

Trees dying off faster as temperatures rise, scientists find

By Gordon Hamilton, Vancouver Sun
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An old-growth forest in Cathedral Grove on Vancouver Island.

Photograph by: Debra Brash, Canwest News Service

Trees across the West are dying at twice the rate they were as recently as 20 years ago and scientists are pointing to climate change as the likely cause, according to a new study to be published Friday.

The report in Science Magazine includes studies conducted in British Columbia's old-growth forests as well as forests across the western United States.

In every instance, mortality rates have doubled, states the report, led by a U.S. Geological Survey team.

At the same time, average temperatures have climbed by one degree Celsius, making climate change the most likely cause, said University of B.C. biogeography professor Lori Daniels, who was part of the team.

She studied 1,200 trees in old-growth forest plots in the Capilano and Seymour watersheds over a 17 year period and found that not only are more trees dying, but the undergrowth trees that would typically replace the old giants are suffering greater mortality as well.

Tree death rates have increased across a wide variety of forest types, at all elevations, in trees of all sizes, and in pines, firs, hemlocks, and other kinds of trees.

The fact that scientists monitoring trees over such a broad region found the increasing death rate raises alarm, Daniels said Thursday in an interview.

“We are losing trees faster than we are gaining trees.”

The one degree change in temperature, while small, has profound effects, she said. Snow packs are smaller, leading to longer dry periods in summer. Trees are stressed by drought in summer and their roots can be exposed to freezing in winter because there is less snow to blanket them.

At the same time, the warmer temperatures are proving a boon to insects – from the mountain pine beetle, that has devastated lodgepole pine forests from Northern B.C. to Colorado, to the tiny Western hemlock looper, which was responsible for a significant number of tree deaths in Daniels’ old-growth plots.

Her findings are being repeated all across the West. Eleven scientists monitoring plots in Idaho, Colorado, Arizona Washington, Oregon and California, found the same patterns.

“All of us have established research plots in the forest and have been monitoring them for anywhere from 15 to 30 years,” she said. “We have been tracing the fate of more than 58,000 trees and over the study period, more than 11,000 have died.

“The concerning factor here is that the mortality rates have more than doubled in recent decades.”

Mortality rates doubled in 17 years in the coastal forests and doubled in 29 years in Interior forests, she said.

“What we think is happening that temperature has both direct and indirect impacts on trees.

“Directly, increased temperature is going to change not only the metabolic rate in the trees but its need for water. We have detected both an increase in temperature and an increase in the water deficit, which means there is a water shortage for these trees at the same time the temperature is going up.”

That stresses the trees, she said.

Disease and insect outbreaks are the indirect impact.

Team co-leader Phil van Mantgem, said in a news release that the changes can have cascading effects. Increased tree mortality reduces the ability of the forests to soak up carbon, potentially increasing the rate of global warming.

At the beginning of the study, mortality rates were less than one per cent a year but by the end of the study, they were more than two per cent, Daniels said.

“That might seem really small but mortality rates work like interest in a bank account. They compound over time.”

Over a 50 year period, out of 100 trees only 36 will survive at the current mortality rate, she said. Twenty years ago, 65 would survive.

“A very subtle change has a large impact on the proportion of trees that die versus those that get to survive.”

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