

# Human activities increasing carbon sequestration in forests

June 13 2007

---

Human-caused nitrogen deposition has been indirectly “fertilizing” forests, increasing their growth and sequestering major amounts of carbon, a new study in the journal *Nature* suggests.

The findings create a more complex view of the carbon cycle in forests, where it was already known that logging or other stand-replacement events – whether natural or not – create periods of 5-20 years when there is a net release of carbon dioxide from forests to the atmosphere, instead of sequestration as they do later on.

The end result is a highly variable forest carbon cycle that appears to be heavily influenced by the footprint of humans, one way or another. It’s a complicated process with powerful driving forces that were poorly understood, said scientists from 10 institutions in the U.S., Canada and Europe.

Until this report, researchers had never quantified the effect of continuous low levels of nitrogen deposition – about 5-10 percent of the amount used by a farmer each year - to spur net carbon uptake by forests and actually offset a significant amount of greenhouse gases into the atmosphere.

This broad study analyzed the carbon balance across a network of forest sites that represent nitrogen deposition in most of Western Europe and the continental United States. Until now, it has been difficult to separate the effects of nitrogen deposition on forests from the many other

variables that affect their carbon release or sequestration – things like forest age, logging, wildfires, disease or insect epidemics, or other causes. This study attempted to do that, and found that the net carbon sequestration by temperate and boreal forests was overwhelmingly determined by nitrogen inputs.

“What is surprising is that the net sequestration is quite large for a relatively low level of nitrogen addition,” said Beverly Law, a professor of forest science at Oregon State University, co-author of the study and director of the AmeriFlux monitoring network in North and South America.

“Through our forests, fertilization by nitrogen deposition is to some degree offsetting our carbon dioxide emissions – at least right now,” she said.

It was first recognized in the 1980s that human activities, by releasing unprecedented amounts of active nitrogen into the atmosphere, were not just altering the global nitrogen cycle but also causing the eutrophication of large parts of the biosphere, the researchers said in their report. Nitrogen – produced by automobile engines, factories, and intensive agriculture – is often a key, limiting nutrient in forests and other ecosystems.

Early forest growth puts a severe nitrogen stress on the ecosystem initially, and then the forest continues to grow and remove carbon from the atmosphere for the rest of the management or life cycle, accumulating wood at a high rate on the small additional nitrogen inputs.

This growth and sequestration is achieved without applications of fertilizer that would likely result in nitrous oxide emissions, another greenhouse gas, that would offset the benefits to the atmosphere of carbon removal.

However, it's known that large additions of nitrogen to ecosystems can also be damaging above a certain threshold, researchers say, and it's unclear how long this process will continue.

“The results demonstrate that mankind is ultimately controlling the carbon balance of temperate and boreal forests, either directly through forest management or indirectly through nitrogen deposition,” the study authors said.

Ultimately, mature forests, at least in northern latitudes, absorb and sequester substantial amounts of carbon from the atmosphere. Forest protection and management options have been viewed as one mechanism to absorb carbon dioxide from the atmosphere and reduce concerns about the greenhouse effect and global warming.

Source: Oregon State University

Citation: Human activities increasing carbon sequestration in forests (2007, June 13) retrieved 9 April 2024 from <https://phys.org/news/2007-06-human-carbon-sequestration-forests.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--