

Trees dying in the West at record rate

[David Perlman, Chronicle Science Editor](#)

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(01-22) 16:31 PST SAN FRANCISCO -- Trees are dying faster than ever in the old-growth forests of California and the mountains of the West, a phenomenon scientists say is linked to rising regional temperatures and the destructive forces of early snowmelt, drought, forest fires and deadly insect infestations brought on by global warming.

Over the past 17 years in some regions - and 25 to 37 years in others - the death rates of mature trees have doubled, the scientists said, raising concerns that the problem goes well beyond the death of trees alone.

"The ultimate implications for our forests and the environment are huge," said Mark Harmon of Oregon State University, a member of the team that helped write a report that appears today in the journal *Science*.

As the forests shrink, their capacity to absorb carbon dioxide from industrial lowlands diminishes, which means that more greenhouse gases would be added to the atmosphere, resulting in the acceleration of global warming, the researchers said.

While no trees are immune from the accelerating death rates, the victims are primarily the conifers whose abundance throughout California's Sierra Nevada makes the mountain forests famed throughout the world. Varied species of pines, firs and hemlocks are most at risk, the scientists said.

Leading forest ecologists involved

The research involved nearly a dozen leading forest ecologists who studied mortality rates of individual trees in 76 plots of unmanaged forests, situated primarily in California, Oregon, Washington and southwestern British Columbia. They also looked at trees in a few interior states: Idaho, Montana, Utah and Arizona.

The increase in death rates for the trees has been "pervasive," said Phillip J. van Mantgem, a forest expert with the U.S. Geological Survey's Western Ecological Research Center in Arcata (Humboldt County) and a leader of the research team.

"If current trends continue, our forests will eventually become sparser, the ages of our trees will decrease by half, and they will be able to sequester less carbon - further

speeding up the pace of global warming," van Mantgem said during a teleconference sponsored by the American Association for the Advancement of Science.

The most likely cause of the increasing deaths, van Mantgem said, is the widespread rise in average temperatures throughout the study regions over the past three decades - an increase of a full degree Fahrenheit and an amount consistent with the global warming measurements and models reported by the world's experts of the Intergovernmental Panel on Climate Change.

Death in Yosemite, Sequoia

Van Mantgem led his own California team tracking the fates of 20,000 trees in Yosemite and Sequoia National Parks, and found that their death rates had doubled in 25 years. Colleagues did a similar job for the study of old-growth forests throughout the Pacific Northwest. In those forests the deaths were particularly striking among younger and smaller trees, although all ages and sizes were among the dead.

A powerful influence on the rising tree mortality rates has been increasingly frequent droughts in the High Sierra, where more rain instead of snow has been recorded in recent years and the snowpack has melted earlier, said Nathan L. Stevenson of the USGS forest ecology center, the co-leader of the research group.

"The droughts are lasting longer, and they're helping all those things that like to eat trees," Stevenson said, referring, of course, to all the hungry beetles and their ilk.

The scientists also found that wherever the death rate of the trees has been accelerating, fewer young trees have been replacing them. "Recruitment" is the forest ecologists' term for that succession, and slower recruitment marks another uneasy portent for the future, they warned.

"It's like a human population," Stevenson said. "If deaths among older people were doubling fast and fewer young ones were replacing them - well, if you saw this going on in your own family, it's high time you'd be concerned."

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