

Strategies for increasing carbon stored in forests and wood

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While the U.S. and other world leaders consider options for offsetting carbon emissions, it is important to take into account the role forests play in the global carbon cycle, say scientists in a paper published in the spring edition of *Issues in Ecology*. Currently, the carbon stored in forests and harvested wood products offsets 12-19 percent of U.S. fossil fuel emissions—growth primarily the result of recovery from the large scale harvesting that occurred around 100 years ago. These high offsets are not permanent but have the potential to increase; however, not without tradeoffs.

"Several strategies for offsetting carbon emissions have been proposed or are currently being implemented in the U.S.," says Mike Ryan from the United States Department of Agriculture, Forest Service and lead author of the paper. "Some of the important tradeoffs are worth mentioning because many people have viewed forests as a simple and uncomplicated partial solution to reducing CO₂ in the atmosphere, and they are not."

Mike Ryan and colleagues discuss eight strategies being used or proposed in the U.S., and the risks, uncertainties and tradeoffs of each. These include avoiding deforestation, afforestation (planting or replanting forests), decreasing harvests, increasing the growth rate of existing forests, using biomass energy from forests to reduce [carbon emissions](#), using wood products in place of concrete or steel for building materials, implementing urban forestry and using fuel management to reduce fire threats.

The tradeoffs of these strategies need to be taken into account accordingly. By reducing harvests, avoiding deforestation or afforestation, for example, we could increase the amount of forest carbon in the U.S. But the demand for forest products would still remain, so tree harvesting or other current land use may move to other areas, canceling out the carbon benefit to the atmosphere of the changes in the U.S.

"The numbers are daunting because our fossil fuel use is so large," says Ryan. "Take increasing the use of wood for biomass energy: In order to offset just 10 percent of our fossil fuel use, we would need to harvest all of the annual forest production of U.S. forests. This practice also would lower the long term effects of carbon stored in forests."

"To offset another 10 percent of our fossil fuel use with tree planting would require planting trees on one-third of our agricultural land," says co-author Robert B. Jackson from Duke University.

These strategies are not yet cost effective and would require a price on carbon, regulation or incentives to succeed, say the authors. Another risk in relying on forests to lower atmospheric CO₂ is that climate change may reduce carbon stored in forests by increasing fires, storms and insect outbreaks.

"So, we need to make sure we focus on retaining the forests we have by making sure we get tree regeneration after these disturbances," says Ryan. The authors review these methods, and the cycle of forest growth, death and regeneration, and the use of wood removed from forests and how it ties into measuring carbon pools and flows. They also analyze the processes of measuring forest carbon and the science behind mechanisms proposed for increasing the amount of carbon stored in forests.

"This topic could not be more relevant," says Jill Baron, Editor-in-Chief of *Issues in Ecology*. "The need for biological carbon storage is ever apparent, but the methods for making the most of our forest stores while not reducing other important forest ecosystem services are still underexplored. This paper, like future *Issues in Ecology*, provides a synthesis of the current scientific research and understanding on the topic. It should be on the desk of anyone interested in how to minimize the effects of climate change, and certainly anyone assigned with mitigating climate change through [forest](#) carbon storage."

More information: "A Synthesis of the Science on Forests and Carbon in U.S. Forests" is published in the spring 2010 edition of *Issues in Ecology*, a publication of the Ecological Society of America. esa.org/science_resources/issues.php.

Provided by Ecological Society of America

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