ClimateWire

Old trees store more carbon, more quickly, than younger trees

Tiffany Stecker, E&E reporter *Published: Thursday, January 16, 2014*

A sweeping study of forests around the world finds that the older the tree, the greater its potential to store carbon and slow climate change.

The 38 researchers from 15 countries found that 97 percent of trees from more than 400 species studied grew more quickly as they aged, thus absorbing more carbon. Although trees become less efficient at processing carbon as they get older, there are a greater number of leaves to absorb CO2, explained Nate Stephenson, lead author of the study. Leaves are crucial in photosynthesis, the process by which plants make energy and absorb carbon dioxide.

"Even though on an individual leaf scale their productivity might be declining slightly, they just have so many more leaves that the net effect is that they're able to fix more carbon in total than a small tree," said Stephenson, a scientist with the U.S. Geological Survey's Western Ecological Research Center in Three Rivers, Calif.

If a typical tree's diameter grows 10 times as large, it will undergo a hundredfold increase in leaf mass and a fiftyfold to hundredfold increase in total leaf area, the study found. This outweighs the lower rate of productivity.

More than 400 species of trees from six continents were repeatedly measured, with some records dating 80 years ago. The findings were published in *Nature* yesterday.

The study supported findings from a 2010 **<u>study</u>** on eucalyptus and sequoia trees, which found that large trees could add up to 600 kilograms (1,300 pounds) of aboveground biomass each year, Stephenson said.

The findings -- that old trees not only store carbon and prevent it from

escaping into the atmosphere, but actively covert CO2 in the air into their trunks, branches and leaves -- make an important case for the preservation of the country's old-growth forests.

Going into the future, "we are going to want to manage some forests for carbon sequestration; to do that, you've really got to know which trees are your star players," Stephenson said. In this case, the star players on the team are not the young 20-year-olds, but the 90-yearolds, he added.

The study highlights the critical role old forests play in climate mitigation, said Laurie Wayburn, president of the Pacific Forest Trust, which represents private forest owners nationwide.

"Young forests have a role, but they are not the game changer that old forests are," she said.

The study differentiates between individual trees and entire forests, an important point, said Mark Harmon, a forestry professor at Oregon State University and a co-author of the paper. Forests have a diversity of old and young, and many different species.

"Is the amount of total carbon in those forests changing radically? Probably not," he said. Nevertheless, he said the study puts to rest any assumptions that forests with many old trees are less valuable for storing carbon.

A separate study in the *New Phytologist* last week found that the taller the tree, the more carbon it stores. The researchers found that tall trees receive more light at the top of the canopy, are better able to suppress competitors and allow for pollen to disperse over greater distances