

UNDERSTANDING AND MANAGING THE WATER USE OF PLANTED FORESTS IN A CHANGING ENVIRONMENT

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Forest productivity will only become more important in the future, not just for carbon sequestration and renewable energy but for wood products and economic security for an increasing population. However, the threat of increasing drought and resource scarcity means a need for more explicit characterization of the water use of planted forests and the understanding of productivity trade-offs necessary to reduce water use. This requires prediction of species-specific water use under different soil, topographic, climate, and planting conditions and a mechanism to account for trade-offs in ecosystem services that cannot always be directly compared. High quality site-specific research has been conducted and synthesized globally to illustrate general principles: in an energy limited setting, trees use more water than grass in a ratio that increases with water availability. Plant physiology studies have given an understanding of water use (evapotranspiration (ET)) response to soil and atmospheric conditions, somewhat extractable to various tree species. But knowledge bridging the scale from landscape to plant for a given site is still limited. Several strategies for accounting for and reducing the water use of planted forests have been suggested, including fees for additional water consumption over a baseline and site-specific management techniques such as thinning, understory suppression, and site layout in the landscape and within the management tract; however, there is limited research linking these to operational forestry. This presentation uses ET data from silvicultural and biofuel feedstock research and industrial ownership patterns in the southeastern US to evaluate proposed water management strategies and estimate water yield, productivity, and economic outcomes. New ET assessment methods will allow not only scientists, but planners and forest managers the opportunity to quantify the water use of plantation forests. Management techniques, however, must be developed along with the data. We must not just use an objective function that maximizes runoff and favors low productivity settings, but consider the effect of water for ecological requirements and forest productivity and develop workable forest management strategies that optimize benefits.

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