Agriculture Breakout Session

Projections for the next century suggest climate change will have important impacts on Washington State's economy and natural resources. In order to both control the costs and maximize the benefits of a changing climate, we must begin preparing now. To stimulate discussion in this session, we summarize projected climate impacts from the conference white paper, enumerate previously suggested adaptation strategies, and provide case studies to illustrate planning techniques, vulnerabilities, and/or opportunities.

Prepared by Jennifer Kay, Joe Casola, Amy Snover, and the Climate Impacts Group (CIG) at the University of Washington for King County's October 27, 2005 Climate Change Conference.

Summary of projected climate change impacts on agriculture

Impacts will vary throughout the region depending on the crops being produced and water availability. Projected increases in atmospheric temperature and carbon dioxide concentrations (CO_2) could increase yields for some crops in some places. However, earlier peak flow in rivers and decreasing soil moisture could reduce the availability of irrigation water. In some areas, projected changes could result in the need for more irrigation water to support the same acreage. In addition, climate change may increase the prevalence of some agricultural pests and diseases.

Adaptation discussion starters

Guiding principles for planning:

1. Recognize that the past may no longer be a reliable guide to the future.
2. Integrate climate change projections into all planning processes.
3. Monitor regional climate and resources for ongoing change.
4. Expect surprises. Design policies and management practices to be flexible to changing conditions.

Credit: Benton County, WA

Artists Rendition of Black Rock Reservoir

Could these strategies help Washington prepare for change?

Manage agricultural industry for a changing climate. For example: promote greater use of plants that benefit from a longer growing season and enhanced atmospheric CO_2; consider double cropping where longer growing seasons allow; promote greater use of heat-resistant, pest-resistant, and disease-resistant crops.

Promote water conservation. For example: install high efficiency delivery systems (sprinkler systems or drip irrigation systems); change to less water intensive crop species.

Use market forces to distribute water. Water banking and water markets can be used to trade water rights between users and distribute impacts during periods of water shortage.

Diversify and expand water infrastructure. For example: diversify sources of water supply; increase usable storage (including surface water storage, off-stream storage, and aquifer storage and recovery).

Be aware of how climate change affects global agriculture. WA commodity pricing is sensitive to the world agricultural market and global agricultural production.

Sources: 1) Hamlet, A. F., Preparing for Climate Change in the Pacific Northwest: A Discussion of Water Resources Adaptation Pathways. Preparatory White Paper for Climate and Water Policy Meeting, Skamania, Washington, July 2001. 2) Snover, A., Miles, E. and B. Henry, OSTP/USGCRP Regional Workshop of the Impacts of Global Climate Change on the Pacific Northwest Annex D, NOAA Climate and Global Change Program, Special Report Number 11, 1997.

Vulnerability case study – Yakima River Basin (YRB): Agriculture in the YRB produces crops worth ~ $1 billion annually, mostly from perennial crops. Approximately half of YRB water users have junior water rights, including many of the perennial crop growers. In the low water years 1994 and 2001, junior water rights holders received only 37% of their water allocation, resulting in economic losses of up to $140 million per year. Climate change in the YRB, a snow-melt driven basin, could cause peak stream flows to arrive earlier and reduce summer stream flow. One study[2] found peak flows could occur in April instead of June by the end of the century. Another study[3] projects global warming would decrease the amount of water available for irrigation in the YRB by an average of 20 to 40% in a typical year by 2050. Although proposals for building additional storage on the YRB have been identified, they are expensive. For example, the proposed Black Rock Reservoir has an estimated cost of $3.5-4 billion.

[2]Salathe, Eric. P. Downscaling simulations of future global climate with application to hydrologic modeling, International Journal of Climatology, 25, 419-436, 2003.

[3] Scott, M.J., L.W. Vail, C.O. Stöckle, A. Kemanian. 2004. "Climate Change and Adaptation in Irrigated Agriculture-A Case Study of the Yakima River." In Proceedings of the UCOWR/NIWR Annual Conference, July 20-22, 2004, Portland, OR. PNWD-SA-6448. Pacific Northwest National Laboratory, Richland, WA.

Vulnerability case study - Water transfer barriers: On the Snake River, the state of Idaho operates a water bank and several water districts run rental pools for privately held storage in Bureau of Reclamation reservoirs. On the Klamath River in Oregon, there are no established water banks or rental pools and proof of no third party injury is required for water use transfer. While Idaho policies encourage the transfer of water rights, Oregon law tends to discourage these transfers. The reasons for the development and flexibility of differing water laws are complex. Regardless, as illustrated by the 2001 drought on the Klamath, vulnerability to climate is higher when water transfers are limited.[1]

[1]Slaughter, R. A., Water allocation under stress: Institutional comparison of the Snake and the Klamath Rivers, *Journal of the American Water Resources Association (in review).*

Prepared for King County Conference on Climate Change, October 27, 2005. Materials available at: http://www.cses.washington.edu/cig/outreach/workshops/kc2005.shtml