Forestry and Carbon in British Columbia: Summary

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It's Now or Never

Humanity has but 20-30 years to forestall runaway climate warming. We are urged to reduce greenhouse gas (GHG) emissions drastically, and to achieve net zero emissions by 2050. **The imperative is to avoid carbon emissions now**, not to rely on deathbed salvation through increased carbon uptake and storage 30 to 80+ years from now.

The BC Climate Change Strategy of 2018 (aka CleanBC) is ambitious and includes many specific actions to reduce GHG emissions, especially in the transportation, 'built environment', and energy sectors. But the new strategy skates around forestry and the forest sector. Recent forest policy announcements don't even mention forestry's key role in climate change mitigation. Forests fix and store huge amounts of carbon, and forestry is by far the biggest source of carbon emissions in BC. Yet the unruly dynamics of forest carbon are not fully reported in provincial emissions totals. The standard voodoo accounting treats forestry and related subsectors like bioenergy as carbon neutral, not counting their emissions as GHGs because in theory the trees will grow back—even if it takes until 2100 and beyond.

BC's forest carbon strategy favours accelerated logging, more wood products, and more bioenergy. The mantra goes like this. *Our forests will all soon burn up, fall to beetles, or blow down anyway. So we should quickly log much more, store the carbon in long-lasting wood products and landfills, use the logging debris for biofuel, and promptly reforest to take up more carbon.*

Myth and Reality

Here are seven forest carbon myths, misconceptions, or oversimplifications tied to this strategy.

1) Forestry is carbon neutral.

It could be but usually isn't. Logging primary, mature and old forests and converting them to secondary, managed forests releases large and essentially unrecoverable amounts of carbon to the atmosphere, even when off-site storage in wood products is factored in.

2) Young forests take up more carbon than they emit and are 'carbon sinks'; old forests take up less carbon than they emit, are 'carbon sources', and contribute to climate warming.

The second part of that oversimplification is mostly false. Forests both absorb and release carbon throughout their life. The balance between uptake and emission determines whether a forest is a carbon sink or a source. Most old forests fix more carbon than they emit. Net carbon uptake in old forests does level off or decrease, but total storage increases. Old forests store much more carbon on site than do young post-logging forests.

3) **Mature and old forests are impermanent carbon banks doomed by wildfire, insects, and diseases.**
BC forests will not disappear overnight. Although all eventually will be replaced, currently they are carbon banks. Their stored carbon has much greater **time value** now and in the crucial next 30 years than uptake by juvenile forests or storage recouped over 75+ post-logging years. Whether a source or a sink at any given moment, BC forests continue to store megatonnes of carbon as long as they still have trees on site—even if the trees are dead.

4) **Trees will grow faster and forest productivity will be enhanced as climate continues to become warmer and wetter and as CO_2 levels rise.**
Unlikely to be a widespread response in BC. Forest productivity will be constrained by: increasing moisture stress in many areas; more wildfires and problems with insect pests and diseases; short-lived effects of extra CO_2; and reduced resilience of managed forests.

5) **Production forestry slows global warming because logging shifts carbon to long-lasting products, and replacement forests rapidly absorb more carbon.**
This argument is flawed on several counts:
- Most forest carbon is lost as residues from harvesting and processing. Only a small fraction ends up in 'longer-lived' products.
- Wood products in practice often don't last very long.
- Logging roads and landings remove much carbon storage potential.
- Producing lumber or shunting wood products to landfills does not fix carbon, rather it shifts some tree carbon elsewhere and releases to the atmosphere other carbon, from the forest and from burning fossil fuels. The net result is an increase in emissions, notwithstanding carbon uptake by the young forests.

6) **Intensive plantation forestry maximizes storage of carbon by fixing lots of it and substituting wood products for fossil-fuel-intensive products.**
In terms of carbon stewardship, agroindustrial forestry is a losing proposition. Emissions from logging and forest management cannot be simply offset on paper by reforestation because it takes a **long time** for trees and forests to grow back. Intensively managed, short-rotation stands will not attain the original levels of carbon storage, thus incurring a permanent 'carbon debt'. If wood products substitute for concrete and steel in construction, the presumed benefits would be cumulative and would exceed the carbon storage of an unlogged forest only after many decades, if ever.

7) **Generating energy by burning woody biomass is both renewable and carbon neutral. Wood pellets help fight climate change.**
Large-scale production of bioenergy from forests is not GHG neutral, nor is it sustainable or environmentally friendly. Yes, wood is renewable but its regrowth takes several decades at least (mostly more than 75 years in BC). Wood also has low *energy density*. For equal heat, you must burn more woody fuel than fossil fuels, **giving off more CO_2**. Burning wood pellets **will not** help reduce human-caused emissions of CO_2 to the atmosphere by 2050.

Key Conclusions

Forests both absorb and release carbon, resulting in a dynamic balance that changes over time, depending on stand age and on type and intensity of disturbance. The relative balance between absorption and emission determines whether a particular forest ecosystem is a net carbon source or a sink. Depending on how they naturally function, and how they are managed, forests can therefore either contribute to or reduce greenhouse gas emissions and climate change.

Whether BC forests are a net source or a sink at any given moment, they continue to store megatonnes of carbon as long as they still have trees on site—even if the trees are dead. If we are serious about carbon stewardship we should protect more forest, especially old carbon-rich forests that have a good chance of being with us for decades and centuries to come (in other words, prioritized protection of long-lived coastal, interior wetbelt, and wetter high-elevation forests).

Old-growth forests steadily accumulate carbon for centuries. When old forests are logged, there is a net release of carbon to the atmosphere for decades and sometimes for over a century. Logging results not only in losses to above- and below-ground carbon stocks, but also in lower rates of sequestration for one to several decades, until rates of net carbon uptake in the secondary forest return to pre-harvest rates.

Although all BC forests will eventually be replaced—suddenly, episodically, or gradually—currently they are carbon banks. Their stored carbon has much greater **time value** now and in the crucial next three decades than projected carbon uptake and incremental storage over the next seven or more decades. Keeping forests buys time to develop alternative strategies to reduce CO_2 emissions, to change our behaviour, and also to establish a lower GHG base level. Replacing persistent, old, carbon-rich forests with juvenile plantations does not make sense in the present dire circumstances.

Bioenergy from wood can make economic sense as a secondary by-product industry, where there is 'waste' from existing processing facilities, such as sawmills. Pellet production from harvest residues could also help reduce the air pollution caused by slashburning, but it **will not** help reduce anthropogenic emissions of CO_2 to the atmosphere by 2040 or 2050. Large-scale production of bioenergy from forest biomass is not GHG neutral, nor is it sustainable or environmentally friendly.

Notwithstanding the "fierce urgency" of the next 2-3 decades, BC will probably need to pursue all feasible options to mitigate climate change, whether they provide short- or long-term GHG reduction benefits.

It's not just about carbon. Forests are much more than mere carbon factories. Forests are critical to sustaining the web of life/biodiversity; conserving natural capital and maintaining ecosystem services; providing habitat connectivity; and strengthening our Life Support System. Forests also have deep cultural and spiritual significance for humans. BC's forests have many different values and provide multiple goods and services, including clean water, wood, wildlife, food and medicinal plants, other non-timber forest resources, recreational opportunities, and aesthetic and spiritual experiences.

Recommendations

1) Develop and implement a strategy for forest carbon stewardship.

- Focus on specific, carbon-rich, less disturbance-prone ecosystem types, in particular humid forests and associated peatlands.
- Protect more of such ecosystems, especially old carbon-rich forests that have a good chance of being with us for decades and centuries to come. For example, establish 'carbon buffer forests' or 'carbon protection forests' in selected areas of wet coastal (coastal temperate rainforest), wet subalpine, and interior wetbelt (inland temperate rainforest) forest land. Include in the 'carbon buffer' area adjacent secondary forests that have been logged or that have experienced stand-replacing natural disturbances. Replant them if necessary and allow them to regrow, become old, and realise their carbon bank potential.

2) Broaden core protected areas into a climate conservation network.

Establish new conservation areas designated primarily for biodiversity and ecosystem services, especially carbon storage and sequestration. Increase the area and effectiveness of the protected area network and provide incentives for beyond-reserve conservation to maximise carbon stocks and biodiversity, and hence the resilience of ecosystems.

3) Prevent catastrophic wildfire—if we can.

- Requires the right mix of legislation, policy, licensee incentives, some prescribed fire, and building a network of landscape level discontinuity that is sensitive to both fire management objectives and ecological function.
- This is a much needed but complicated initiative that must be an integral part of higher level planning and embedded in Ministry of Forests etc. (FLNRORD) policy.

4) Reduce energy consumption and increase its efficiency, conserve existing natural forests, restore/rehabilitate disturbed or degraded forests.

5) Reduce the allowable annual cut (AAC) to sustainable levels.

- In an orderly but accelerated fashion, starting with the Timber Supply Areas where timber supply reviews and AAC determinations are already due or overdue.
- Use realistic estimates of a) the limited harvest opportunities that marginal & remote stands could provide, and b) projected losses due to insects, disease, fire, windthrow, frost damage, susceptible growing stock—all interacting in a rapidly changing climate.
- Include a more balanced consideration of the full range of forest resource values; in 2019 it's not just about maintaining timber supply.
- Permanently reserve more old forest stands and remove them from the timber harvesting land base (THLB).

6) Do more partial cutting and less clearcutting, especially in primary forests.

- Instead of cutting down all the trees in a cutblock and then removing the most desirable logs and leaving the rest on the ground, retain some standing trees, in groups or patches and as individuals. This would reduce logging debris and losses of tree carbon to logging.

- Do the partial cutting in ways that mitigate wildfire (e.g., promote stand structure that helps prevent running crown fire and reduces rate of spread on the ground) and still maintain ecosystem function and some timber supply.
- But don't do the same thing everywhere.

7) Manage more commercial forests on extended rotations.
Longer rotations result in more carbon stored per hectare.

8) Reduce drastically the amount of slash burning.
- Improve harvest utilisation and reduce logging debris (slash) in cutblocks.
- Perhaps make biochar (charcoal from incomplete combustion of organic materials) from the slash and use it to amend the soil and store carbon for centuries or millenia.
- Pile but don't burn the slash.
- Combined approach: take sawlogs to mills, convert much of what remains to biochar, tipi some non-commercial poles for slow decay, spread some large pieces for ecological reasons, and bury the rest.
- Apply the BC Carbon Tax to the burning of slash.

9) Continue planting trees to remove CO2 from the atmosphere in the future.
- Concurrently do more work on tree species/stock selection for adaptive reforestation, and on assisted migration of tree species that might more effectively mitigate climate change while producing wood.
- In some clearcuts, establish plantations with higher densities so as to sequester more carbon, buffer some forest health impacts, and create a stand condition that, at 20 to 40 years of age, is (reportedly) relatively fire resistant.

10) Husband the forests that we still have and avoid converting them to alternative uses.