Production of biofuel from forests will increase greenhouse emissions

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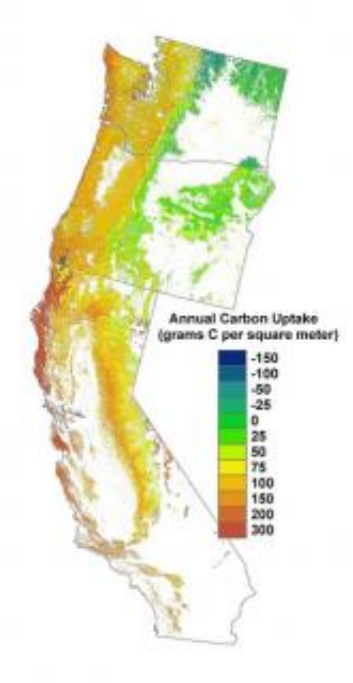


Under existing forest management approaches, almost all forest lands in Oregon, Washington and California are "sequestering" carbon, or absorbing more than they release to the atmosphere. (Graphic courtesy of Oregon State University)

The largest and most comprehensive study yet done on the effect of biofuel production from West Coast forests has concluded that an emphasis on bioenergy would increase carbon dioxide emissions from these forests at least 14 percent, if the efficiency of such operations is optimal.

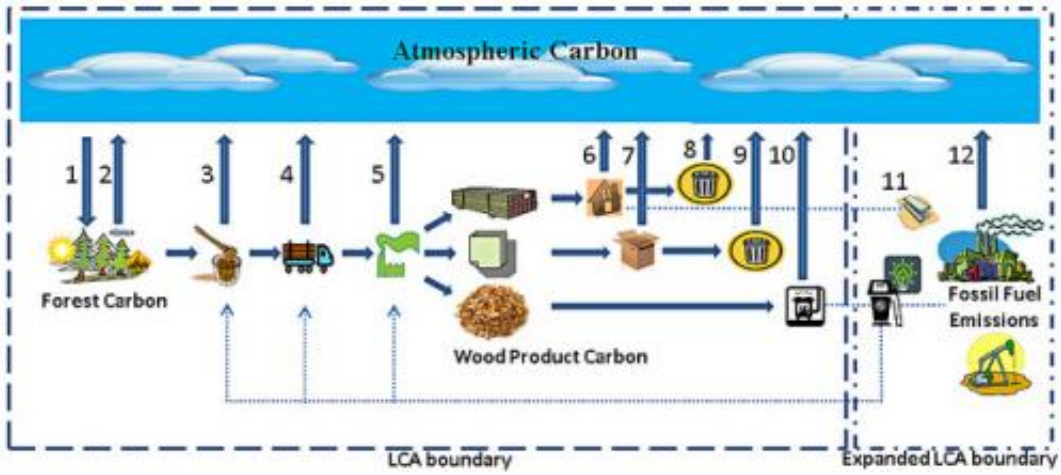
The findings are contrary to assumptions and some previous studies that suggest biofuels from this source would be carbon-neutral or even reduce greenhouse gas emissions.

In this research, that wasn't true in any scenario.

The study was published today in *Nature* Climate Change, by scientists from the College of Forestry at Oregon State University and other institutions in Germany and France. It was supported by the U.S. Department of Energy.

During the past four years, the study examined 80 forest types in 19 eco-regions in Oregon, Washington and California, ranging from temperate rainforests to semi-arid woodlands. It included both public and private lands and different forest management approaches.

"On the West Coast, we found that projected forest biomass removal and use for bioenergy in any form will release more carbon dioxide to the atmosphere than current forest management practices," said Tara Hudiburg, a doctoral candidate at OSU and lead author on the study.



A complete "life cycle analysis" outlines the various ways that wood products

can be used and their influence on atmospheric carbon. (Graphic courtesy of Oregon State University)

"Most people assume that wood bioenergy will be carbon-neutral, because the forest re-grows and there's also the chance of protecting forests from carbon emissions due to wildfire," Hudiburg said. "However, our research showed that the emissions from these activities proved to be more than the savings."

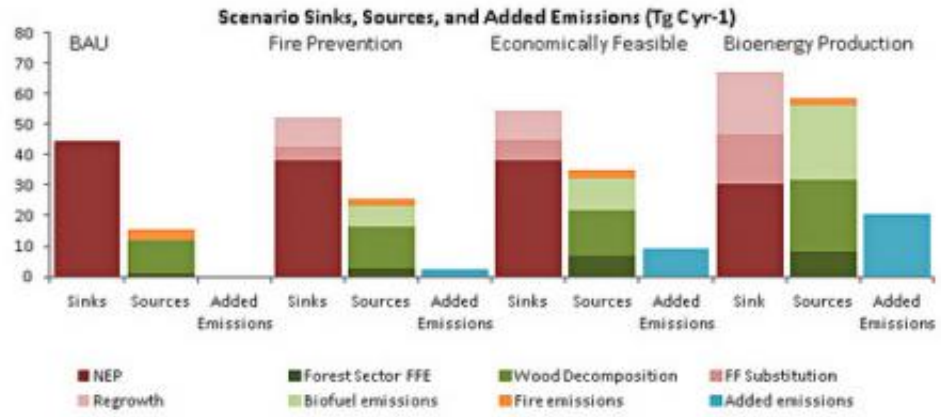
The only exception to this, the researchers said, was if forests in high fire-risk zones become weakened due to insect outbreaks or drought, which impairs their growth and carbon sequestration, as well as setting the stage for major fires. It's possible some thinning for bioenergy production might result in lower emissions in such cases if several specific criteria are met, they said.

"Until now there have been a lot of misconceptions about impacts of forest thinning, fire prevention and biofuels production as it relates to carbon emissions from forests," said Beverly Law, a professor in the OSU Department of Forest Ecosystems and Society and co-author of this study.

"If our ultimate goal is to reduce greenhouse gas emissions, producing bioenergy from forests will be counterproductive," Law said. "Some of these forest management practices may also have negative impacts on soils, biodiversity and habitat. These issues have not been thought out very fully."

The study examined thousands of forest plots with detailed data and observations, considering 27 parameters, including the role of forest fire, emissions savings from bioenergy use, wood product substitution, insect

infestations, forest thinning, energy and processes needed to produce biofuels, and many others.



Compared to BAU, or "business as usual," all of the forest management scenarios outlined here increase carbon emissions to the atmosphere. (Graphic courtesy of Oregon State University)

It looked at four basic scenarios: "business as usual"; forest management primarily for fire prevention purposes; additional levels of harvest to prevent fire but also make such operations more economically feasible; and significant bioenergy production while contributing to fire reduction.

Compared to "business as usual" or current forest management approaches, all of the other approaches increased carbon emissions, the study found. Under the most optimal levels of efficiency, management just for fire prevention increased it 2 percent; for better economic return, 6 percent; and for higher bioenergy production, 14 percent.

"However, we don't believe that an optimal efficiency of production is

actually possible in real-world conditions," Hudiburg said. "With levels of efficiency that are more realistic, we project that the use of these forests for high bioenergy production would increase carbon emissions 17 percent from their current level."

About 98 percent of the forests in this region are now estimated to be a carbon sink, meaning that even with existing management approaches they sequester more carbon than they release to the atmosphere.

Plans for greenhouse gas reduction call for up to 10 percent lower emissions by 2020, and forest-derived fuels are now seen as a carbon-neutral solution to reducing energy emissions, the researchers note. However, this study suggests that increases in harvest volume on the West Coast, for any reason, will instead result in average increases in emissions above current levels.

Forests capture a large portion of the carbon emitted worldwide, and some of this carbon is stored in pools such as wood and soil that can last hundreds to thousands of years, the scientists said.

"Energy policy implemented without full carbon accounting and an understanding of the underlying processes risks increasing rather than decreasing emissions," the researchers wrote in their report.

More information: Paper: DOI: 10.1038/nclimate1264

Provided by Oregon State University