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Death rate of West's old-growth forests doubled

Experts suspect warming, fear 'prelude to bigger, more abrupt changes'

Jen Chase / Colorado State Forest Service via AP

Pine trees killed by beetles are shown in their rusty red color near Grandby, Colo., west of Denver. A new study found forest mortality has doubled and tied warming temperatures to drought as well as beetle infestations.

msnbc.com
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The mortality rate of old-growth forests across the West has more than doubled in recent decades, and those forests are now losing more trees than they gain, according to a new study that identified the most probable cause as warming temperatures.

The trend is happening at every elevation, in trees of different sizes and of various species, researchers with the U.S. Geological Survey and universities reported in the peer-reviewed journal Science.

"Our long-term monitoring shows that tree mortality has been climbing, while the establishment of replacement trees has not," USGS scientist Phil van Mantgem, a co-leader of the research team, said in a statement.

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Tree mortality doubled in just 17 years in the Pacific Northwest and 25 years in California. Mortality rates in states farther inland took 29 years to double.

The authors ruled out several factors — including air pollution, crowding and fire suppression impacts — as being significant drivers since the trend has been consistent in all areas and among all age groups studied.

Moreover, "because mortality increased in small trees, the overall increase in mortality rates cannot be attributed solely to aging of large trees," the researchers wrote in Science.

In contrast, increasing regional temperature during that time was correlated with tree deaths.

"Regional warming and consequent increases in water deficits are likely contributors to the increases in tree mortality rates," the researchers said.

Van Mantgem noted that "average temperature in the West rose by more than 1 degree F over the last few decades. While this may not sound like much, it has been enough to reduce winter snowpack, cause earlier snowmelt, and lengthen the summer drought."

That warming also favors insects like the mountain pine beetle, which has devoured forests in recent years.

'Effects compound over time'

The long-term impact could mean thinner forests, smaller trees and changed habitat for animals.

"Tree death rates are like interest on a bank account — the effects compound over time," said USGS scientist and research co-leader Nate Stephenson. "A doubling of death rates eventually could reduce average tree age in a forest by half, thus reducing average tree size."

"That may be our biggest concern," said Stephenson. "Is the trend we're seeing a prelude to bigger, more abrupt changes to our forests?"

Jerry Franklin, a University of Washington researcher on the team, noted that forests can probably maintain functional capacity as long as they "don't go over a tipping point."

Tracking vital signs like mortality are vital to figuring out where that tipping point is, he added, but no one is doing that. "We need to be doing a lot more," he said.

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The researchers also noted that the high mortality rate could turn Western forests from carbon sinks, where they absorb the greenhouse gas, into carbon sources, emitting carbon dioxide into the atmosphere as they die — further speeding up the pace of global warming.

"An alarming implication of increased mortality rates is that the fundamental structure of these forests could be undergoing change," Franklin said. "The forests may stabilize at lower overall levels of biomass resulting in less carbon stored in the forests."

The areas studied were 76 forest stands 200 or more years old in Arizona, California, Colorado, New Mexico, Oregon, Washington and Canada's southwestern British Columbia. Researchers counted trees and looked back at records kept for more than 50 years at multiple sites.

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