THE LOG JAM

Published by the Woodlot Association of Alberta (WAA)

December, 2018

Results of a wet freezing snowfall

Our Mission Statement

"The Woodlot Association of Alberta's purpose is to promote leadership in sustainable forest management by encouraging the development of Private forest by increasing awareness of their inherent social, economic and environmental values."

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Board of Directors

President's Report

Laval Bergeron

Sense of Purpose

« We strive to keep you informed, advocate on your behalf and protect the things that matter to you »

Hello everyone. This line is borrowed from someone else report. Since I've been writing them I tend to pay a little more attention to them and it stuck to me. So I thought I would share it. It is very appropriate to your Board of Directors and Association.

The last big issue that we had success with is the « Farm Woodlot Management Plan » to have your woodlot considered as a farming operation and dealt as such.I am surprised as to the amount of Woodlot owners, members or not, applying for the plan and making it a reality.
If you get your plan approved through the Association you get one free year of membership!

We had our first FF, face to face, meeting since the AGM, it was postponed a couple of times due to whether and due to the fact that we wanted a full Board present and it was, but one regret, fighting health issues and our thoughts are with him..
We got to meet the latest addition, Brian Mullen also serving as secretary. Thank you again.

In the past two months or so, you might have had a telephone call from one of the Directors asking you if you had issues concerning the Association, special needs and encouraging you in keeping your membership up to date. Paid up membership is crucial...

As a follow up to last year's story about the blow down on our woodlot, well we are back at it. With harvest finally over and trust me, it was long and at times it really didn't look like we were going to get done but whether shaped up a bit and gave the chance to most everyone to get it over with.
Back at it meaning, get the « skidder » out, sort the good and the not so good, firewood or sawmill bound..
With eight inches of snow on the ground the ski trail is ready and active and that means, yes, winter is here and on that note I wish you a good one.
Stay safe and make sure you visit that woodlot of yours as much as possible. Good place to be.

Happy Holidays

If your cellar is dark , there is danger of accidents when going down the stairs. Have the last step whitened so you may easily know when you are at the bottom. You can see this step plainly even in dim light.

Are trees on farms the future for the timber industry?

A multi-disciplinary research team is developing new models for growing trees on farms to help meet the needs of landholders, investors and the timber industry.

Project leader Professor Rod Keenan said the need for wood is increasing to meet future timber demands of Australian housing.

"The increasing use of wood in construction for design and environmental benefits will increase this demand as will the substantial push for renewable and sustainable products to replace plastics," Prof Keenan said.

"We are examining whether timber industry investment in trees on farms can provide their wood needs and also provide shade, shelter, carbon, water and biodiversity benefits.

A survey mailed to selected owners and managers of land in south-west Victoria and Gippsland asks about current agricultural activities, views on planting trees for harvest in the future and the importance of different factors when considering integrating trees with other land uses.

"We are working with industry, landholders and the finance community to develop innovative ways to provide benefits to farming and the environment, and meet demand for timber and wood products," Professor Keenan said.

"As well as generating more benefits from farm trees for farmers and the environment, the project is driven by growing global and local demand for wood.

"Importantly, new investment in trees can also contribute additional income for landowners and support new or expanded regional industries."

The study has found there is nearly a million hectares of suitable farmland in southern and eastern Victoria where timber trees could complement existing agricultural land uses.

"Planting 20 per cent of this area would help address our looming national wood shortage. Rural land prices are high, and it is generally not financially feasible, or socially acceptable, for the timber industry to buy whole properties for plantations," Professor Keenan said.

To help develop new business models, the project team is keen to hear from land owners and managers about integrating trees on farms. Participation in the survey is voluntary and it should take about 15 minutes to complete.

Project researcher Nerida Anderson said completing the survey does not commit people to planting trees.

Editors Note :

This article is from Australia and their timber resources are undoubtedly quite different from ours as much of the country is desert whereas our country is near 50% treed. But the difference between our two countries is really a matter of area covered by trees, the concerns are seemlier in that they are harvesting more than they can grow. This is true in most countries and we are no exception as we are experiencing a fully allotted timber supply which is threatened by the Pine Beetle and Forest Fires. Further more some are reducing the rotation age for conifers, the reason it is being reduced is to meet the annual allowable - cut, the results of this is that immature trees are being harvested which are experiencing their best diameter growth. These polices will in the long term reduce the allowable - cut because the volume just will not be there.

I believe that Australia is on the right track in encouraging land owners to plant trees, therefore it may well be a track that we should follow their example in that 20% of the land be planted to trees on some farmland. Even though our wood shortage is yet not evident but the wood shortage is clearly evident world wide within the next 100 years which is when a conifer planted today would be ready for harvest.

So keep your woodlot because a wood shortage will result in better prices, thus your grandchildren will be well pleased .

Bugs & Diseases

Vol. 29 No. 2
August 2018

The Feast of Larch Needles

A few years ago staff in Whitecourt noticed large stands of dying larch and decided to investigate. What we thought was an old fire turned out to be a stand filled with eastern larch beetle . Therefore, when we flew over a stand filled with yellow, red, and grey larch in early August this year, we made the assumption that these larches had succumb to the beetle as well. Weren't we surprised when we walked into this struggling stand to see it crawling with Larch Sawfly (*Pristiphora erichsonii)* larvae!

Larch sawfly larvae. Photo: B. Taylor

One thing every source I've read about the Larch Sawfly agrees on is that it is "the most damaging pest affecting larch". The reason for this is that two of the life stages of the Larch Sawfly cause damage to the larch tree. The adult Sawfly resembles a small black wasp with an orange band around its middle and it lays its eggs by cutting a slit in the ends twig to insert the eggs into the twig. The female lays approximately 75 eggs in rows, after which the twig will shrivel up. These droopy twigs can be early indicators of the Sawfly's presence in the stand. The eggs are laid throughout May will hatch into larvae about a week later.

The larvae are fairly distinctive looking, and we had no trouble marching the larvae found on the larch tree to the photos of Larch Sawfly in resources. They have a shiny circular black head and front legs, and an olive-grey body up to 20 mm in length. Young larvae will congregate on the tree trunk, and then disperse and climb into the crowns to consume the foliage. This is the most damaging life stage of the larch sawfly, as the defoliation causes loss of growth and stress to the tree. The branch, and eventually the whole tree, may die as a result of the defoliation. However, Larch can withstand defoliation better than other conifers, as it acts like a deciduous tree and will grow a new set of needles the following spring.

Once the larvae are mature, they will let go of the branches in the crown of the tree,

and fall to the ground. They will spin their cocoon in the littler layer on the forest floor and over-winter in that phase, perhaps using any heat from the ground or insulation from the above snow to survive the winter. Most pupae will emerge as adults the following spring; it's been noted that some will diapause for over 1 year before they emerge.

The jury seems to be out on whether the Larch Sawfly is a native or introduced pest. Some claim it is native and have found reduced growth rings in trees that they've dated back to the 1700's, while some say it was introduced from Europe and have documented outbreaks in Eastern Canada in the early 1800's. Either way you look at it, the entomologists agree that the Larch Sawfly outbreak in Eastern Canada had destroyed tracts of mature larch and that some sort of control was required.

Entomologist found that natural population checks for the Larch Sawfly included factors such as heat and predation; heat can cause mortality to the eggs or the larvae in the cocoon phase, and in terms of predation, vertebrate, invertebrate, and small mammals have been known to consume the larvae. High water tables can also keep the population in check, as when the Larch Sawfly creates its cocoon in the duff layer floods can cause the larvae to drown.

However, none of these natural checks were enough for the growing population, and in the early 1900's entomologists imported the parasitoid *Mesoleius tenthredinis* and *Olesicampe benefactor* to Canada. A release of the masked shrew was also performed in Newfoundland to allow predation on larch sawfly larvae in that area. Each form of control has varying amounts of success, depending on many factors. A release of parasites was even made in Alberta back in the 1970s to knock down the population at that time.

As for the stand we found here in Whitecourt, we plan to investigate this stand further. Our goal will be to quantify the severity of the infestation by surveying the area. Now that this pest is on our radar, we'll be keeping a close eye out for any spread into neighboring larch areas.

Infested Larch Stand showing mortality of trees. Photo: A. Brown

Undiscovered Country

A year in the life of a newly off the grid woodlot owner

By David McGregor

Part III - Quest for the 8-hour burn.

The first little tastes of winter began to appear early in September. Our wood supply is slowly gaining and the shed is nearly full. We started to burn wood sparingly at first, probably a bit anxious about the prospect of a September to April wood burning season. Because our house is well insulated it hasn't been a big deal if the fire burns out at 2 or 3 in the morning. However, we know the bitter cold nights are going to show up at any time.

When we decided to try the first year with only wood heat, there was a lot of literature and YouTube content bragging about 8, 10, or even 12 hour burn times with our stove (The Esse Ironheart). I knew in the back of my mind that most of these sources were coming from quite a bit further south than the Peace Country. Not only do their temperatures stay quite a bit higher, they talk about burning oak or maple like it is no big deal. Though I knew this, I had no clear idea of what the difference was.

I started taking different approaches to setting up the stove for the night. Slow burn, low but steady heat – out in a couple of hours without much effect on temperature. Very hot burn with a large spruce log put in and damped down – overheated the house but still cold in the morning. Then I got serious and scared up a few blocks of old maple scraps. I built a hot fire and popped them in only to find the same result – too hot and then out by morning.

The combo cook stove/heater is probably not in the same league as some of the ultra efficient wood stoves on the market but I had seen people getting these insanely long burns out of them. Was I being naïve about the potential of my standing dead spruce firewood… almost certainly.

Whether it was down to denial or too many other things to worry about, some warm weather returned and I left my experiments by the wayside. Usually making a fire in the evening and letting it die out through the night.

On one particularly coyote-howling-y clear night our new puppy began trying out her grown up bark. I got up and checked the yard, calmed the dog down and then noticed an orange glow in the main room. It was 4:30 in the morning and I hadn't touched the fire since the evening. Without really understanding, I tried to retrace how I had built the fire. I remembered a friend telling me about how a stove can only get so hot and then you are wasting heat. I had kept the fire going from late afternoon on at a steady medium heat and then loaded it and damped it down before bed.

The balance is subtle. Wood burning is almost like a language of its own and you have to learn to how to read the momentum of the burn as well as which pieces of wood you select to load next. Now I know it is possible! Is it easily repeatable? I'm not so sure.

Next Time: Indoor hours and Night Skiing

Up Coming Events

Board of Directors - Teleconference January 29, 2019
February 26 , 2019

All calls at 7pm

There will be a Face to Face meeting in March ____ , 2019

Classified ads

*These ads are **free** to all members , for the - sale and purchase of any item, or a service you can supply - or pets/livestock , etc.*

For Sale

D & L Double Cut Sawmill
Fully Hydraulic & Portable
One Person Operation
Operated for 500 hours
For Info Call 780-778-4272

For Sale

Sawmill - 48" Coutts working antique
Cat D1300 power, 12 ft. carriage,
Live slab roller, Sawdust blower.
Also mill yard and Woodlot for lease
in the Elmworth AB. area.
Call Larry @ 1-780-354-2710

Elm pruning ban in Alberta is over

The annual elm pruning ban in Alberta is over until March 31, 2019.

"With the annual ban now lifted, it's time to start taking the dead wood out of your elm trees," says Janet Feddes-Calpas, executive director, Society to Prevent Dutch Elm Disease (STOPDED). "To help eliminate elm bark beetle habitat, elm sanitation is essential to an integrated Dutch elm disease (DED) prevention program to keep Alberta DED free."

The only time it is legal to prune elms in Alberta is between October 1 and March 31. "This is when the elm bark beetles, responsible for spreading the deadly DED fungus, are not active," says Feddes-Calpas. "Elm bark beetles feed on healthy elms and breed and overwinter in dead and dying elm trees. If elm trees are pruned between April 1 and September 30, beetles will be drawn to the scent of the fresh pruning cuts, potentially infecting an otherwise healthy elm."

Having your tree pruned properly is important, says Feddes-Calpas. "STOPDED recommends that all trees be pruned by a professional arborist such as an ISA Certified Arborist. They will determine what type of pruning is necessary to maintain or improve the health, appearance and safety of your trees. Improper pruning, topping or removing an excessive amount of live wood is not recommended, as these types of pruning will weaken the tree's structure and shorten its lifespan. It's essential that all pruned elm wood be properly disposed of by burning, burying or chipping by March 31. And, it's illegal to store elm firewood since it could be harboring elm bark beetles."

While Alberta is still free of DED, its borders are being pressed from two sides, Saskatchewan and Montana, both of which are battling the disease. "Once an elm is infected with DED there is no cure and it must be removed and destroyed immediately," says Feddes-Calpas. "We must stay vigilant to keep our elms healthy. DED can be prevented."

For more information, call the STOPDED hotline at 1-877-837-ELMS or go to www.stopded.org. To find an ISA Certified Arborist, go to www.isaprairie.com.

Arborists Daria Kedzierska and Michael Gown (in bucket) pruningelm trees along University Ave. in Edmonton in February.

Give the Gift that Lasts

(Reminder Christmas is not that far away)

This an opportunity for you to give a friend, neighbor, or relative, whom you think would like to develop a patch of brush that is on their land into a Woodlot. A one year membership to the Woodlot Association of Alberta, for a reduced rate of $20.00.

How can you do this, Clip out the gift certificate application *(below)* fill it out and mail it to Herb Cerezke, 5916 - 87 ave. Edmonton, AB. T6B - 0K9 along with your cheque of $20.00 *(make cheque out to the Woodlot Association of Alberta)*

We will then send your candidate a certificate that he/she is now a member of the WAA for one year. Gifted to them by your self , along with a copy of the Log Jam .

(Regular one year membership fees are $ 30.00)

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I _____ would like to buy a one year membership to the Woodlot Association of Alberta as a gift at the reduced rate of $20.00 for:

For: Mr. / Mrs._____ of

_____ Phone No. _____

Mailing Address : _____

_____

E -mail Address_____

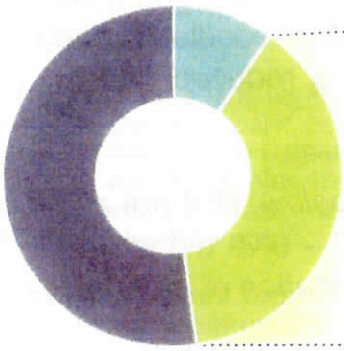
Enclosed is a cheque for $20.00 made out to the WAA

Signature _____

Canada's forests by the numbers

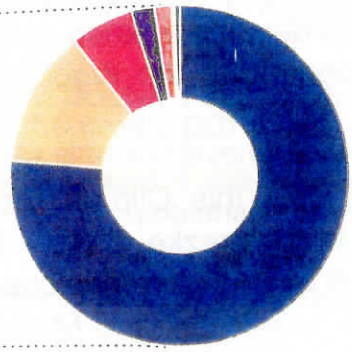
CANADA HAS: 347,069,000 HECTARES OF FOREST LAND

How much of Canada is forest?



Freshwater area	9%
Forest area	35%
Non forest land	56%

Who owns Canada's forests?



Provincial	76.6%	Federal	1.6%
Territorial	12.9%	Municipal	0.3%
Private	6.2%	Other	0.4%
Indigenous	2.0%		

What's the leading cause of disturbance in Canada's forests?

Area impacted by insects (2016): **15,489,117 ha (4.5%)**

Area burned by fire (2017): **3,371,833 ha (<1%)**

Area harvested (2016): **766,659 ha (<0.5%)**

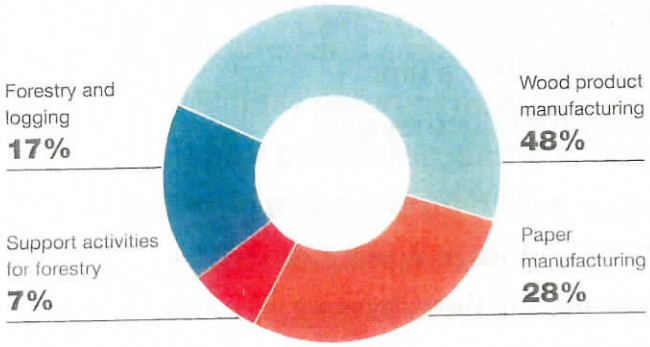
Area deforested (2016): **37,000 ha (0.01%)**

The forest industry contributed **$24.6 BILLION** (1.6%) to Canada's gross domestic product (GDP). (2017)

The forest industry directly employed **209,940** people (1.1% of total employment). (2017)

6% of those employed in the forest industry were **INDIGENOUS**. (2016)

Where do people work in the forest industry?



Women in the forest industry (2016)

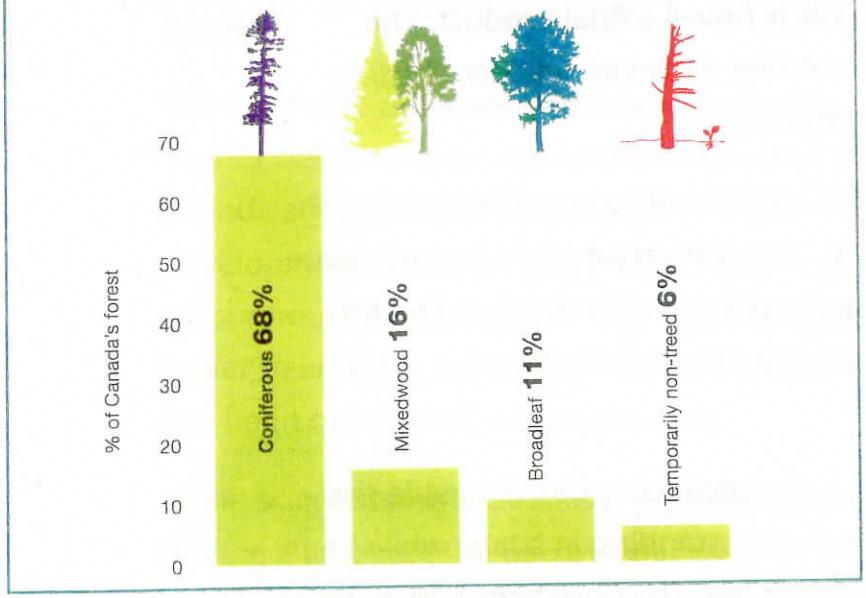
17% of people employed within the forest industry were women.

Of this:

23% of women worked in the forest—in logging, forestry, and forestry support activities.

77% of women worked in wood product manufacturing and the pulp and paper industry.

What types of forest does Canada have?



THE MOST COMMON TREE SPECIES in Canada is the black spruce.

2/3 OF ALL SPECIES in Canada are found in forest ecosystems.

49% OF CANADA'S FORESTS were certified to third party standards of sustainable forest management. (2017)

Over **615 MILLION SEEDLINGS** were planted on 410 thousand ha in Canada's forests. (2016)

Over **1,000 SPECIES** of invertebrates may be found in a single square metre of forest soil.

The future of beer may be in wood pulp bottles

For companies in North America and Europe, fibre packaging may become a new alternative to glass

For companies in North America and Europe, fibre packaging may become a new alternative to glass beer bottles and aluminum cans. When a wood fibre bottle is empty, it can be recycled into a bin. Additionally, the materials are so environmentally friendly they can biodegrade in your garden or compost heap.

Chances are you have already used a wood fibre product as a plate or bowl. While researchers at ecoXpac of Denmark are still determining how to make the transition to a food-safe container, there are few companies at the forefront of this next generation of packaging opportunities. Perhaps it is due to the lack of a final blueprint. EcoXpac has partnered with Carlsberg Group and come up with a bottle design, but have yet to publicly unveil a final product. The container design is sleek and resembles a traditional beer bottle in the Carlsberg beer colours and labelling.

"The bottle has been created with input from some of the leading packaging specialists in the world, who are very excited to participate in the project," says Håkon Langen, packaging innovation director. "Though we still have technical challenges to overcome, we're on track on the project."

One necessity to be determined is the secondary barrier inside the fibre bottle which would keep the bottle standing in shape while beer was stored inside for long periods of time. The fibre beer bottles must be specially designed to hold the liquid and keep a barrier between it and the actual wood fibre bottle.

Though exact techniques remain proprietary, the process is similar to a Type 4 moulded fibre process. The basic steps of production start by

combining the recycled paper and water in a slurry which then goes through a screen and is dried in layers to a moulding machine. The end product is oven heated. It is a bit like paper mâché on a mass production level. Custom colours and formulations can be added and forms can be designed to meet the exact specifications of the customer. According to ecoXpac, up to 600 units per hour can be created using this process.

In a Type 4 paper moulding process, the designs may be printed, coloured and embossed, and include special additives. EcoXpac offers a slightly different heating and curing method than the traditional Type 4 processing, and is known as the Impulse Drying Technique. Using thermoformed fibre, ecoXpac can eliminate much of the evaporation necessary to fully dry the end product by using a combination of pressure and flash heating. This significantly reduces the water needed to create the final product, as well as the energy to heat dry. This Danish technology makes good use of water which would otherwise be wasted, and ensures the least amount of water necessary is pumped through the system in order to get to the final product.

The food-safe additives which would need to be used to form an inner barrier between beer and bottle have yet to be publicly announced. All indications show that this aspect is still in research and development, and that may be the reason other companies throughout North America have failed to embrace the idea of the paper beer bottle. Some research indicates that a milk-based barrier has been considered as one solution.

While scientists with Carlsberg and ecoXpac say they are close to finding a solution, the barrier which will be produced must be in line with the companies' mutual goals of an ecofriendly and sustainable end product. Expect to hear more about the project and, according to Carlsberg, see and taste its product in a wood fibre beer bottle sometime in 2018.

Editorial

JURGEN

Yes it is here again the long - long winter time that most Canadians talk a lot about and hope that it is not too cold- snowy - and most of all not too long. But the high-point is that at the very shortest and darkest days it is time for the Christmas festival, fallowed by the New Years celebration, which lifts most peoples spirits.

But for many who find that two weeks of celebration with to much rich food sweet drinks and loving family, is too much so they turn to exercise in nature These could be ski-ing either cross country or down hill, snow-shoeing through the forest, skating on a pond and a friendly hockey game. Many are followed with a camp-fire and wiener/marshmallow roast. Then there are those that love their snow machines and go riding with some friends for some 50+ km.

There are also some like myself who just go for a walk it may be only a km or less but if by your self which makes one quite so stop every once in a while to hear the sounds of life in the woodlot. The thing is that the woodlands in winter are much more quite than in the summer, if you and listen for time you will hear squirrel, winter birds such as the chick-a-dee-dee, blue jay or the grey-jay (my favourite bird). you will see the tracks of many forest animals but may never see them, but they may well see you.

Today as I am writing this is the first real day of winter (Nov 3) cause it is alternating from rain to snow, windy and very dreary enough to make one feel down at the mouth, plus today it will get dark an hour earlier as clocks were rolled back last night.

I think I will go for a walk in my woodlot which will make me feel better. But before I go I want to — WISH ALL OUR MEMBERS A

MERRY CHRISTMAS and a HAPPY NEW YEAR

9 out of 10 Canadians Are Happier When They Spend Time in Nature

Nature Conservancy of Canada (NCC) announces $750 million Landmark Campaign, inspiring Canadians to explore relationship with nature

TORONTO, Sept. 27, 2018 /CNW/ - The Nature and Me survey, released by the Nature Conservancy of Canada (NCC) in partnership with Ipsos Public Affairs reveals a growing disconnect between

Canadians and nature. Canadians feel happier, healthier and more productive when they are connected to nature and yet, 74 per cent say that it is simply easier to spend time indoors and 66 per cent say they spend less time in nature today than in their youth.

The survey is being released as part of NCC's announcement of the Landmark Campaign - the largest charitable campaign for conservation in Canadian history. This $750-million campaign will double the land and water conserved by NCC to more than 6 million acres, including 500 new conservation projects. To inspire Canadians, NCC has also curated a pop-up art exhibit called *Nature and Me*. The exhibit features nature photography and reflections from notable Canadians.

"We are at a turning point," says John Lounds, NCC's President and CEO. "It's time to talk boldly about the tangible benefits nature provides, and the urgency and importance of protecting it. Nature is Canada's gift to the world and we have an opportunity, perhaps more than any other country, to make conservation count. It will take young and old alike, working together, to protect the laadnd, water and wildlife so unique to Canada. That's what the Landmark Campaign is about."

"Respect for the planet and each other — these are core values, both for myself and for Kicking Horse Coffee," said Elana Rosenfeld, Kicking Horse Coffee Co-Founder, CEO and NCC Donor. "NCC is committed to protecting Canada's great natural spaces, for everyone's benefit. Their values are aligned with ours, and I'm proud to contribute to an incredibly compelling initiative — the Landmark Campaign."

The Landmark Campaign

Canadian forests, wetlands, grasslands, freshwater and coastline habitats are all declining at a rapid rate. In fact, habitat loss is the leading threat to Canada's wildlife, especially our most endangered species. The Landmark Campaign is building momentum, having already raised $551-million and completed 400 of 500 projects. These projects are restoring rare habitats, supporting species at risk, and improving the quality of our air and water.

Nature and Me Survey Results:

- More than 80 per cent worry that accessible natural areas will not be there for future generations to enjoy.
- 94 per cent of Canadians are aware of the benefits that spending time in nature can bring to their physical and mental health.

Is energy from woody biomass positive for the climate?

IEA Bioenergy, January 2018

Energy from woody biomass can be very positive for the climate, particularly when applying sustainable forest management practices, and when the biomass is used efficiently (such as in combined heat and power plants and biorefineries).

Considering the crucial role of forests to the climate and many other ecosystem services, **sustainable forest management is key to maintaining healthy and productive forests, and for controlling harvest levels so as to maintain or increase carbon stocks in forests**[1]. Within this overall framework, efforts to increase global forest area through reforestation and afforestation, and management strategies aimed at maintaining or increasing carbon stocks, while also producing an annual sustained yield of timber, fibre and energy from forests are very important for climate change mitigation; these strategies contribute to **replacing carbon-intensive materials and fossil fuels, which is crucial in future decarbonisation strategies**.

Most woody biomass sourced for energy is a by-product or residue of forestry operations and forest industry. Examples from forest management include thinnings, diseased or low quality trees, tops and branches; examples from forest industry include shavings, sawdust, bark and black liquor. Generally, the primary forest sector aim is to produce high value products, such as sawnwood and wood panels, or pulp and paper. **Using by-products and residues for energy has typically been found to achieve climate change mitigation benefits in the short term**. It is not recommended to use long-rotation high quality stemwood for energy[2], or cutting entire forests to generate bioenergy. Nevertheless, lower-value roundwood from short rotation forestry, thinnings, diseased or low quality trees should not be excluded.

1. *Fossil vs biogenic CO_2 emissions*

Some people are puzzled about how bioenergy can contribute to climate change mitigation because burning biomass emits carbon dioxide (CO_2). There have even been headlines in the media claiming that "biomass is worse than coal". In fact, it is perfectly true that a bit more CO_2 is released per unit energy from biomass than from black coal – this is purely a consequence of the chemical composition of biomass and coal. However, statements like "the use of woody biomass for energy will release higher levels of emissions than coal" overlook the fundamental difference between energy supply from fossil fuels and from biomass: **burning fossil fuels releases carbon that has been locked up in the ground for millions of years, while burning biomass emits carbon that is part of the biogenic carbon cycle**. In other words, fossil fuel use increases the total amount of carbon in the biosphere-atmosphere system while bioenergy systems operates *within* this system; biomass combustion simply returns to the atmosphere the carbon that was absorbed as the plants grew (Figure 1).

The net greenhouse gas (GHG) outcome of using biomass for energy cannot be determined by comparing emissions at the point of combustion. Instead, the biogenic carbon flows and any fossil GHG emissions associated with the bioenergy system need to be compared with the GHG emissions associated with the energy system displaced, considering also biogenic carbon flows in the absence of the bioenergy system.

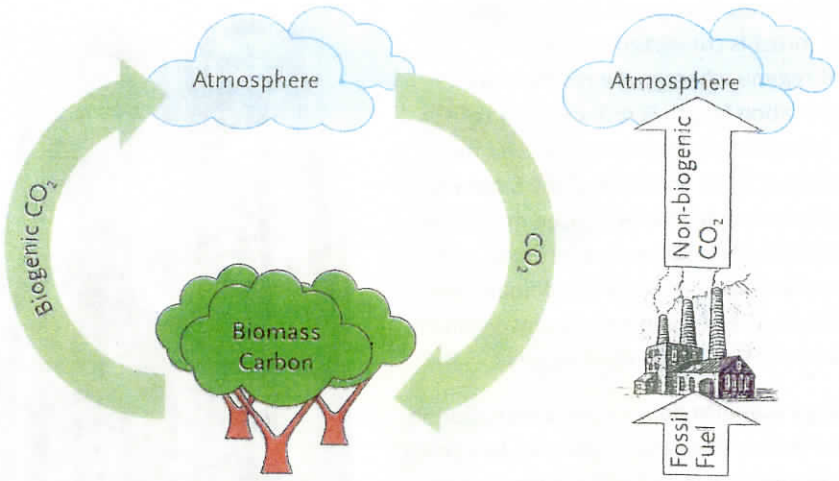


Figure 1: IPCC distinguishes between the slow domain of the carbon cycle, where turnover times exceed 10,000 years, and the fast domain (the atmosphere, ocean, vegetation and soil), vegetation and soil carbon have turnover times in the magnitude of 1– 100 and 10– 500 years, respectively. Fossil fuel transfers carbon from the slow domain to the fast domain, while bioenergy systems operate within the fast domain. (source: National Council for Air and Stream Improvement)

2. Carbon neutrality

Bioenergy is commonly said to be "carbon neutral", but this is an unhelpful term because it is ambiguous, and used differently in different contexts. Within the biospheric carbon cycle, bioenergy can be carbon neutral because the carbon that is released during combustion has previously been sequestered from the atmosphere and will be sequestered again as the plants regrow, i.e. if sustainably produced. However, **the full supply chain must be considered**, and all emissions associated with the production, processing, transport and use of bioenergy need to be included. Particularly harvesting, transport and processing generally involves fossil energy use. Nevertheless, analysis shows that the **fossil energy used in the supply chain is generally a small fraction of the energy content of the bioenergy product**, even for woody biomass transported over long distance, e.g. between North America and Europe.

The important issues in terms of climate impacts relate to **how the forest carbon cycle is affected by management changes to provide biomass for bioenergy in addition to other forest products**. With respect to the forest, the key issue is the net assimilation of carbon (carbon sink strength) and associated changes in carbon stock in forest soils and vegetation and/or harvested wood products, and carbon losses through natural disturbances such as fires or insect attacks.

3. Timing of greenhouse gas emissions

Another important issue which is often raised is the asynchrony between the timing of emissions and sequestration, particularly when biomass is obtained from long rotation forests, where a stand takes decades to regrow. In reality, a forest usually comprises stands of different ages, managed such that different stands are harvested each year. Thus, **considered across the whole forest estate, stand level fluctuations in carbon stock are evened out**. If the annual cut is equal to the annual growth, at estate level, the carbon stock of the whole forest will remain constant. If the annual cut is less than the annual growth, the forest will have a net sequestration of carbon, while also providing wood for

products and biomass for energy. It is important to note that if a forest is converted to a new management regime where more residues are extracted or rotation length is reduced, the carbon stock of the forest estate may decrease, and this should be included as an emission of the bioenergy system. It is also possible that enhanced management (e.g. improved site preparation, use of nurse trees, advanced genetics) stimulated by the demand for bioenergy, will reduce or even negate any decline in carbon stock under the bioenergy scenario.

If the bioenergy scenario does cause a reduction in forest carbon stocks, this carbon cost can be repaid if the biomass displaces use of fossil energy sources. Climate benefits will continue to accumulate with each successive harvest. The payback time can be almost immediate when biomass is obtained from annual plants or residues that would otherwise decay rapidly, and are used efficiently (such as in combined heat and power plants or biorefineries) to displace greenhouse gas-intensive fossil resources. Bioenergy based on by-products from forest industry processes (sawdust, bark, black liquor etc.), as well as tops and branches and biomass from some silviculture operations such as fire prevention and salvage logging are typically found to achieve climate change mitigation in the short term. However, some studies have shown payback times of decades or longer in other bioenergy systems, particularly when considering slowly decaying residues and long-rotation roundwood as feedstock.

Nevertheless, the focus on short term carbon balances may be misleading. Considering the long residence time of CO_2 in the atmosphere, it is less important whether carbon in forest residues is emitted to the atmosphere soon after the forestry operations take place (such as when used for energy) or is emitted in the course of the next few decades (such as when the residues are left in the forest to decay). **What matters most is whether increasing use of forest biomass for energy leads to systematic changes in the forest carbon stocks and a reduction of fossil energy use.**

4. Forest management and market responses

Biomass extraction for energy is one of many interacting factors influencing the development of forest carbon stocks. Forest management to supply other product markets (Figure 2), the forest ecosystem structure (species composition), and natural conditions (climate, soil type, topography) also have an impact on development of carbon stocks. **In a sustainably managed forest, silvicultural operations and harvest activities are coordinated across the forest landscape to maintain a healthy forest and to obtain a continuous flow of wood for society, while maintaining or increasing wood volume in the forest.** Carbon losses (through harvest) in some stands are balanced by carbon gains (growth) in other stands, so that across the whole forest landscape the fluctuations in carbon stock even out. In their fifth assessment report, IPCC stated that in the long term, such sustainable forest management strategies will generate the largest sustained greenhouse gas mitigation benefit from forests (through the combination of maintaining/increasing carbon storage in the forest, and replacing carbon-intensive materials and fossil fuels).

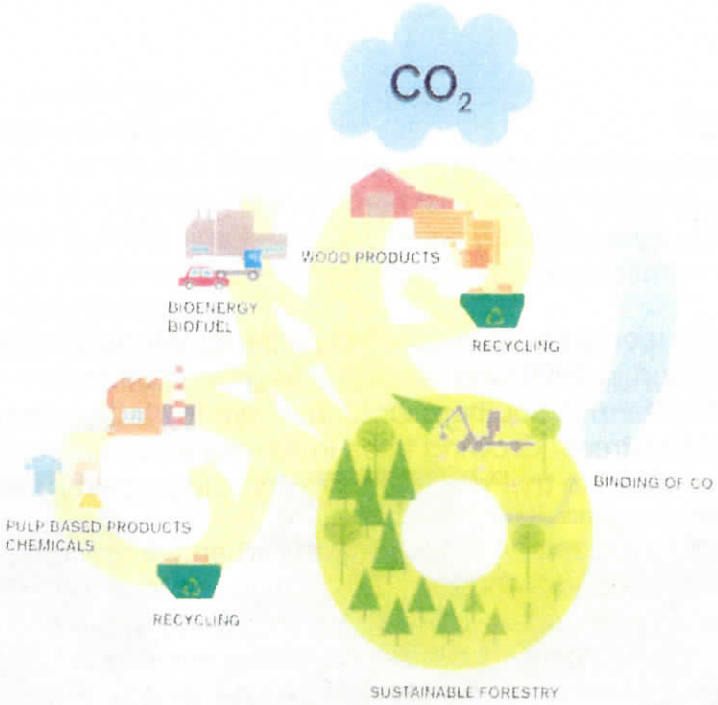


Figure 2: Forest bioenergy systems are often components in value chains or production processes that also produce material products, such as sawnwood, pulp, paper, and chemicals.

Climate impacts of bioenergy are commonly quantified by comparing with a reference "no-bioenergy" scenario. Some claim that forests would remain unharvested and continue to grow in the reference scenario; however, extraction of biomass for bioenergy is generally not the main economic driver for wood harvests. Moreover, **unharvested forests have declining carbon uptake over time** because growth rates diminish as forests get older and approach maturity, or high tree density constrains further growth. As growth rates decrease, the forest moves towards a steady-state, where carbon uptake is balanced with the carbon release from decaying trees that died from natural causes. Unmanaged forests are also at greater risk of disturbance from fires, storms and insect attacks, which can lead to high decreases in carbon stocks.

Thinning, where some smaller trees are cut to promote better growth of the remaining trees, is the main method of influencing growth and development in production forests. Thinning promotes the production of high-quality stemwood and can stimulate increased growth rate of the forest stand. Thus, **utilisation of thinned trees for bioenergy is beneficial both to the carbon balance of the forest-product system and also to future production of high-value timber** (harvested stemwood), which is typically much less greenhouse-intensive than alternatives such as concrete, steel or bricks.

Forest management is linked to economic incentives and market expectations of forest owners for different forest products. Emerging bioenergy markets, along with the outlook for other forest product markets, influence the decisions of forest managers. **A market for bioenergy can support investment in forest improvement** – to enhance health and productivity of the forest, which in turn positively influences forest carbon stocks. For example, forest owners that are positive about future forest product markets may implement measures to protect their forests against disturbances, replanting and tending the forest and introducing more productive tree species and provenances where appropriate. They may also be less inclined to convert forested areas to agriculture or other land uses in regions where legislation does not prevent conversion, and they may even be inclined to increase the forested area. Moreover, **reforestation and afforestation of degraded lands** results in carbon sequestration in biomass and soils; to the extent that bioenergy demand is a driver for such activities the carbon sequestration can be considered an additional contribution to climate mitigation provided by the bioenergy system.

My Woodlot

Gord and Brenda Doherty

Our woodlot is located near Whitecourt, Alberta. We purchased a quarter section of land in 1999 with the intent to grow Christmas trees. I grew up on a farm in southern Ontario where my father and grand father grew Christmas trees. Growing trees in Alberta was something that I had always wanted to try.Prior to purchasing the property, I enjoyed hunting on our land for many years.

There was only a grass trail to the property when we purchased it. In order to talk the wife and 3 children into coming out to enjoy the land I had to build an outhouse. I started clearing a path at the corner of the property with a chain saw to where we would eventually build our house. For the next 2 years we made ATV trails and cleared a few acres to grow Christmas trees. Spending time at the property and riding the trails with the family allowed me to learn the water shed of the property.

We moved onto our property, from Mayerthorpe, in 2003. We started with 450 lodge pole pine (not buy choice). Once the pine were 4-5 feet tall the wildlife thought there were great trees to run the velvet off their antlers and wipe out about 30% of the trees.

Our next attempt for Christmas trees was in 2003 when we planted white spruce, approximately 2000. That year we had no rain and we were fearful we would loose the trees that we planted but the seedling survived the drought and the grasshoppers that year. Pruning and cutting grass around the trees took up about forty hours of each summer. I had looked into growing echinacia, even made a garden plot to grow it, but backed out of the idea. We were given white spruce seedlings that had might of been frozen. We planted 700 under the canopy of mature poplar and 500 in the garden plot. It has been interesting watching the trees grow for the past 10-12 years.

In 2009 we received around 8000 white spruce seedlings with tree planters through the Woodlot Association. The trees were planted throughout the property. These trees have done extremely well and hopefully mature to enhance the property in years to come.

In 2004, I purchased a woodmizer LT40 Hydraulic Bandsaw Sawmill, this was intended to be a hobby. Within 2 years I purchased a new mill bandsaw and retired from the Blue Ridge lumber mill after 18 years as a millwright. This summer, 2018, I sawed a log from one of the pine trees that we planted as a seedling.

Living here has given us the opportunity to enjoy wildlife including elk, moose, deer, lynx and coyotes as well as numerous birds and even a few wild boar. Today I shoot more with a camera then a gun.

We have have been rewarded with selling Christmas trees over the last five years and have enjoyed it. The family join us with the grandchildren and it has become a tradition not only for our family but for the many families who

are coming back year after year.
In 2015 we opened up a B&B.
The B&B has brought us visitors from all over the world including South Korea, China, New Zealand and France, as well local families come to stay. Our home and the B&B we have 3 wood burning fireplaces. We enjoy the fireplaces but hauling the wood seems at rimes to be never ending.In a few years the grandchildren will be old enough to help us with this chore. If you
are in the area and in need of a Christmas tree, stop by for a cup of hot chocolate and smore cooked on the outside fire, built to keep warm and for the enjoyment of our customers.

My home and the B & B on the woodlot

Never get tired of seeing the abundant wildlife

The sawmill that is now a hobby

One of my five Grandchildren at the Christmas Tree field