become involved, see U.S. Global Change Research Program at www.globalchange.gov.

[iii] Melillo at 2.

[iv] Mote, P, A. Snover, S. Capalbo, S. Eigenbrode, P. Glick, J. Littell, R Raymondi, and S. Reeder 2014: Ch.21 "Northwest," *Climate Change Impacts in the United States: The Third National Climate Assessment*,489-491. (http://nca2014.globalchange.gov/system/files_force/downloads/low/NCA3_Full_Report_21_Northwest_LowRes.pdf?download=1)

[v] Mote at 491

[vi] Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. vose, M. Wehner, and J. Willis, 2014 "Our Changing Climate" *Climate Change Impacts in the United States: The Third National Climate Assessment, 45 http://nca2014.globalchange.gov/system/files_force/downloads/low/NCA3_Full_Report_02_Our_Changing_Climate_LowRes.pdf?download=1*

[vii] Mote at 492-493.

[viii] See Note 2 at 2, and Walsh at 22-25.

[ix] http://ipcc.ch/

[x] Washington State Integrated Climate Change Response Strategy http://www.ecy.wa.gov/climatechange/ipa_responsestrategy.htm

[xi] http://www.epa.gov/climatechange/impacts-adaptation/northwest.html

[xii] http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants#rule-summary

[xiii] http://www.ecy.wa.gov/climatechange/

[xiv] http://app.leg.wa.gov/billinfo/summary.aspx?year=2015&bill=1314

[xv] http://carbonwa.org/

[xvi] http://www.presidentsclimatecommitment.org/

[xvii] http://www.epa.gov/climatechange/ccs/

[xviii] Bierbaum, R., A. Lee, J. Smith, M. Blair, L. M. Carter, F. S. Chapin, III, P. Fleming, S. Ruffo, S. McNeeley, M. Stults, L. Verduzco, and E. Seyller, 2014: Ch. 28: Adaptation. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 670-706. doi:10.7930/J07H1GGT.

[xix] http://mrsc.org/Home/Explore-Topics/Environment/Special-Topics/Climate-Change.aspx; http://www.seattle.gov/Documents/Departments/OSE/2013_CAP_20130612.pdf

[xx] http://www.seattle.gov/util/EnvironmentConservation/ClimateChangeProgram/ProjectedChanges/Sea-LevelRiseMap/index.htm

[xxi] http://www.atmos.washington.edu/SPU/

[xxii] http://www.portlandoregon.gov/bes/article/474043

[xxiii] http://www.swinomish-nsn.gov/climate_change/Docs/SITC_CC_AdaptationActionPlan_complete.pdf

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[xxiv] On December 18, 2014, CEQ released revised draft guidance for public comment that describes how Federal departments and agencies should consider the effects of greenhouse gas emissions and climate change in their National Environmental Policy Act reviews. http://energy.gov/nepa/downloads/revised-draft-guidance-consideration-greenhouse-gas-emissions-and-climate-change-nepa

[xxv] http://www.ecy.wa.gov/climatechange/sepa.htm

[xxvi] http://www.kingcounty.gov/operations/policies/executive/utilitiesaeo/put7101aeo.aspx
http://www.seattle.gov/DPD/publications/CAM/cam207.pdf