



Photo Credit: OMNRF

ISSUE:

CANADIAN FOREST PRODUCTS: CONTRIBUTING TO CLIMATE CHANGE SOLUTIONS

Canada's forests are remarkable for their size and diversity. Covering over three million square kilometres they range from the northern taiga forests of the territories to temperate forests of oak and maple in eastern Canada, and from the wet coastal rainforests of British Columbia to the pan-Canadian boreal forests stretching from Yukon to Newfoundland and Labrador.

Sustainable management of our forests aims to respect the long-term environmental health of ecosystems while providing employment, social and cultural benefits to Canadians. Among the many vital natural processes forests carry out, sequestering carbon from the atmosphere is increasingly important given the risks climate change poses to Canada and the rest of the world.

The strong negative consequences for people and ecological systems resulting from a rise in global average temperature beyond 2°C is accepted by nations around the world. To avoid such warming, large reductions in emissions of greenhouse gases that we produce – carbon dioxide (CO₂) and others – must be made quickly. Canada's forests can contribute to that critically important objective.



Photo Credit: Forest Products Association of Canada (FPAC)

A SEA OF CARBON IN CANADA'S FORESTS

Forests are among Earth's largest natural storehouses of carbon: second only to the world's oceans, they contain more carbon than is presently found in the atmosphere. Carbon moves into and through forest ecosystems, playing important roles in ecological processes.

Forests take in and release large amounts of CO₂. Some of the carbon that trees have absorbed returns to the atmosphere when leaves and fine roots are shed by trees and decompose and when trees die, but some of this carbon remains in the forest in dead organic matter. Natural disturbances, which affect tens of thousands of square kilometres of forests annually across Canada, also release carbon that was absorbed by trees.

Harvesting, a managed disturbance, leaves a large fraction of tree carbon in the forest, in branches, tops, stumps and roots, where it gradually decomposes. For merchantable fibre removed from the forest, there is a high efficiency of fibre utilization in Canadian forestry, meaning that almost all of the merchantable wood has a use. Wood from a single tree is often used for many types of products. For example, when a tree is sawn for lumber, sawdust and chips from sawmilling waste are used in products such as pulp, paper and panels, such as medium density fibreboard, while wood waste and bark are combusted to produce energy in place of fossil fuel.

Many products made from trees stay in use for decades. When a product is removed from use it does not mean that its carbon is re-emitted. It may be recycled or repurposed before it is disposed to landfills or combusted for energy. The longer a product is in use, and the slower it decomposes after use, the longer its carbon remains stored and out of the atmosphere, helping to mitigate climate change. When post-use wood products are combusted to produce energy, they can replace energy from fossil fuels, avoiding the addition of carbon to Earth's carbon cycle.

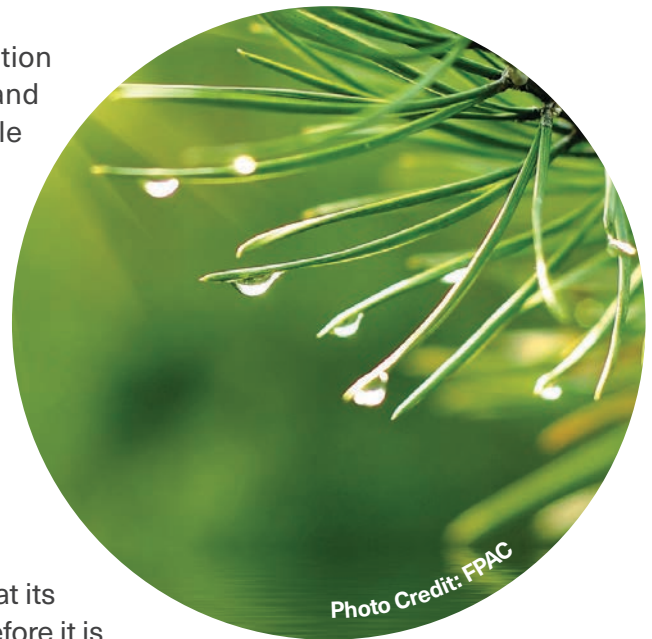


Photo Credit: FPAC

THE ROLE OF THE FOREST SECTOR IN CLIMATE CHANGE MITIGATION

Over the 20th century, Canada's managed forest areas and wood products from them removed more carbon from the atmosphere than were emitted by all fossil fuels burned in Canada over the same period. Looking ahead to the 21st century, the best long-term strategy for climate change mitigation using forests is to harvest a sustainable supply of wood for use as timber, fibre or energy, a strategy recognized by the Intergovernmental Panel on Climate Change, the leading body on climate change science.

Forest products help reduce CO₂ in the atmosphere and mitigate climate change in a number of ways:

- Forest products store carbon – each cubic metre of wood represents almost 1 tonne of CO₂ removed from the atmosphere – while carbon harvested from forests is replaced as forests regrow
- Energy and greenhouse gas emissions to produce forest products are less than materials wood often replaces, such as metals, concrete and plastic.
- Canada's forest products industry has been a leader in reducing greenhouse gas emissions from its manufacturing processes. Since 1990, the pulp and paper industry in Canada has reduced emissions by about 65%. This has been accomplished by replacing fossil fuels used for mill processes with low net-carbon emissions energy generated by burning wood residues once disposed of by burning without energy recovery.
- Many forest products can be repurposed or recycled, storing carbon after their original use is over, paper products recycling being the best-known example. In Canada, about 70% of paper and cardboard are recycled, one of the highest recycling rates in the world
- Even in disposal, forest products can mitigate climate change, if they are burned to produce energy, displacing fossil fuels, or disposed of in a landfill where methane is captured:
 - Forest products, even paper, store carbon for decades in landfills, where decomposition is slowed by the lack of oxygen. Even though one of the by-products of anaerobic decomposition is



Photo Credit: Martin Kane

The importance of Canada's forests:

Canada's forests are globally important ecosystems. They play crucial roles in regulating the Earth's water, carbon, and climate systems. Forests purify the air; store carbon removed from the atmosphere; help regulate the water cycle; and provide habitat for wildlife.

Forests in Canada help sustain many First Nations peoples and are an important part of the entire country's cultural fabric. For generations, Canada's forest products industry has been a significant contributor to the Canadian economy and one of the country's largest employers.

methane, a more potent greenhouse gas than CO₂, it can be collected at landfills and burned to produce energy, in turn displacing fossil fuels. Landfill methane collection is not yet universally practiced, presenting a major mitigation opportunity.

As uses for wood fibre continue to expand – they range from clothing to car parts and chemicals to advanced construction systems – they provide alternatives that can store carbon and displace more CO₂-intensive products.



Photo Credit: FPAC

CLIMATE CHANGE IS AFFECTING CANADIAN FORESTS TODAY

There are many recent examples of climate change impacts in Canada:

- Warm temperatures have enabled unprecedented epidemic insect outbreaks in western Canada, affecting trees stressed by drought: the spruce bark beetle infestation in Yukon has killed most mature white spruce in forests where such damage was previously minor. Mountain pine beetle in BC has killed more than one billion cubic metres of mature lodgepole pine across the province (photo right). The beetle has crossed the Rocky Mountains into northern Alberta, from where it is expected to migrate to pine forests in eastern North America, all the way to the Atlantic Ocean;
- Aspen decline across North America has been linked to droughts and high temperatures. A massive die-off of aspen affected a 1,000 km band of forest between Edmonton, AB and Prince Albert, SK. In Ontario, aspen in more than 5,000 km² of forest suffered widespread mortality;
- Late winter thaws causing trees to lose cold hardiness, followed by a return to seasonally cold winter temperatures, has damaged thousands of square kilometres of northern Ontario forest in the past decade.



Photo Credit: FPAC

Climate warming since the 1960s is believed to have increased the area burned by forest fires in Canada. Fire seasons tend to start sooner in the spring and last later into the fall, with the number of extreme fire years increasing. Recent extreme forest fire seasons have occurred in Yukon (2014), British Columbia (2009, 2014), and NWT (2014). In 2011, Ontario saw the biggest forest area burned in the province in the last 50 years, and unprecedented wildfires drove the largest community evacuation in Saskatchewan's history in 2015.

These phenomena have been driven at least in part by climate change. Such events reduce forest growth and carbon sequestration, change the distribution of forest-dwelling species, and disrupt forestry operations. Adaptation is now obligatory to reduce the vulnerability to climate change of forest ecosystems, the industry and forest dependent communities across Canada.

ADAPTING FORESTS TO CLIMATE CHANGE IS A LONG-TERM INVESTMENT IN REDUCING ATMOSPHERIC CO₂

While forests remove CO₂ from the atmosphere, their future rates of growth and carbon sequestration will be challenged in parts of the country as temperatures rise, precipitation patterns change, and extreme weather becomes more frequent and severe. One of the major challenges to sustainable forest management is to find the appropriate balance between conserving Canada's forests as we know them, versus promoting change to adapt to new climate conditions.

Thus, in parts of Canada, adaptation may involve increased measures to protect forests from disturbances and to preserve the current state of forest biodiversity. In other areas it may be more appropriate to use increased forest disturbances as opportunities to regenerate using seed sources and species better adapted to anticipated future climate. In both approaches, the long-term contribution of Canada's forests to carbon storage and climate change mitigation is inextricably tied to efforts to maintain the sustainability of Canada's forests.

Management of Canadian forests by the forest industry gives them an important role in adapting forest management to climate change. The long-term supply of fibre to support the industry depends on adapting our forests to meet the conditions of a different climatic future. Managing sustainably in the midst of large environmental changes will require close cooperation between the forest industry, provincial governments and other stakeholders. It will also require that they develop policy environments that allow changing management approaches with active support of forest scientists to implement innovative approaches to sustainable management.



Photo Credit: Ontario Ministry of Natural Resources and Forestry (OMNRF)

Today, the industry:

- operates in 200 communities across the country;
- employs 230,000 workers directly and close to 600,000 people indirectly;
- generates \$58 billion dollars a year (approximately 2% of Canada's gross domestic product);
- exports products from sustainably managed forests to more than 180 countries, and is Canada's number one exported product to Asia.

As the country faces the challenge of reducing greenhouse gas emissions, it is understood that healthy Canadian forests, and wood products obtained sustainably from them, need to contribute to decarbonizing the country's economy.

Photo Credit: John Payzant





Photo Credit: OMNRF

TACKLE CLIMATE CHANGE, USE WOOD: NEW AND EXISTING MARKET OPPORTUNITIES FOR FOREST PRODUCTS CAN ADDRESS CLIMATE CHANGE

Nearly all uses of trees from sustainably managed forests can help to mitigate climate change. Their uses can be ranked based on comparisons of carbon stocks, a full life cycle analysis and the fate of trees or fibre if not used. In general, greater mitigation benefits come from using wood in long-lived products that displace alternatives whose production embodies higher fossil fuel energy emissions, especially when disposed wood products are burned to produce energy and displace additional fossil fuel combustion. New opportunities for using wood are creating additional options for mitigating climate change:

Tall wood buildings:

- The lower life cycle emissions/embodied energy of wood building materials, combined with their long-term storage of carbon, makes them an attractive building material compared to concrete and steel. Recent amendments to building codes now permit architects and building engineers in some jurisdictions to construct wood buildings as tall as 6-stories. In Prince George, BC, a 6-storey building made principally of wood was completed in 2014. From an engineering perspective, the potential exists to construct low carbon emissions skyscrapers, using “mass wood” – large wood panels and beams made from glued laminated wood veneer, strands, or timber. An 18-story wooden building is in the planning stage at the University of British Columbia in Vancouver.



Photo Credit: FPAC

Energy from forest biomass:

- The move to large-scale forest bioenergy production is part of a global trend to renewable energy. According to Statistics Canada, in 2014, Canada exported 1.64 million tonnes of wood pellets with a value of

\$276 million dollars (CAD), making it the world's second largest pellet exporter. Domestically, forest bioenergy has enabled the forest products industry to greatly reduce fossil fuel use and is one of the alternative fuels replacing coal-fired power generation in Ontario. Within Canada there is large opportunity to meet current and new energy demand using forest biomass.

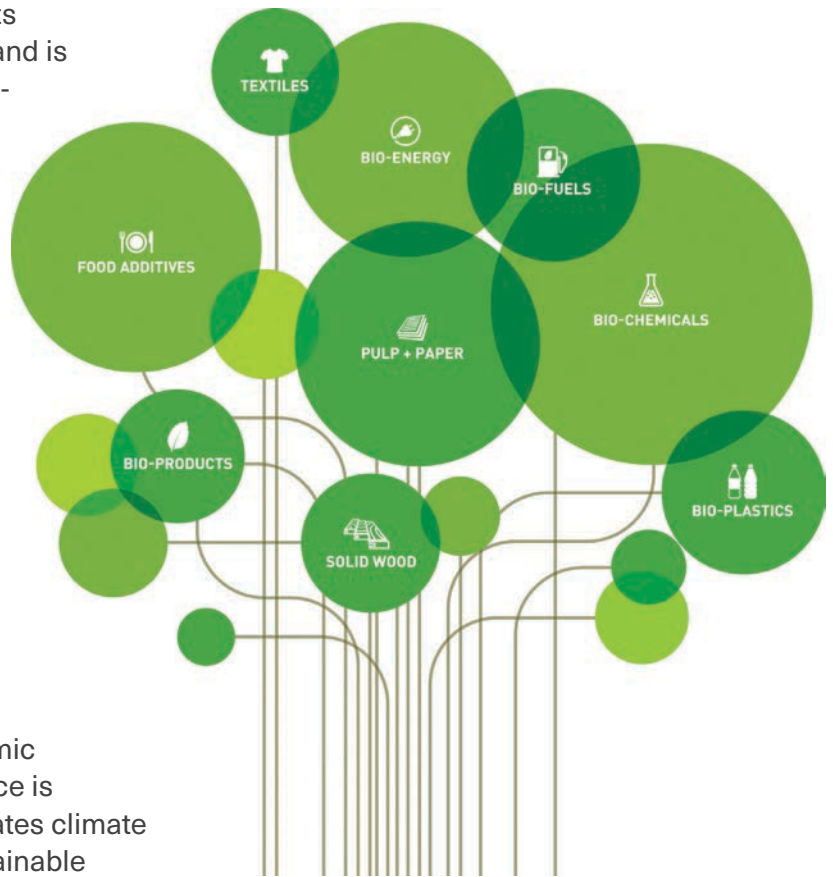
Biomass source makes a difference in the mitigation benefit bioenergy provides. The largest mitigation happens when using biomass whose carbon would have been released quickly to the atmosphere even if not burned for energy. However, in the long-term, all forest biomass sources are preferable to fossil fuels, because carbon emissions from trees are part of the natural carbon cycle and trees can regrow.

CONCLUSION

Forests have deep cultural, social and economic significance to Canadians and their importance is growing because the carbon they store mitigates climate change. At the same time they provide a sustainable supply of raw materials for products with lower carbon footprints than their alternatives, thus aiding the transition to a low-carbon economy. Exporting Canadian forest products to countries that do not have extensive forests can help reduce their national greenhouse gas emissions by displacing more energy intensive materials.

Climate change poses significant challenges for Canada's forests, our forest industry and Canadians in general. Meeting these requires applying best practices in forest management to increase forest resilience, as well as innovative management approaches, to reduce impacts from, and adapt forests to, climate change.

Achieving these objectives will require partnerships between forest industry, local communities, First Nations, environmentalists, and all levels of governments, as well as a commitment by all to explore evolving practices of sustainable forest management. While forest management is practiced locally, what happens to the large carbon sinks in Canada's forests and to Canada's forest industry has global consequences to climate change and its mitigation.



Graphic Credit: FPAC



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