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Nearly all US forests threatened by drought, climate change

Risks include wildfires, major diebacks in the west; emerging risks in the east

Date: February 22, 2016

Source: Duke University

Summary: Forests across the United States are feeling the heat from increasing drought and climate change, according to a study by scientists from 14 research institutions. While the effects have been most pronounced in the West, the team found virtually all US forests are now experiencing some degree of change and are vulnerable to future declines.

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FULL STORY



This is a picture of drought-induced dieback of ponderosa pines in California's Tehachapi Mountains as seen in June 2014.
Credit: Ian McCullough, Univ. of California Santa Barbara

Forests nationwide are feeling the heat from increasing drought and climate change, according to a new study by scientists from 14 research institutions.

"Over the last two decades, warming temperatures and variable precipitation have increased the severity of forest droughts across much of the continental United States," said James S. Clark, lead author of the study and Nicholas Professor of Environmental Science at Duke University.

"While the effects have been most pronounced in the West, our analysis shows virtually all U.S. forests are now experiencing change and are vulnerable to future declines," he said. "Given the high degree of uncertainty in our understanding of how forest species and stands adapt to rapid change, it's going to be difficult to anticipate the type of forests that will be here in 20 to 40 years."

Drought-induced forest diebacks, bark beetle infestations and wildfires are already occurring on large scales across the West, and many models predict droughts are likely to become more severe, frequent and prolonged across much of the United States.

There is also mounting evidence that climate is changing faster than tree populations can respond by migrating to new regions. Clark said that as conditions become drier and warmer, many tree populations, especially those in Eastern forests, may not be able to expand rapidly enough into new, more favorable habitats through seed dispersal or other natural means.

Clark and his colleagues published their paper in the Early View online edition of the peer-reviewed journal *Global Change Biology*.

The paper synthesizes findings from hundreds of studies and serves as a summary overview of a first report released earlier this month by the U.S. Department of Agriculture and the U.S. Global Change Research Program as part of the U.S. Forest Service's National Assessment on the Impacts of Drought on Forests and Rangelands.

"Prolonged drought affects wildfire risks, species distribution, forest biodiversity and productivity, and virtually all goods and services provided by forests, so there is a pressing need to know what is happening now, what might happen in the future and how we can manage for these changes," Clark said.

The new report addresses this need by providing a comprehensive overview of current and projected future drought impacts on forests nationwide, how they vary by region, and which management practices could help partially mitigate problems. The paper also identifies critical knowledge gaps that hinder scientists' ability to predict the pace and extent of future effects.

"We currently have a pretty good handle on predicting the impacts of climate change and drought on individual trees," Clark explained. "Ecologists have identified many of the important differences between species that explain how they respond differently to drought. But there's still uncertainty about what might happen at the species-wide or stand-wide levels, particularly in Eastern forests. These are the scales where we really need reliable predictions so forest managers can take steps now to help reduce large-scale problems."

Without a better understanding of the complex interactions between trees, species and environmental conditions, even the most sophisticated current models can provide only limited guidance on climate effects, he explained. "That's where we need to focus our efforts now."

Story Source:

The above post is reprinted from materials provided by **Duke University**.
Note: Materials may be edited for content and length.

Journal Reference:

1. James S. Clark, Louis Iverson, Christopher W. Woodall, Craig D. Allen, David M. Bell, Don C. Bragg, Anthony W. D'Amato, Frank W. Davis, Michelle H. Hersch, Ines Ibanez, Stephen T. Jackson, Stephen Matthews, Neil Pederson, Matthew Peters, Mark W. Schwartz, Kristen M. Waring, Niklaus E. Zimmermann. **The impacts of increasing drought on forest dynamics, structure, and biodiversity in the United States.** *Global Change Biology*, 2016; DOI: 10.1111/gcb.13160

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