

Climate change could shift Southeast's drinking water supply to higher ground

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(Phys.org) —Researchers studying how Southeastern forests respond to drought report that stressed watersheds at lower elevations will be less able to provide high-quality drinking water as the climate continues to change.

"Lower elevation forests are becoming more stressed (lacking water) and this may shift high- quality freshwater sources to remaining high-elevation forest sites," said Lawrence E. Band, director of the Institute for the Environment and Voit-Gilmore Distinguished Professor of Geography at the University of North Carolina at Chapel Hill. Band is a hydrologist who models freshwater flows from watersheds. "If we become more dependent on upper elevation catchments for our water supplies, they become much more valuable."

The study, published recently in *Global Change Biology*, showed that forests at low elevations in the Southern Appalachian Mountains respond differently to drought than those at higher elevations. Lower precipitation and higher temperatures as a results of climate change make low-elevation forests more vulnerable to frequent drought than those at [higher elevations](#), conclude the researchers from UNC, the U.S. Forest Service, the University of Minnesota and the University of Georgia .

The findings came from studying patterns in leaf-fall data at various elevations gathered from satellite observations of the Forest Service's Coweeta Hydrologic Laboratory, a Long-Term Ecological Research site

in the Southern Appalachians near the North Carolina-Georgia border. The study site has a highly biodiverse ecosystem and a broad temperature range that creates vastly different climate zones. Abundant rainfall, well-filtered by its dense forests, makes the site a major source of high-quality fresh water for Southeastern cities including Asheville; Knoxville, Tenn.; and Columbia, S.C.

The team of scientists is led by Taehee Hwang, a UNC Institute for the Environment post-doctoral researcher, and consists of Band; Conghe Song, UNC associate professor of geography; Forest Service project leaders Chelcy Miniati and Jim Vose; Paul Bolstad, University of Minnesota professor of ecology; and Coweeta site manager Jason Love.

Past studies have shown that the timing of spring leaf-greening varies with elevation, temperature and day length. This study indicates that timing of autumn leaf coloring (and fall) is not consistent with elevation change. "This difference in leaf-fall with elevation change shows [forest](#) growing season length is not just affected by temperature, and that lower elevation forests are more vulnerable to change in water availability," Hwang explains.

Miniati, a plant ecophysiologicalist, says that the results also have implications for the services that these ecosystems provide. "Water quality and quantity are two ecosystem services that are derived from forests. It is important to understand what affects these services, especially in the face of [climate change](#) and increasing U.S. population," she said.

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Provided by University of North Carolina at Chapel Hill

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