How much carbon does our lumber sequester?

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Carbon sequestration is generally thought of as locking carbon out of the atmosphere semi-permanently by incorporating it into rocks or forests that are then preserved. But there’s a large cache of carbon in a form that’s not especially permanent: the wood we use in our buildings and other structures. Some of that lumber has been in place for hundreds of years, while other bits of wood are used temporarily and then burnt or left to decay, which rapidly releases their sequestered carbon back into the atmosphere.

So it shouldn’t surprise you that figuring out how much carbon ends up sequestered through our use of wood products is not a simple task. Undaunted, Craig Johnston and Volker Radeloff of the University of Wisconsin, Madison, have decided to tackle it. By viewing that carbon as a pool that’s being drained and filled at the same time, they find that the total sequestered carbon is tiny—and subject to rapid changes based on political and economic factors.

Into the woods

The secret to tracking this pile of carbon is to recognize that we’re never going to have a full inventory of lumber that was put in place a century or more ago. But that lumber is

going to be an ever-shrinking portion of the material that was put in place more recently. Thus, if we can track the production of lumber (and other wood products) over the decades for which we have good data (1960 and beyond), then we have a decent sense of the total inputs to this sequestered carbon.

But at the same time new production goes into the pool, old material comes out as houses burn or are torn down, paper ends up in landfills, and so on. It's possible to get estimates for that as well. By subtracting the loss from the input, we can make an estimate of the annual sequestration. While that would tell us very little about the total pool of sequestered carbon back when the data starts at 1960, over time, the running total of the annual flux should provide an increasingly accurate estimate of sequestered carbon.

Overall, in 2015, the researchers estimate that the total carbon sequestered through wood products was the equivalent of 335 megatonnes of carbon dioxide, according to the accepted tracking method. That method, however, does not include tracking wood harvested in one country and then shipped to another for use, so this is an under-estimate; Johnston and Radeloff calculate that there is an additional 71 megatonnes unaccounted for due to international trade.

Even upping the total to 400 megatonnes, however, is not especially comforting given that our annual carbon emissions are well over 350 gigatonnes. "Even under a best-case scenario and when accounting for this gap," Johnston and Radeloff write, "the global potential of [wood products] as a carbon sink is minor and always less than 1 percent of emissions."

So, should we care?

At this point, it's tempting to dismiss lumber as completely irrelevant to concerns about carbon emissions. But the authors show there are exceptions. In Canada, where timber is a major

contributor to the economy, wood products end up sequestering 2.4% of its annual emissions, or over 30% of its industrial emissions. In Sweden, those numbers are 9% of the total emissions and over 70% of industrial emissions. So, when it comes to setting national emissions targets, there are countries where harvesting forests really matters.

The other issue is that the sequestration is extremely sensitive to economic conditions. For example, the 2008 economic crisis saw the United States shift from sequestration to a net release of carbon as turnover of wood products continued even as new use plunged. A similar thing happened for a much longer period after the collapse of the Soviet Union. And, starting at the turn of the century, China shifted to an astonishingly rapid growth in its annual sequestration, driven by its booming economy. So, nations that do plan to use wood harvesting to balance their emissions books need to be aware that this form of carbon sequestration won't always be a major factor.

While sequestration through wood products may be significant for some nations, as a whole, there's no way that it's going to be able to make a significant dent in the total carbon emissions until other factors have cut them down to a manageable size. While that probably isn't a shock to anyone in the forestry industry, the topic comes up often enough in online discussions that it might be worth saving this link for future reference.

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