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HARVESTED WOOD PRODUCTS: FOREST CARBON AFTER HARVEST

This May 2017 blog is written by Marina Melanidis from the PICS Forest Carbon Management Project, a multi-year collaborative effort created by the Pacific Institute for Climate Solutions, involving scientists from Natural Resources Canada (NRCan), the University of British Columbia (UBC) and other agencies.

The forest sector represents a large source of income for Canadians. In 2013, the forest sector contributed $19.2 billion - or 1.25% - of Canada's GDP [1]. Harvested wood products (HWPs), which are manufactured using wood harvested from forests, have also made headlines recently, with the world's tallest wood building at 18 storeys having completed construction at the University of British Columbia [2]. How wood is used after it is harvested from forest ecosystems has a significant impact on forest sector carbon emissions [3]. In addition to economic benefits, the use of wood products has the potential to contribute to climate change mitigation objectives [4].

HARVEST, PROCESSING, AND EXPORT

By dry weight, 50% of wood is made up of carbon that was sequestered by a living tree [5]. Harvesting a tree and using that wood to create a wood product does not immediately emit the carbon that is stored into the atmosphere – rather, it transfers the carbon out of the forest ecosystem, where it was stored in living tree biomass, and into HWPs [5].

Common logging practice results in 40-60% of the carbon in harvested trees remaining in the forest in the form of dead organic matter such as branches, stumps, roots, and leaves [6]. The carbon will remain stored until it is returned to the atmosphere through decay, or if it is burnt [7]. Harvest residues are often burnt in a process called slash burning to satisfy provincial regulations that require the disposal of the residues to reduce fire hazards [8]. The remaining 40-60% of the carbon is contained within the stemwood that is removed from the forest ecosystem. Depending on the product manufactured, a large or small fraction of the harvested carbon remains in the primary product. The remainder (e.g. bark, sawdust, etc.) is used for paper, bioenergy, or other products. Harvested wood can be used for many different products. Examples include bioenergy, pellets, and pulp and paper, which are short-lived products, and construction lumber, plywoods, and panels, which are long-lived products. Waste from wood processing can be burned for bioenergy in mills – this option results in a relatively low requirement for outside energy sources by wood product manufacturing when

compared to most other material manufacturing, as much of the energy needed can be generated by utilizing process by-products [5].

Wood products, including lumber, panels, and logs, are an especially large export for B.C., making up 25% of all commodities the province exported in 2016 [9]. The wood products that Canada's harvest is used to produce, whether domestically or abroad, are tracked and included in Canada's National GHG Inventory Report and B.C.'s Provincial GHG Inventory Report – this allows us to estimate the fate of forest carbon stored in HWPs.

PRODUCT USE AND DISPOSAL

The longer a wood product is in use, the longer carbon will remain stored within the wood. Therefore, allocating a greater proportion of harvested wood to produce long-lived wood products avoids releasing stored carbon into the atmosphere for longer periods of time [3]. Using wood in buildings is one example of long-term carbon storage, as buildings generally have long useable lives. In addition, if wood is used in the place of materials such as steel or concrete, which are more emission-intensive on a lifespan basis, the level of greenhouse gas (GHG) reductions that could result from using wood increases [5].

When a wood product reaches the end of its life, the carbon is not immediately emitted (unless the product is burned). The manner of disposal of the product is critical to the stored carbon's fate. Recycling and reusing products, for example, can extend the time that the carbon remains stored [10]. Wood products could also be used as biofuel at the end of their life, displacing more emission-intensive fossil fuels and resulting in net GHG emission reductions [3]. Disposing of wood products in landfills may result in carbon being released in the form of methane, a GHG much more potent than carbon dioxide. However, a well-managed landfill is able to capture emitted methane and use it for energy production to displace fossil fuels [5].

HWP AS A CLIMATE CHANGE MITIGATION STRATEGY

The use of harvested wood, the length of time a wood product is used, and the way it is disposed of significantly impact the carbon budget of the forest sector. Accounting for the carbon stored in HWPs is a critical component of taking a systems perspective to forest carbon accounting, which includes the carbon fluxes in forest ecosystems and the substitution benefits that result from the emissions that are avoided when choosing to use wood products [4**]. See the first blog in our series to learn more about the systems perspective.**

When sustainably managed, forests provide products that have lower carbon footprints than many of their alternatives [12]. In fact, the inclusion of HWPs in forest sector mitigation strategies has been globally recognized as an effective strategy to reduce overall GHG emissions [11]. The use of wood will play a large role in designing new mitigation activities for the forest sector. Understanding the role of HWPs in the forest sector's GHG balance is necessary to accurately measure the emission reduction potential that climate change mitigation strategies could achieve.

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