'Watering the forest for the trees' emerging as priority for forest management

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A new analysis led by the U.S. Forest Service's Pacific Northwest Research Station encourages resource managers to consider a broadened view of forests as consumers of water.

A shift in thinking toward reducing the risk of water stress to vegetation can help forests maintain their resilience and health in a changing climate, according to a paper published online in the journal *Frontiers in Ecology and the Environment.*

"Our work emphasizes how forests primarily need and consume water, and so managing forest health requires thinking about how much water is available for forests, how forests use that water, and how management strategies can mitigate increasing drought stress," said station research hydrologist Gordon Grant, who led the analysis.

More than half of the U.S. water supply comes from forest lands where most precipitation falls, filters through soil, and, ultimately, becomes streamflow. Current research demonstrates that many of the growing threats facing forests, like wildfire and insect outbreaks, are linked to water stress from combinations of drought and a warming climate. Climate change is projected to increase forest water stress in many areas.

Along with co-authors Christina Tague, from the University of California, Santa Barbara; and Craig Allen, from the U.S. Geological Survey, Grant reviewed a range of studies—mostly from the western U.S. and in drought-stressed forests—to identify management strategies

that may retain water for forests, such as thinning and soil water conservation.

Then, to demonstrate the potential effects of water-enhancing strategies, the researchers used a model of vegetation, water, and carbon cycling on a forest site in New Mexico's Bandelier National Monument, which recently experienced a multi-year drought and associated tree mortality. Modeling revealed that substantial ponderosa pine mortality during the 2002-2003 drought might have been prevented by small increases in plant-available water via forest thinning, mulching to reduce evaporation from the soil, or irrigation.

"Many of the strategies for addressing increased drought stress are consistent with established forest management objectives and practices, but increasing water availability to forests through the use of specifically designed management activities has not been an explicit goal," Grant said. "Ultimately, these strategies would need to be tailored to particular management objectives and landscapes."

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