

Study: Temperate Forests Could Worsen Global Warming

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Growing a forest might sound like a good idea to combat global warming, since trees draw carbon dioxide from the air and release cool water from their leaves. But they also absorb sunlight, warming the air in the process. According to a new study from the Carnegie Institution's Department of Global Ecology and Lawrence Livermore National Laboratory, planting forests at certain latitudes could make the Earth warmer.

Image: New climate modeling research from the Carnegie Institution and Lawrence Livermore National Laboratory shows that northern temperate forests (top) may contribute to global warming, while tropical forests (bottom) can help keep global temperatures cool.

Carnegie's Ken Caldeira will present the work at the American Geophysical Union Fall Meeting in San Francisco on December 7, 2005.

The researchers used complex climate modeling software to simulate changes in forest cover and

then examined the effects on global climate. Their results were surprising. "We were hoping to find that growing forests in the United States would help slow global warming," Caldeira said. "But if we are not careful, growing forests could make global warming even worse."

The researchers found that while tropical forests help keep Earth cool by evaporating a great deal of water, northern forests tend to warm the Earth because they absorb a lot of sunlight without losing much moisture. In one simulation, the researchers covered much of the northern hemisphere (above 20° latitude) with forests and saw a jump in surface air temperature of more than 6° F. Covering the entire planet's land mass with trees led to a more modest increase of about 2° F.

When the scientists restricted the simulation to middle latitudes such as the continental United States, the picture was not quite so clear. At first, cooling due to the uptake of carbon dioxide would offset warming from sunlight absorption. But after several decades, carbon dioxide would begin diffusing from the ocean into the atmosphere, diminishing the cooling effect and warming the Earth in the long term.

Caldeira warns against planting forests on abandoned croplands as a strategy to combat global warming, which some have recommended. But he also recognizes the importance of forests.

"I like forests. They provide good habitats for plants and animals, and tropical forests are good for climate, so we should be particularly careful to preserve them," Caldeira commented. "But in terms of climate change, we should focus our efforts on things that can really make a difference, like improving efficiency and developing new sources of clean energy."

The study, authored by Seran Gibbard, Ken Caldeira, Govindasamy Bala, Thomas J. Phillips,

and Michael Wickett, will be published online under the title “Climate effects of global land cover change” in the journal *Geophysical Research Letters* on December 8, 2005.

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