# Drought-induced tree mortality accelerating in forests

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## Los Alamos' paper published in *Nature Climate Change*

LOS ALAMOS, N.M., May 19, 2015—Researchers at Los Alamos National Laboratory have found that drought and heat-induced tree mortality is accelerating in many forest biomes as a consequence of a warming climate in their paper "Darcy's law predicts widespread forest mortality under climate warming," published in the journal Nature Climate Change.

"The warming climate is creating a threat to global forests unlike any in recorded history," said Nathan McDowell, of Los Alamos' Earth and Environmental Sciences

Division. “Forests store the majority of terrestrial carbon and their loss may have significant and sustained impacts on the global carbon cycle.”

To predict characteristics of plants that will survive and die during drought in future warmer climates, scientists used Darcy’s Law, a core principle of vascular plant physiology. Darcy’s Law is an equation that describes the flow of liquid through a porous medium, which is how trees take in water.

They found that tall plants with low hydraulic conductance and high leaf area are most likely to die from future drought stress. This means that tall trees in old forests are at the greatest risk, which could negatively affect the earth’s carbon storage.

“This work is another line of evidence indicating that historic forests in general, and irreplaceable, ancient trees may be increasingly at risk from hotter droughts if global climate warms as projected,” said Craig Allen, of the United States Geological Survey and coauthor of the paper.

McDowell's and Allen’s research indicates today’s forests should be replaced by shorter and more xeric plants, which need less water, due to future droughts and associated wildfires, and pest attacks.

The application of Darcy’s Law provides a simple and robust framework for informing forest management interventions needed to promote the survival of current forests.

“Today’s forests will see continued increases in mortality rates that will result in substantial reorganization of their structure and carbon storage,” McDowell said.