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Scientists Estimate Size of the US Carbon Sink
Scientists Estimate Size of the U.S. Carbon Sink

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June 21, 2001

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DURHAM, N.H. -- A group of scientists including two from the University of New Hampshire -- has come up with new estimates of the size of the U.S. carbon sink, consistent with both land- and atmosphere-based assessments.

The study, which appears in the June 22 issue of the journal Science, estimates that U.S. carbon sinks stored between one-third and two-thirds of a billion tons of carbon annually during the decade of the 1980s. Carbon sinks are areas of land, such as regrowing forests, that soak up large amounts of carbon dioxide, a major greenhouse gas that causes global warming.

"When we chopped down the forests, we released carbon trapped in the trees into the atmosphere," says Stephen Pacala, a Princeton professor of ecology and evolutionary biology and the study's lead author. "When we plowed up the prairies, we released carbon from the grasslands and soils into the atmosphere. Now, the ecosystem is taking some of that back."

Despite widespread consensus about the existence of a U.S. carbon sink, the size remained uncertain, according to another of the study's co-authors, George Hurtt, research assistant professor in the University of New Hampshire's Institute for the Study of Earth, Oceans, and Space.

"Earlier studies implied that the atmospheric estimates
and ground-based estimates were quite far off," he says, "but refined technology and more comprehensive accounting has resulted in a new consistent set of estimates. This study helps build consensus about the size and causes of the carbon sink, and that's important as we develop models of ecosystems and climate change."

Scientists have been trying for more than a decade to track the fate of carbon dioxide pumped into the atmosphere as a result of burning fossil fuels. Globally, fossil fuel emissions were about 5.4 billion tons per year, and emissions from net deforestation were about 1.6 billion tons per year. Of that, approximately 3.4 billion tons per year accumulated in the atmosphere, approximately 2 billion tons annually accumulated in the oceans, and 1.6 billion tons is presumed to have gone into land sinks, such as the U.S. sink.

A Princeton University-led group in 1998 reported that much of this absorption was happening in North America -- a phenomenon called the "North American carbon sink."

The dominant factor governing carbon uptake in the U.S. is historical changes in land use and management, due primarily to the reforestation of agricultural land over the century, as trees and other plants absorb huge amounts of carbon dioxide during photosynthesis.

Hurtt adds that other important factors include a greater than 95 percent reduction in the area burned by fires since before the middle of the 18th century. Fires emit carbon dioxide when vegetation burns, whereas growth absorbs it from the atmosphere. The use of improved agricultural techniques, storage of wood products and the accumulation of sediment in reservoirs also contribute to net carbon storage.

Despite the fact that land sinks help remove carbon from the atmosphere, the U.S. continues to emit more carbon than it removes. In 1990, for example, the country released 1.337 billion tons from fossil fuel emissions, making it a net source of between two-thirds and 1 billion tons of carbon per year.

However, America's forests won't soak up the greenhouse gases forever. The sink will begin to
diminish and eventually disappear as the forests reach maturity. Even if the country could slow fossil fuel consumption and maintain current levels of carbon dioxide emissions, says Pacala, the U.S. net contribution to atmospheric accumulation would continue to rise as the benefit of the sink goes away.

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