

Northern forests may be losing their ability to trap carbon

February 2 2012, By Joel N. Shurkin



Credit: Linnea Hanson/U.S. Forest Service. Young aspen grove.

The northern forests of western Canada are likely absorbing less carbon dioxide because of climate change, and the decline may be making a bad situation worse, researchers from Quebec and China have concluded.

If the situation remains as it is, the forests may actually put more [carbon](#) dioxide back into the air than they absorb, the researchers said. While researchers have seen this happen in [tropical rainforests](#), the new result suggests that this problem could be much more widespread.

The scientists at the University of Quebec's Montreal campus and from several Chinese institutions, reporting in this week's *Proceedings of the National Academy of Sciences*, have been able to put numbers to the fears that the ability of northern forests to absorb carbon -- to act as carbon sinks -- was decreasing.

The researchers studied 96 permanent old-growth forests out of 20,000 candidates, concentrating on aspens, which are more sensitive to changes in precipitation.

They deliberately chose forests that were not affected by insect infestation or fires. They then estimated biomass production -- the growth of the [trees](#) -- from 1968 to 2008.

Trees in both east and west were dying sooner, but the eastern forests were replacing biomass while the forests in the western provinces of Manitoba, Alberta and Saskatchewan were not. The west has had less precipitation and rising temperatures, which they believe is the cause.

"Our results indicate that since 1963, drought-induced water stress has led to a weakening of the biomass carbon sink across a large area of the western Canadian boreal [northern] forests, with the largest reduction after 2000," they wrote.

Eastern Canadian boreal forests are not showing a similar phenomenon, they said, because trees are being replaced fast enough.

A reduction in biomass does not necessarily mean the forests are actually shrinking. There could be the same number of trees over the same area, but they might be smaller. In this study, the scientists reported the forests actually were getting smaller.

"Over time, more trees died than were regenerated," said Changhui

Peng, Director for Ecological Modeling and Carbon Science, Institute of Environment Sciences, University of Quebec at Montreal. "The population of trees is declining."

Dead trees release the carbon back into the atmosphere as they decompose, Peng said.

Peng said until recently, scientists thought the decrease in the carbon sink was restricted to tropical rain forests, but apparently it is happening in the northern latitudes as well.

The theory is that the more and larger the trees and the larger the forests, the more [carbon dioxide](#) will be captured, mitigating the greenhouse effect.

The Canadian research seems to indicate that may not be so, Peng said.

Almost half the carbon stored in the world's forests is in northern latitudes.

The same thing appears to be happening in the American West as well, according to the U.S. Forest Service, although the forests of Western Europe are growing.

"In interior Alaska, we're seeing very big decreases in productivity," said Teresa Nettleton Hollingsworth, a research ecologist for the U.S. Forest Service in Fairbanks. Productivity means the growth in biomass.

There also has been higher mortality in trees. But Hollingsworth said there is no evidence the change was due directly to [climate change](#) in Alaska. It could also be the result of insect infestation and the increase in [forest](#) fires, which are endemic in the area, the indirect results of climate change.

"It could be that the number of trees have stayed the same but that they are not growing as much as they were in the past," she said.

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