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Environment Blamed in Western Tree Deaths

By MIREYA NAVARRO

Rising temperatures and the resulting drought are causing trees in the West to die at more than twice the pace they did a few decades ago, a new study has found.

The combination of temperature and drought has also reduced the ability of the forests to absorb carbon dioxide, which traps heat and thus contributes to global warming, the authors of the study said, and has made forests sparser and more susceptible to fires and pests.

The scientists, who analyzed tree census data collected in 1955 and in later years, found that the mortality of trees increased in 87 percent of the 76 forest plots studied. In some plots, the die-off rate doubled in as little as 17 years; in others, it doubled after 29 years, the study found.

“Summers are getting longer,” said Nathan L. Stephenson, of the United States Geological Survey, a leader of the study with Phillip van Mantgem, also of the geological survey. “Trees are under more drought stress.”

The study will appear in Friday’s issue of the journal Science.

The scientists analyzed the effects of higher temperatures on old-growth temperate forests in three regions: the Pacific Northwest (including southwestern British Columbia), California and inland Western states. The average temperature in those regions rose by more than one degree Fahrenheit from the mid-1970s to 2006.

Precipitation and snowpack runoff decreased over the same period.

The higher mortality rates held regardless of tree size or type or elevation at which it grew. The fact that birth rates remained unchanged among the nearly 60,000 pines, firs, hemlocks and other trees in the study indicates that forests are losing trees faster than they are replacing them, the authors noted.

It remains unclear how much of the regional warming is a result of a natural climate cycle and how much results from a global trend toward higher temperatures. But Jerry F.

Franklin, a professor of ecosystem analysis at the University of Washington and an author of the study, blamed global warming. “We see the regional warming as part of a much larger shift globally,” Mr. Franklin said.

The study focused on forests more than 200 years old where rapid changes in demographic rates would more likely be caused by environmental changes rather than by internal processes like self-thinning that are more common in young forests. The spike in mortality cannot be attributed to aging, fires and other events, the researchers said

Warmer weather makes trees more vulnerable to insects and pathogens that thrive in warmer conditions.

In a report last year, the Department of Agriculture said that climate change had “very likely” increased the size and number of fires, insect infestations and overall tree die-offs in forests in the West, the Southwest and Alaska, and that the damage would accelerate in the future.

The authors of the new study said in a teleconference that if tree mortality rates continued to rise, the average size of trees could fall because trees would die at younger ages. Smaller trees cannot store as much carbon dioxide as large ones.

In addition, areas could also become less suitable for some species and more welcoming for others, and existing species might begin to act in peculiar ways. “Novel behaviors on the part of pests and pathogens are the sort of thing we’ll get surprised by,” Mr. Franklin said.

But Steve Pyne, an environmental historian at the University of Texas who has studied fires in forests, said that how bad things became depended on what replaced the vegetation that was being lost.

“Part of the trick here is we don’t know,” Mr. Pyne said. “It’s like the financial meltdown. It’s the uncertainty. What’s going to replace it?”

He added, “It may make no difference; it may make a huge difference.”

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