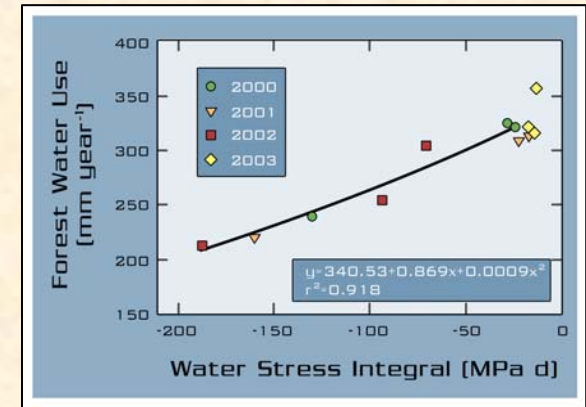
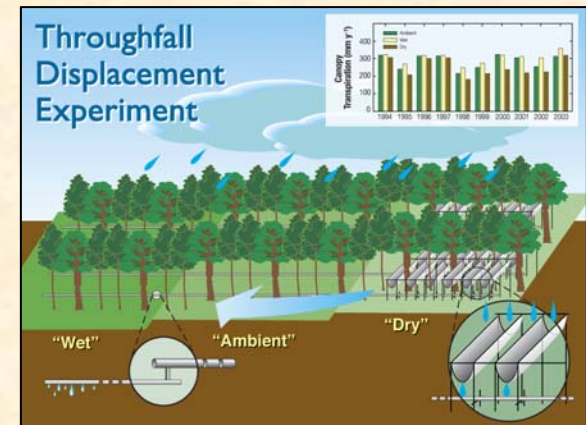


Unique field experiment emphasizes the sensitivity of forest water use to drought

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- ↪ Scientists at the ORNL Throughfall Displacement Experiment have been examining the sensitivity of deciduous forests to increases and decreases in precipitation since 1993.
- ↪ Seasonal water use measured between 21000 and 2003 was strongly correlated with the water stress integral, a cumulative index of drought severity and duration.
- ↪ Although droughts in deciduous forests tend to be limited in duration and most often occur late in the growing season, soil water deficits of the magnitude observed in this study have the potential to impact local and regional forest water budgets.



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Water is a fundamental component of the natural ecosystems upon which society depends for the delivery of vital goods and services. Water availability, although not currently a major problem in the eastern United States, could become an issue if and when changes in regional precipitation are realized. Scientists working at the Throughfall Displacement Experiment have been examining the sensitivity of deciduous forests to increases and decreases in precipitation since 1993. Sensors have been used to measure water flow in trees and scientists have related seasonal patterns of soil water potential and treatment-specific differences in forest water use to precipitation amount. Across four years in which water use was measured, there was a strong correlation between seasonal water use and the water stress integral, a cumulative index of drought severity and duration. These differences were explained by the primary effect of soil water availability on leaf and whole-plant physiology, with surprisingly little influence from drought-induced changes in canopy development, leaf area production, leaf senescence, or changes in vertical root distribution among treatment plots. Seedlings and saplings, due largely to the shallow placement of roots within the soil profile, were more sensitive to soil water availability than mature trees. Scientists conclude that while droughts in deciduous forests tend to occur late in the growing season, soil water deficits of the magnitude observed in this study have the potential to impact patterns of forest succession and local and regional forest water budgets.

Wullschleger, S.D. and P.J. Hanson. 2006. Sensitivity of canopy transpiration to altered precipitation in an upland oak forest: Evidence from a long-term field manipulation study. *Global Change Biology* 12: 97-109.