Pacific Northwest National Laboratory

ENVIRONMENTAL SUSTAINABILITY SUCCESS STORIES

PNNL Seeks Solutions to the Growing Demands and Diminishing Resources of the Northwest's Water Supply

PNNL and regional partners' water impact study addresses how to maintain the delicate balance of the Northwest's water provisions.

"By providing complex objective data in a scientific manner, stakeholders can use the information to make more informed decisions related to conflicting uses of water resources,"

Lance Vail,
PNNL Hydrologist

WATER, WATER EVERYWHERE, BUT WILL THERE BE A DROP TO DRINK?

The future quantity and quality of freshwater resources in the Pacific Northwest is difficult to assess, owing to complex and rapidly changing issues surrounding water supply and use. Competing demands on water resources stemming from growing population demands and agricultural needs have made it increasingly more difficult to balance the supply with the demand. Pacific Northwest National Laboratory is taking several proactive measures to better understand the complexities surrounding the problems and develop viable solutions for humans, the environment and economy.

Within the Northwest, the availability of water is strongly dominated by seasonal release and storage from mountain snowpacks. Present scientific models show the effects of climate change on nature's "catch and release" system. This can result in significantly reduced snowpack, wetter winters, drier summers and changes to river temperatures and flows that are tough on migrating salmon.

Legislative programs, such as the Clean Water Act and Endangered Species Act, dictate how stakeholders can impact water issues. This coupled with climate change effects and forecasted water demands leaves the economy in the middle of a tug-of-war competition.

TAPPED WATER RESOURCES STRAIN ENERGY RESOURCES, AGRICULTURE AND SALMON

The interdependency of water and energy lies in the heart of major regional environmental and economic problems. Citizens and industry are seeking more water to maintain their livelihoods. Hydropower—which delivers the majority of energy produced in the Northwest—adds an additional demand. Growing population generates an increased demand for agricultural products. This includes pumping more groundwater to meet irrigation requirements.

Salmon are an iconic element of Northwest's cultural and ecological landscape. Protecting salmon runs requires the careful maintenance of aquatic habitats, which includes streamflow volume, temperature and seasonal timing that matches the life cycle of the species.

PNNL TURNS ON FAUCET FOR REGIONAL WATER STRATEGY

To solve this growing predicament, Pacific Northwest National Laboratory is developing an integrated regional water, energy and sustainable ecosystem research agenda, which will better inform stakeholders and regional decision makers so they can make better water allocation decisions.

This approach embraces the Laboratory's signature capabilities in integrated earth and energy systems modeling, water treatment technologies and scientific decision support systems. Additionally, the research will gain insight to the spatial and temporal availability of water and aim to achieve a regional water balance. The successful analysis of this dilemma will help scientists and stakeholders alike, to understand the interdependence of energy and water for alternative energy source development and ways to reduce regional climate change impacts.

PARTNERS FOR PROTECTING FUTURE WATER SUPPLIES

The Pacific Northwest Regional Collaboratory, PNNL-led, NASA-funded collaboration conducted research to couple satellite images with watershed forecasting models as predictive analytics tools. The results of this study have provided researchers a better understanding regarding water release from reservoirs for hydropower, salmon, irrigation and municipal use.

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The sustainability of the Northwest's future water supplies comes down to nature versus nurture. In the wake of climate change, nature will dictate how future supplies of water will be distributed, but it will be our job to carefully nurture the water we get using cutting-edge research in water resource management. PNNL is working to establish a solid foundation for the sustainable use of this limited resource. The Laboratory's expertise in turning complex challenges into innovative solutions will be essential to solving this regional dilemma.

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