Forest Management in Finland – Learnings for BC Forestry

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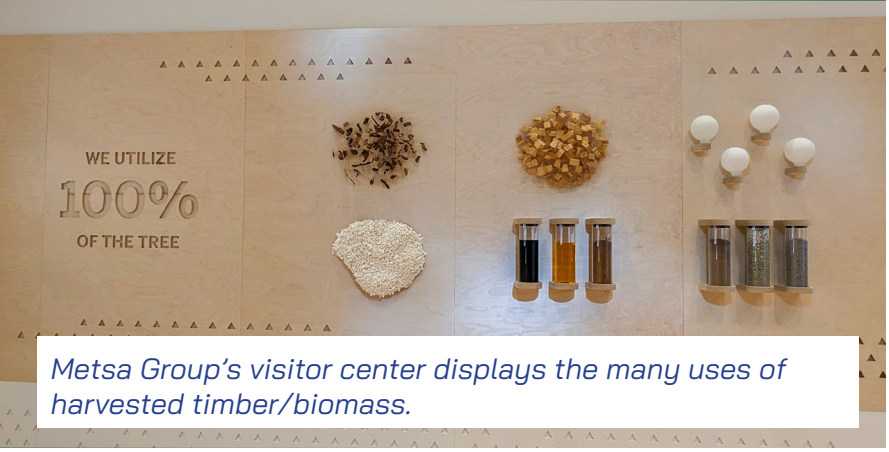
Imagine a forest industry championed by its government and people – a source of great pride, deeply valued and ingrained in the culture and character of the country. Guided by a clearly stated and regularly updated vision that embraces a changing world and new information. An industry integrated with the systems and infrastructure of public services, and at the forefront of technology and innovation. An industry sustainably managing forests while reducing the risk of wildfire and pest outbreaks. An industry functioning as a part of a holistic and sustainable bioeconomy.

A group of BC Foresters recently travelled to Finland on a study tour led by UBC Forestry to better understand the history, practices, motivations and objectives which have led to Finland's world-class forest sector, supporting a proud and vibrant society.

Finland has a long history of intensive and sustainable forest management in their boreal forests and maintains a robust timber supply using a range of silvicultural tools such as thinnings, small scale final fellings, and continuous cover forestry. While these practices have provided the country extensive benefits, the Finns acknowledged concerns around biodiversity (e.g. a lack of dead wood, snags and coarse woody debris) in intensively managed stands. Striking the right balance between timber production and ecosystem management is being approached using research, data, monitoring, and a continuous improvement cycle. This approach to addressing issues was seen repeatedly during the tour.

The group learned that Finland's forests cover 22.8 million hectares and support a harvest level of approximately 75 million m3/year of primarily Norway spruce, Scots pine, and Silver birch. The total volume of wood and carbon stored in the forest has been increasing since the 1970s. Approximately 13% of the forest falls in protected areas. A significant diversity in stands types were observed while traveling across the landscape (different species mixes, vertical layers, and stand ages).

Many aspects of Finland's forest sector are very different from our situation in BC (extensive private land ownership, greater resolution of indigenous ownership, more homogenous ecosystems, gentle topography, extensive road and bioenergy infrastructure, etc.), but there are still many ideas that are relevant in the BC context.



Metsa Group's visitor center displays the many uses of harvested timber/biomass.

What do the forest practices and industry structure look like? A key difference is the amount of private land ownership. In Finland, almost 60% of forested land is owned privately, with 660,000 private landowners who own on average 32 hectares. Twenty percent (20%) of Finns over 20 years old own forested land. The forest industry owns 9% and the government manages the remaining forest land, mostly located in parks and northern Finland through a state-owned agency. This level of private ownership, much of it multi-generational, ensures Finns are connected to the land. In BC, forest tenure holders are more like tenants, focused on accessing timber while meeting short-term legal obligations like achieving 'free growing' regeneration. In Finland, landowners seek to maximize value from their forests by investing in their forests for both short and long-term returns. A long-term, value-based approach to forest management is clearly needed on a subset of BC lands.

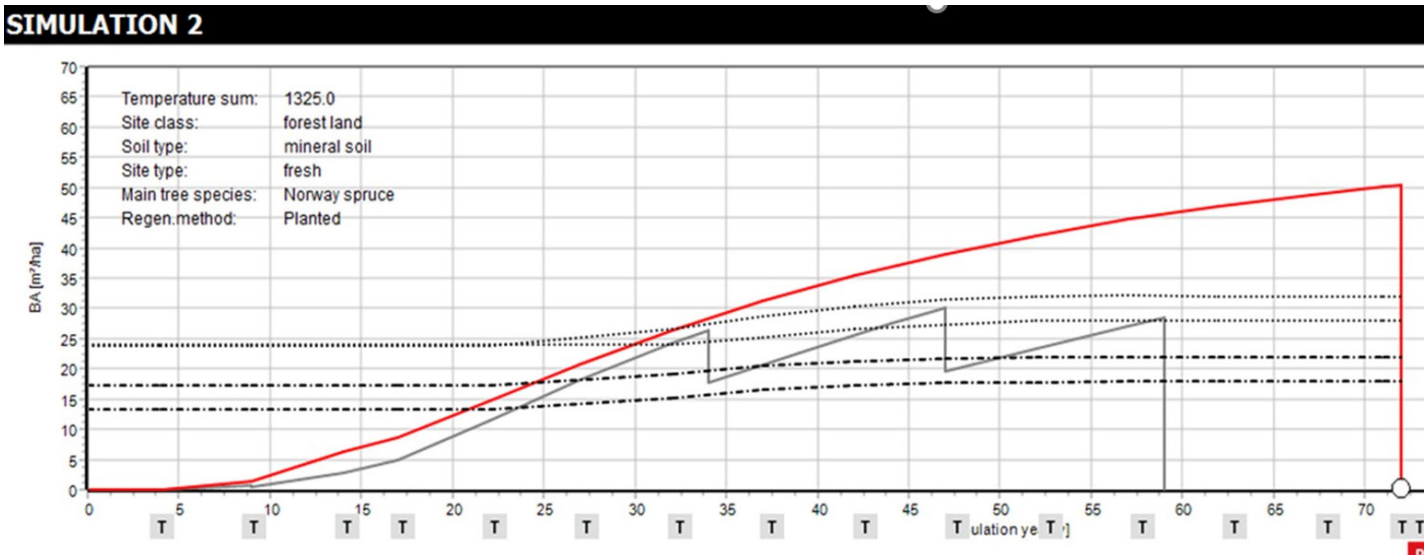
The level of public interest and engagement with forested lands in Finland is important. Forests persist deep in Finland's culture from spiritual and recreational uses to sustenance, housing and revenue generation. Forests are part of the national identity in Finland and are culturally interwoven throughout history in the economy, food, cemeteries, marriage, and heating with wood (which replaced Russian oil and gas in a strategic policy). A Finnish policy, Every Person's Right, allows everyone access to private lands for hiking, berry picking and recreation which helps support a positive societal view of forest lands. The culture appears biased toward 'active forest management' outside of national parks. There is visible difference between the forests in Finland's parks and those in general private ownership.

Forest thinnings

Two thirds of the annual harvest volume is realized through thinning. Treatment decisions are based on economic value and financial returns rather than just volume (AAC) outcomes. The importance of considering outcomes over the full rotation is highly visible and practiced: Plant for stocking - Brush for success - Thin for value – Regeneration felling for profit.

Thinning is done with the future in mind and focuses on retaining the best trees. It results in increased diameter growth and reduced time to final harvest. Thinning can also reduce final harvest cost, while providing economic returns early in the rotation. The Finns have detailed visual tools to assess alternative treatments plans relative to different financial discount rates (3% is typically used).

Thinning is guided by stand density diagrams and models with a focus on capturing mortality, increasing stand value, and avoiding excessive loss of growing stock. They take great care to set stands up for early commercial thinning by



Example outputs from the stand development simulator "Motti" developed by the Natural Resources Institute Finland (LUKE). The software is used for evaluating treatment plans by integrating growth and yield information, silvicuture treatment options, and financial analysis.

implementing brushing/cleaning treatments when stands are 3-5m tall. These treatments aim to leave 1800-2000 healthy well-spaced stems per hectare on site to grow for another ~20 years when the first commercial thin would occur. As a result of cleaning and thinning, trees are healthier and more resilient as unhealthy or poorly spaced trees are removed as the stand grows, and thrifty growing trees are more likely to fend off pests and disease.

Intensive forest management allows for improved financial outcomes and reduced risk (improved resistance to pest/disease, shorter rotations, and reduced fuel loading/wildfire risk). In Finland, forest fires are typically very small by Canadian standards due to moist soils and small landholdings with good road networks (<500 ha burned by wildfire per year). Science is valued and utilized to support decision making. Research and government-funded forest inventories play an important role in helping landowners to be successful by providing foundational information for management based on detailed data. This appreciation for science and reliable data supports trust and collaboration at all levels (contractor, landowner, government, industry), resulting in positive forward momentum.

The industry is highly automated and vertically integrated: pulp, sawn timber, energy wood, ash for fertilizer, biogas, and biofibers. This leads to very high utilization of the resource. It appeared rare for any portion of harvested stands to not to be used - a true circular / renewable bioeconomy. Successful industry players are actively reinvesting in R&D to develop new products, improve data collection, and improve fibre flow, and value across supply chains.

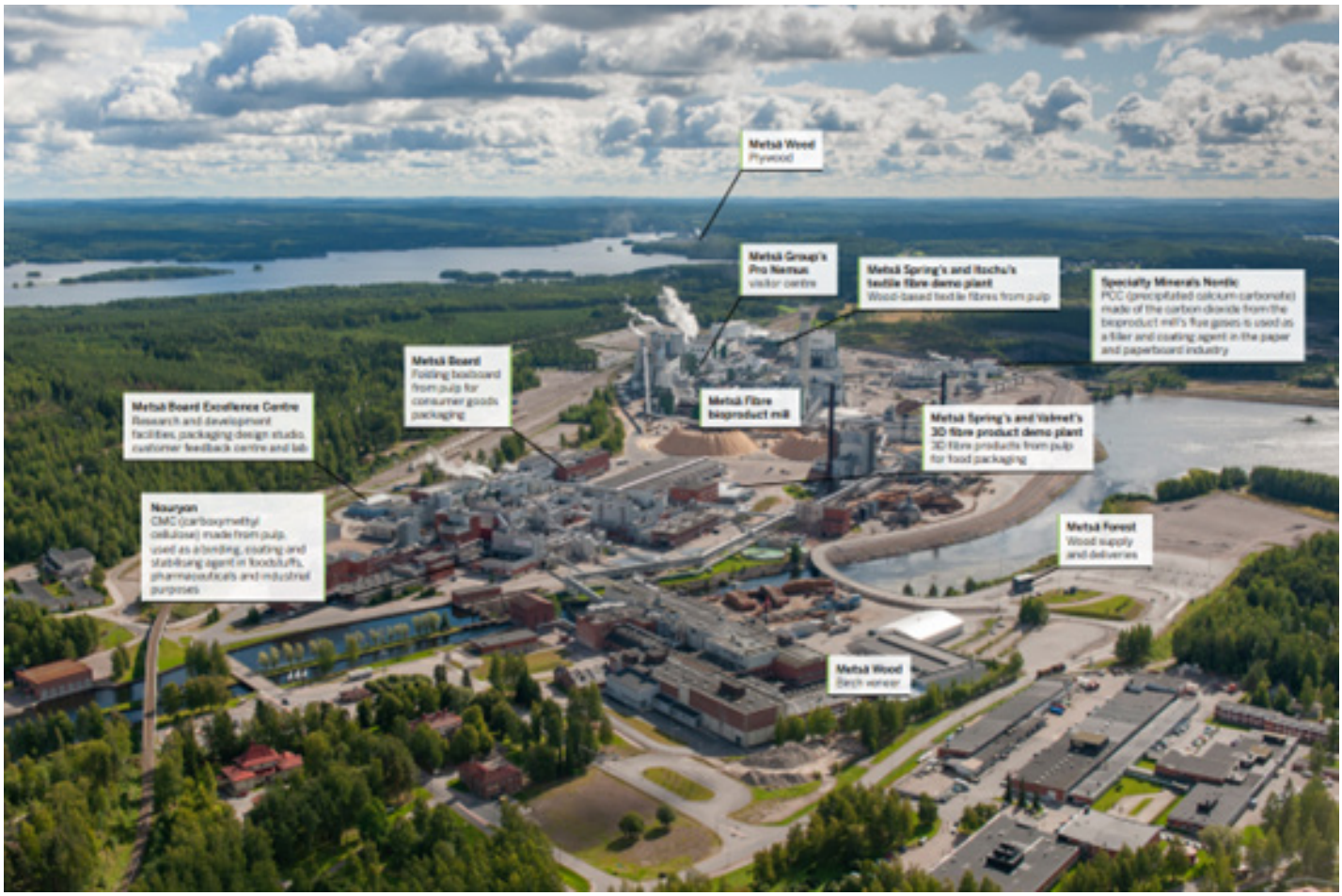
Forwarder trailer pulled behind a farm tractor for use at smaller scales.

Finland's thinning/harvesting is predominately done using wheeled harvester and forwarder systems that are very efficient at handling smaller material and working in partial harvest situations. They range

in size from large production-focused machines to smaller, lower-cost machines suitable for family woodlots. Harvest planning and layout is, to a large extent, done in the office using freely available forest inventory and mapping data. Dedicated schools exist to train operators to run these sophisticated machines and implement detailed treatment prescriptions without tree marking or laying out physical boundaries. When harvesting occurs, all products (sawlog, pulp, biomass/energy wood) are brought to roadside and left for self-loading logging trucks to pick-up. The energy wood is typically left for at least a year to cure in 4-5m tall piles, decked under a paper tarp (Finnish innovation), before it is coarsely chipped at roadside and hauled to local bioenergy plants. There is no grinding of biomass because it is kept clean for improved biomass recovery. Integration with the primary harvesting process is critical to achieving this outcome.

Finland has consistently invested in a detailed national forest inventory covering all of the country's forest lands. The inventory consists of 60,000 plots measured every 5 years and LiDAR data collection to create high resolution, wall-to-wall forest inventory data. This data is considered foundational to their management of the forest (wildlife habitat, timber, biodiversity, fire risk, sustainable harvest levels, etc.). The LiDAR data used to produce the inventory and the inventory itself are made publicly available on the internet.

These data allow landowners and the established Forest Management Associations that support them to make informed decisions about treatments. The inventory data is seen to improve management outcomes and reduce costs. Government information systems also support a highly automated approval system (two weeks for approval to harvest on private land) that compares proposed treatment shapes against areas of concern.



Metsa's integrated bioprocessing site includes a large modern pulpmill, birch peeler plant, sawmill, board plant, bioenergy plant, and several bioproduct facilities.

Both the forest sector and government forestry staff are guided by a National Forest Strategy and a Circular Bioeconomy Strategy produced by the national government. These strategies are updated every five years with public input and they appeared to be very effective at aligning focus around specific outcomes and ensuring policy consistency across the forest sector.

The following are some suggested ideas for implementation in BC:

1. Develop a focused and coherent Forest Strategy that articulates BC's vision and goals of linking First Nations values, resilient forests, and a world class forest sector.
2. Create detailed forest inventories using LiDAR data, an extensive plot network, and expertise in remote sensing/data science/forest inventory. Ensure this information is made publicly available and updated continuously in the future.
3. Incent investment and innovation by identifying a subset of our forested landbase to be managed intensively to support high value timber objectives through clear long term strategies, predictability, and cost recognition by the land owner. Ensuring a full rotation management is key.
4. Create best practices guides for intensive forest management by ecosystem/stand types. This would include optimal densities at various stand ages and suggested timings for various treatments (cleaning, thinning, regeneration cut). Implement training for foresters to use the guides.
5. Develop approaches to incent increased utilization of all biomass at the time of primary harvest where it is economically reasonable to do so (e.g., intensive forest management zone).
6. Implement community heating systems for communities to create new markets for small diameter logs from thinnings and fuel treatments.
7. Develop a training school for specialized harvesting equipment operators that can support implementation of thinning for fuel reduction treatments, selection harvest in IDF stands, visually sensitive areas, constrained areas, etc.

Many short-term wins can be achieved in BC simply by increasing thinning across a range of forests to enhance multiple values. This includes partial harvesting focused on fire risk reduction, improved Dry-belt Fir management, and accessing fibre in visually constrained landscapes. Implementing partial harvest strategies can help solve many of the key friction points in BC forestry right now - community safety/wildfire risk, fibre supply for mills, ecosystem health and biodiversity, and a focus on stand value over volume. We need policy solutions to encourage this type of investment.

Indigenous reconciliation and climate change adaptation (i.e., fuel reduction) are primary forces driving the need for fundamental changes in BC forestry. We must create a more economically robust, socially acceptable and vibrant forest sector built on a solid foundation of healthy and resilient forest landscapes. Embracing some of the wisdom behind Finnish forestry is part of the solution.

Small community bioheating plant. Trucks deliver chips daily and are automatically fed into a boiler to create heat for local buildings.