

The cover of Silviculture Magazine features a photograph of a man in a tan hat and a yellow shirt with a dark apron, holding a small evergreen sapling. He is standing in a forest with large, broad-leaved plants in the foreground. The background shows a misty, forested hillside. The title 'Silviculture' is written in a large, white, serif font, with a stylized green leaf icon above the letter 'i'. Below the title, the word 'MAGAZINE' is written in a smaller, red, sans-serif font.

Silviculture

MAGAZINE

Fall 2012

Can Carbon Fund the Restoration of BC's Beetle Forest?

New Zealand's Permanent Forest Sink Initiative
Collaboration Powerhouse: Gold Standard, FSC and CarbonFix Unite

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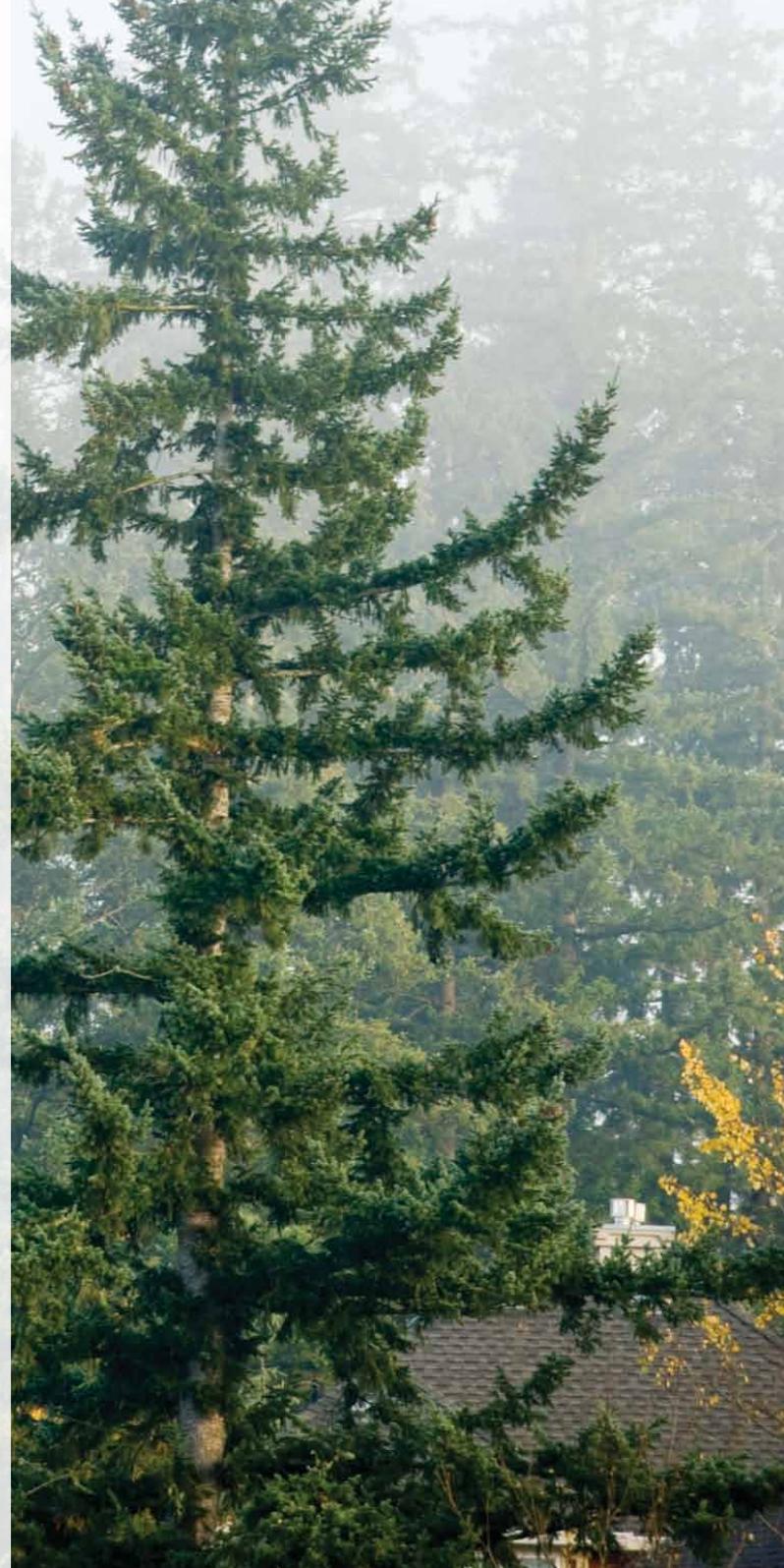
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Editorial

by Dirk Brinkman

Fossil Fuel Tariffs and Forest Carbon Offsets

The promise that forest carbon credits will provide a fresh source of funding for reforestation, forest health restoration and conservation, remains unfulfilled. National carbon market mechanisms are scarcely buying. The European Union's (EU) Emission Trading System (ETS), which was designed to make it easier for industry to stay under their emission caps, had the EU environmental community lobby effectively against forest related offsets from developing countries, because they would delay direct industry reductions (e.g. delay gas replacing coal). New Zealand was the first Kyoto nation to put forests on its account helping to define key climate negotiations. New Zealand's reforestation, conservation, ecosystem and agriculture restoration projects were the first to finally make a few trades in the ETS.

Canada withdrew from their Kyoto commitments (like the US who never ratified) but claims to uphold the global Copenhagen Accord, whose core commitment is to avoid 2°C warming. The Kyoto Protocol only included 23% of global emissions, while the Copenhagen Accord includes developing nations like India, Brazil, and the largest emission nation, China, representing over 80% of global emitters.

What it means to avoid 2°C warming was given a sharper definition in Bill McKibbin of 350.org's article in the Rolling Stone. The world is at .08°C warming now with worse consequences than scientists projected. To stay below 2°C warming total future global emissions have to be limited to CO_{2e} 565 gigatons. With 2011's emissions of 31.6 gigatons and annual increases of 3%, 565 gigatons will be hurdled by 2028. Sixteen years is not a lot of time.

There are known proven coal, oil and gas reserves of 2,795 gigatons of CO_{2e}. Fossil energy companies spend hundreds of billions annually exploring adding to these total reserves. McKibbin quotes Nick Robins, HSBC's Climate Change Centre, "The regular process of economic evolution is that businesses are left with stranded assets all the time. Think of film cameras, or typewriters."

To keep 80% of today's known reserves in the ground will result in a US\$20 trillion write off in coal, oil and gas assets on energy company books. There can be no tougher climate action opponents than these energy companies. With the citizens of all developed nations as carbonaholic customers, of course many national governments are in close partnership with these petrochemical companies.

Mitigation markets can work. The nightmare scenario of a planetary surface irradiated with Ultraviolet B was avoided by the 1987 Montreal Protocol. Scientists proved unequivocally that a disastrous future would follow from the continuous use of ozone depleting substances like CFCs. Consumer response was followed quickly by policy makers and very quickly over 98% of 100 ozone depleting chemicals were eliminated from both industrial production and domestic use.

Markets create first mover opportunities. The US was the dominant economic superpower in the 1980s, but before the 1987 Montreal Protocol, only 5% of refrigerant production remained in the US. Production had been outsourced to developing countries. By imposing a few elegant environmental trade tariffs in the early nineties requiring HCFC refrigeration, the US recaptured 95% of the manufacturing for its refrigerant demand.

China, Japan and Korea are imposing fossil fuel import tariffs that may make it impossible for developed nations to abandon the Copenhagen Accord. Apparently, the US's Montreal Protocol strategy to reclaim refrigerant manufacturing was not lost on the South East Asian countries of Japan, Korea and China. On October 1, 2012, Japan's carbon tariffs on the production emissions from all imported oil, gas and coal increased to approximately US\$17/tonne CO_{2e}. In 2013, South Korea and China plan to impose much higher tariffs.

Japan has properly prepared for World Trade Organization (WTO) challenges to its CO_{2e} tariff, with its strong climate commitment and new initiative to sell full Greenhouse Gas (GHG) life cycle accounted products. China has already become the global supplier of solar and wind power products. Soon it will be able to use these tariffs to further consolidate its global product market dominance. EU tariffs on US airlines flying into the EU are being challenged by the US Congress. California's tariffs on imports from other states, including states and provinces in the Western Climate Initiative, are being challenged by some states as unconstitutional. The courts may secure these states the right to keep these funds by allowing local forest or agriculture offsets.

The outlier nations, the US and Canada are major energy exporters to Japan, S. Korea and China, as is Australia. Within a year or two these tariffs will amount to billions in wealth transfers. Tariffs provide the most tangible potential sources of funding for forest and agriculture offsets. It remains to be seen if these wealth transfers can be recaptured through direct nation to nation or broader trade negotiations through the WTO or the Copenhagen Accord.



A global atmospheric cap of 550-600 gigatons will add impetus to new investment in exploring for cleaner fuels like natural gas and alternative energy. A global cap on total atmospheric CO₂e can also bring reforestation, ecosystem restoration and conservation offsets into focus. Terrestrial sinks like these remove atmospheric CO₂ and offer a large scale solution to easing the painful transition out of fossil fuels with a multitude of spin-off benefits. China has committed to increase forest cover by 40 million hectares and forest stock volume by 1.3 billion m³ by 2020.

Climate credits alone can never pay for reforestation, ecosystem restoration or conservation. The internal rate of return from timber production for forest

plantations is, at best, about 6% in temperate regions and 12% in tropical or moist semi-tropical regions. Because carbon credits can add 1-2% to eligible projects, it helps qualify projects for investment.

Integrating timber returns with bioenergy's climate values which utilize former forest waste, increases the rate of return on investment. REDD+ (conservation projects) cannot stand alone without a buffer zone of restoration and agriculture programs offering sustainable development to local communities, thus taking the pressure off tree-poaching. REDD+ or conservation credits can add early returns to reforestation or agroforestry projects with a longer investment return horizon.

Flood and fire planning can protect communities and integrate with ecosystem health management.

SE Asia's climate tariffs may help connect regional mosaics of linked sustainable land use change planning. To optimize it, each core value requires its derivative: timber requires bioenergy; conservation requires agroforestry; biome health requires flood and fire planning; land use change requires monetizing carbon benefits, because climate change has defined the key principles for measuring other mitigation measures, like fresh water, biodiversity and pollution. It is when land use planners take all of this together that a global scale forest and soil restoration program like China's comes into focus.

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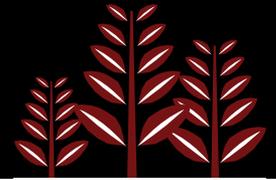
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Notes from the Field



Block Head

By Adrick Brock

Planting finished over a month ago, but the residue lingers. Tendonitis in my right wrist, for instance, flares any time I so much as touch a tennis racquet. For a while I had a terribly imbalanced tan (dark upper body, pasty bottom half), but August's sun cured that. I still catch myself considering a price tag in terms of trees—a tank of gas is a bag-up, rent is a good day's wage. These effects come and go, but the deepest stain from my five-month planting season has been neurological: my brain is tough as a callous. I catch myself multitasking on top of multitasking, burning through daily tasks like they were bag-ups, judging traffic like a cut-block obstacle course, thinking all the time... forever efficiently thinking.

Outsiders to planting always say the same thing: "Tough work, tree planting, I don't think I'm built for it." They see the job as grueling manual labour, and of course there's truth to that. But there's a reason the fifty-six year-old veteran can plant more than the twenty-two year old jock—planting is just as much mental as it is physical. The mind of a treeplanter is as integral to the operation as the steel in our shovels. It allows us to think our seedlings into the ground. It keeps track of numbers, navigation, entertainment, and motivation. During my best days, my mind is like Tony Robbins on speed: give me slope, snow, sun stroke... I can coach my way through anything.

The body is amazing, too. It's the workhorse of the entire reforestation industry, and when we consider the scale of Canadian reforestation, that's a lot of muscle we're talking about. Still, the body is prone to its ebbs and flows. This past season for me was a merry-go-round of different ailments. I rode a sprained ankle one week, tendonitis in the finger, wrist, elbow the next, unexplained rashes, sicknesses, pain... My body became a wizard at healing itself, but what got me through those tough days was mental fortitude. I realized that if I stayed on top of it, my mind never had to dull. It never got tendonitis. It didn't juice lactic acid when the terrain steepened. During shitty, wet July thunderstorms my mind was a bubble of comfort, lifting me above the sopping landscape to future beaches, bonfires, bubble baths.

Now that I'm back in Vancouver, my body is letting go of planting. I feel my spine elongate, my hands soften. I've squeezed the last of the Devil's Club from my knee caps. I feel great, all things considered—healthy, wealthy, alive. It's just that Tony Robbins is loitering at the podium in my head, and his diatribe is tiring me out. I find myself racing through daily tasks as though they were trees. Trying to get to an afternoon yoga class I rush the construction of a bathroom shelf, rip out too much drywall, curse, forget that life is not a cut

block. I overlook the fact that while I benefit from a highly streamlined mental process during planting, there's a time to kick back and relax.

The "real world" outside of bush camps is for me a time of creativity and spontaneity. It is a lifestyle that makes the 200,000 trees I planted this past season worth every incision, insertion and closure. But to fully arrive here I have to desynchronize myself from the patterns of planting, no matter how familiar they may have become. It came to a head the other day when I went on a date. She and I wandered up an abandoned train track with an old camera and a bag of trailmix. Nothing was planned, and I felt myself creeping ahead of the moment to where we'd go next, what we'd do, and what time did I think it was? I was out of flagging tape; there was no line to follow.

Around dusk the crows made their exodus to Burnaby, the sky turning black above us. My date started to sing a song about spaghetti and meatballs. I picked up where her memory failed her and we held that number through to the end.

Adrick Brock has planted in British Columbia and Alberta for the past four years. His writing has appeared in *Vancouver Magazine*, *One Cool Word* and is forthcoming in *The Malahat Review*. He lives in Vancouver and can be contacted at adrickbrock@gmail.com.

Reader's Lens



Photos by Alex Dadzis



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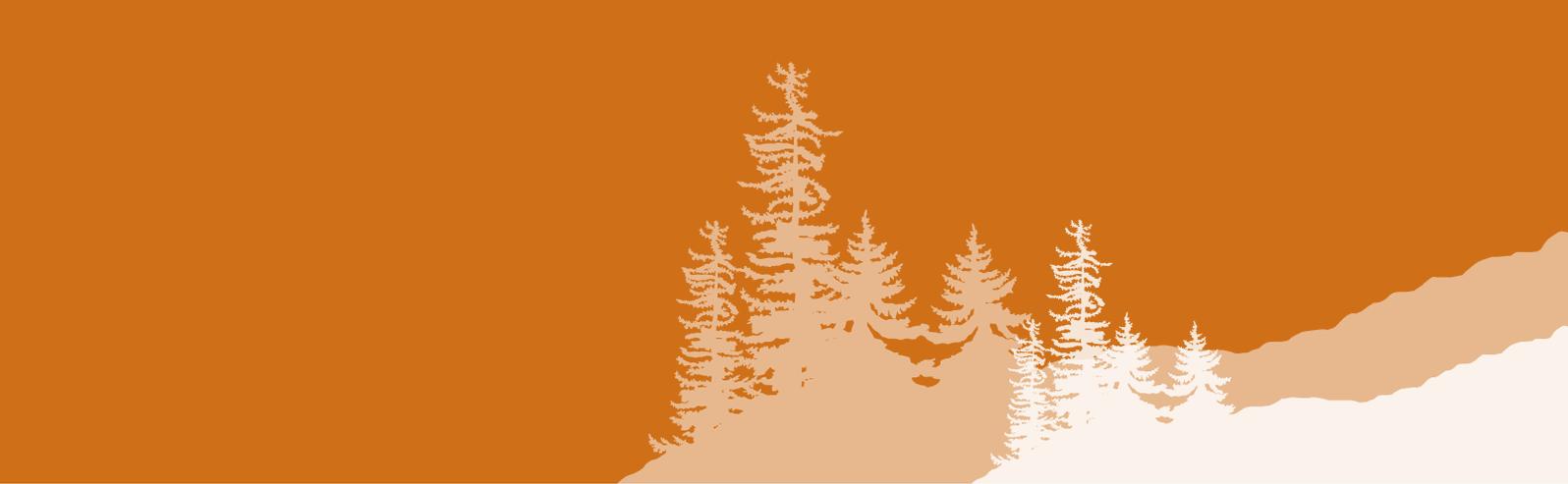
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Enabling Carbon Credit Funded Restoration of the Beetle Forest; Is it Possible?

Tony Harrison



Photo by Erin Kendall



Carbon Credits were quite the rage a few years ago. Grand hopes abounded for a tool with which to finance large scale forest restoration, create employment and enable the human race to reverse damage brought on by dirty energy and historical deforestation. Why not incentivize corporate polluters to reduce emissions while reforesting the earth? Unfortunately, achieving this dream was not quite as easy as hoped, as political will flagged and many western nations became preoccupied with the financial crisis.

Though a number of forest conservation projects have recently achieved success, various factors have stymied the progress of carbon funded reforestation in BC; slow growing northern forests, governments slow to define carbon rights and low prices offered for forest based offsets, among others.

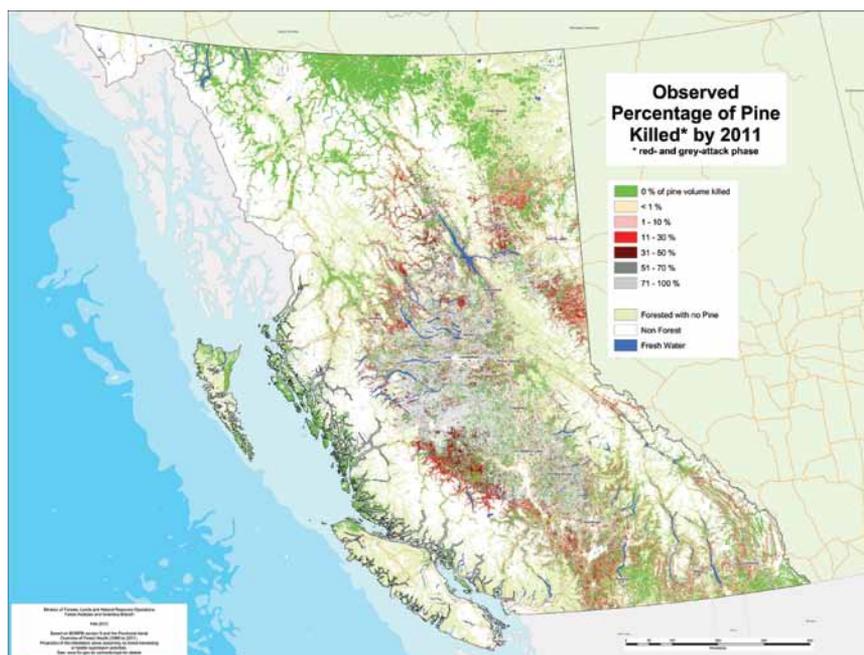
One of the most discouraging impediments has been the “dissing” of the whole idea of reforestation-based carbon credits by environmental groups. The fear seems to be that acknowledging any restoration project benefits will shift the public’s focus away from conservation and energy-sector emissions. This unfortunate and shortsighted approach has spooked corporate sponsors and pushed funding toward non-forestry options with a fraction of the co-benefits. Though every major carbon offset standard in the world now allows reforestation-based offsets, the damage lingers. An example that stands out is that of a BC-based credit union being advised by a prominent enviro group to steer clear of forestry offsets. The credit union’s quest for local offsets ended in the purchase of methane capture carbon credits from a garbage dump in the Maritimes. Not really the warm and fuzzy photo op they were looking for. But I digress.

The Mountain Pine Beetle epidemic has left millions of hectares of BC forests damaged and deforested. The scale of the problem is such that traditionally funded reforestation

can only happen slowly, as the cost of a meaningful campaign is beyond provincial means. Given the considerable challenges in putting these types of projects together, there’s a need for a much more diverse approach to funding and stakeholder involvement. Making a financial case for annually issued (ex-post) offset models is problematic on all but the most productive sites, so combining additional sources – i.e. leveraging existing government funding, bio fuel initiatives and biodiversity funds - is critical.

Early this year a Request For Proposals (RFP) to initiate carbon credit funding of beetle forest restoration tendered by the BC Ministry of Forests (MOF). Unfortunately it bore little fruit because participants couldn’t square the risks and rewards. As a follow up MOF has another RFP in the works for this Fall that is building on some of the better ideas from the initial round. So what is the missing piece that will enable projects to move forward?

Our group presented an idea that would see a project with revised roles, built around a recently minted structure in the carbon market known as a “Program of Activities” or PoA. The PoA represents a “plug and play” approach that allows smaller scale project implementations to go ahead by accessing offset documentation and carbon modeling as components of a larger, overarching project. Long-time forest carbon proponent Joseph Pallant of CPS Carbon Project Solutions Inc. connected the dots between the new PoA carbon market tool, and the huge challenge of restoring the beetle forest. Instead of a single company taking on the entire task (and risk) of developing the project, certifying the carbon offset documentation and trying to plant enough trees to dent the beetle kill, this route would select an organization to fill a more focused role as the “Coordinating Entity” and project manager. This entity would undertake the required carbon diligence to create a PoA offset project,



B.C. Ministry of Forests, Lands and Natural Resource Operations, Feb 2012

and then open the door for silviculture contractors across the province to do what they do best. This presents a lower risk proposition to the contractors, and removes the need for them to retain specialized carbon consulting expertise to access a new financial stream. The approach alleviates the substantial costs of starting from scratch on project design documents and stands to incentivize reforestation at a level befitting the magnitude of pine beetle devastation. Positive noises have been made, and we hope that the Ministry is able to further catalyze movement on carbon-financed reforestation in British Columbia later this Fall.

These positive developments aside, there should be no illusions that carbon offset revenue is a magic bullet, guaranteed to single-handedly finance large-scale reforestation in the province. As alluded to earlier, the slower growing temperate forest simply takes its time in removing CO₂ from the atmosphere for storage in tree trunks, branches, leaves and soil. As the carbon market has converted from ex-ante offset calculation suitable for the voluntary market (think crediting 50 years worth of growth as offsets in year one) to ex-post (annual crediting of proven growth) befitting a regulated compliance market, a basket of incentives are surely needed to make reforestation happen at scale.

The following are potential pieces of the puzzle that could be combined to pave a new avenue for reforestation in BC:

The Pacific Carbon Trust (PCT) The Pacific Carbon Trust is a Crown corporation created to deliver quality, made-in-BC greenhouse gas offsets to help clients reduce their carbon footprint and drive the growth of BC's low-carbon economy. Deeply engaged in catalyzing collaborations between industry and carbon market players, they are tasked with ensuring delivery of over 800,000 tonnes of offsets a year. With the ability to sign long-term delivery contracts for BC-based offset projects, this group acts as secure buyer and injects the much needed price certainty needed to finance your project.

There are challenges with putting PCT reforestation projects together, which have stymied the sector to date. The financial challenge of undertaking high upfront development and implementation costs that must be recouped over long payback periods creates a classic business conundrum. Because PCT offsets must be ex-post and highly standardized, project

development costs are significant even before you put the first tree in the ground. Uncertain international recognition of BC's Forest Carbon Offset Protocol and an illiquid market for excess offsets beyond a guaranteed PCT buy also complicate the life of a project developer.

Having said this, there is a clear desire on the part of the PCT to make reforestation offset projects work. In this context, there is good opportunity to move forward on projects that have complimentary funding schemes. If we can compile the winning conditions for a project in the beetle forest, there may be hope for projects financed through a hybrid of PCT compliance credits, voluntary offset sales and other revenue generators.

Voluntary Market Opportunities An example of a home-grown voluntary market is the new Tree Canada program called "Grow Clean Air". This program represents an opportunity to do small projects through Canadian corporate sponsors. Though the size of these projects is small in scale they are opportunities to work through process, methodologies and prescriptions relevant to the larger scale projects. This has allowed proponents to work through some of the complexities of carbon funding. Small projects like these help to enhance and develop the overall carbon market by demystifying and debunking some of the misconceptions.

Zero Net Deforestation Funding The Zero Net deforestation (ZND) legislation is an interesting piece of government policy that recommends an annual average deforestation rate of 6000 hectares from non-forestry activity be balanced by afforestation of an equal amount of "ex forests" that lack funding. ZND has a streamlined structure that provides a good opportunity to restore less productive forest ecosystems. An ability to replace hectare for hectare with no growth and yield comparisons and no trading of an actual asset represent a simplified route to voluntary funding. Although set up to replace deforestation with afforestation, a creative interpretation of the act through the yet-to-be-drafted regulations could make it applicable for Mountain Pine Beetle restoration.

Unfortunately, a lack of any legislative teeth and flagging corporate budgets for environmental PR projects seem to have put ZND on the back burner. ZND had some good initial interest from the corporate world. BC Hydro spent considerable

time kicking the tires, but has shelved involvement pending recent restructuring and shifts in environmental priorities. Some political and/or corporate champions could revitalise this orphaned piece of legislation.

The Draft BC Cap and Trade Bill In the case of provincial commitment to a cap and trade system under the Western Climate Initiative (WCI), demand for forest offsets will be given a boost via a more liquid and volatile carbon market. Demand models for the California + Quebec WCI markets (going live January 1, 2013) suggest that forestry will reduce cost of compliance for capped entities. There is some low hanging fruit, but the cost of many ecosystem-based interventions is higher than often assumed. Having an inventory of BC-based projects in development and delivery stages allows for efficient contributions to a cap and trade market if and when it matures. Linking protocols will be of particular importance to the insertion of BC carbon offsets into a wider continental market.

In summary, there is a public and corporate appetite for simple, accessible carbon offset projects. People like trees and forests. The beetle forest offers an opportunity for a range of small to landscape-scale projects that would create employment, involve forest-based and First Nations communities and restore ecosystem functionality. Many of the up front impediments such as costly legal agreements and science-based design documents can be dealt with through the capable processes of the Ministry of Forests and the Pacific Carbon Trust. There's a strong case for using existing public funding of pine beetle restoration to leverage a much larger carbon credit-funded restoration program – by providing technical support and risk mitigation. BC has a unique opportunity to use cutting-edge, cost-effective restoration through existing, local silviculture contractors, professional forestry services and carbon offsetting firms.

As stated in the baseball movie, *Field of Dreams*, "Build it and they will come." Or more to the point: Reduce the risk, give support and they will invest. With luck, we can get this whole carbon credit thing going again, and use it to restore our forests. †

Tony Harrison has spent the past 3 years collaborating to develop projects with multiple funding sources for the carbon market. Tony is co-owner of Zanzibar Holdings Ltd., a long time silviculture contracting firm, and a co-founder of River Forest Carbon Inc. tonyzanzibar@gmail.com

Forest Health

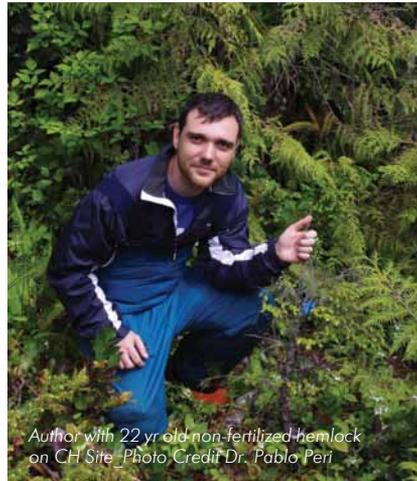
By Victor Nery



Favourable characteristics such as a moist and mild climate year round, the absence of fire or a major insect infestation and disease, has turned the coastal coniferous forests of British Columbia into one of the most productive and highest quality forests in North America. However, wood costs are much greater in the region due to the high cost of harvesting large, uneven-sized timber on difficult and remote terrain. Consequently the focus of wood production on the coast has been driven toward production of higher value or specialty products. The challenge is that demand has plunged in recent years and many companies have been forced to close mills, thereby reducing the amount of work in the region. Many still believe that the future of the forest industry on the coast will be to further concentrate production into higher value products. Nevertheless, the recent increase in the Chinese demand for lower quality timber has the potential to drive companies to change its future forest management strategy to a more mechanized and fast growing production model.

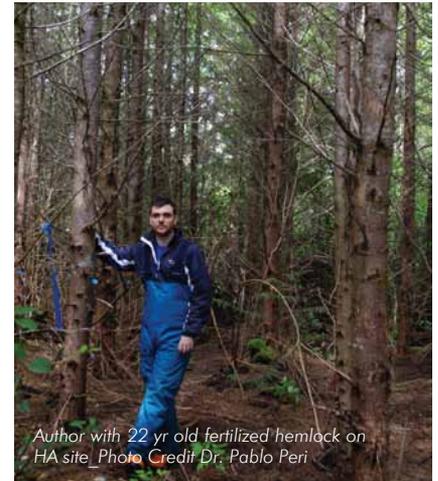
The main challenge of developing a new forest management strategy on the coast is that little is currently known regarding which sites would be most suitable for intensive management or what combination of silvicultural treatments would best achieve the true potential of these sites. In northern Vancouver Island, a second challenge arises given that productivity varies in a mosaic pattern between two very polarized forest types: low-productivity Cedar-Hemlock "CH" and medium-productivity Hemlock-Amabilis "HA". This can be very difficult to manage, particularly because productivity can vary drastically over very small areas as do outcomes of different treatments depending on the interactions between species and fertilization.

In the late 80's a trial called Salal Cedar Hemlock Integrated Research Program (SCHIRP) was initially created to find solutions for the problem of extremely poor growth of recently logged CH forests. This project utilized both western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) at different stand densities and fertilization combinations as a way to mitigate this issue (Weetman *et*



Author with 22 yr old non-fertilized hemlock on CH Site. Photo Credit Dr. Pablo Peri

al., 1989ab). However, following more recent observations of greater growth responses on HA sites, Negrave *et al.* (2007) concluded that these sites were of greater interest and fertilization should be focused on these sites instead. These sites have since been measured throughout 22 growing seasons. The most recent results have indicated a strong potential for intensive forest management in the region (Nery 2012). The last analysis has shown that fertilizer application significantly increased the height and volume of both species at all treatment combinations and sites. However, there was a significant difference in growth patterns between red cedar and hemlock. Depending on the site fertility and treatment used, the stand volume of red cedar increased between 123% to 351% after fertilization and hemlock volume increased between 106% to 2190% after fertilization. In most cases, higher densities (≥ 1500 stems/ha) had much greater volume per hectare than lower density stands. CH sites have shown the best increment response to fertilization; however, even at its highest levels, averages were still low if compared to HA sites. Overall, the best treatments were found to be at fertilized hemlock stands on HA sites (Nery 2012), where high densities have not only shown the greatest volume, but also suppress lateral limbs and understory (Oliver and Larson, 1996), thereby reducing competition and increasing wood quality. However, due to the high costs of fertilization, it is suggested that the focus



Author with 22 yr old fertilized hemlock on HA site. Photo Credit Dr. Pablo Peri

of intensive silvicultural management such as fertilization and increased stand density should be directed only towards the more productive sites, leaving low productivity and environmentally significant areas to a more conservative growing pattern.

Victor Nery recently earned his Masters degree from the faculty of Forestry at the University of British Columbia. His area of research focused on forest improvement and reclamation. He can be reached at victornery@gmail.com

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New Zealand's Permanent Forest Sink Initiative: Experiences From a Functioning Carbon Forestry Mechanism

By Mark Belton

The Importance of Reforestation Mechanisms

The world is struggling in the fight against climate change. Efforts to maintain, let alone improve, a Kyoto type agreement are faltering while greenhouse gas (GHG) levels continue to rise along the worst case business as usual scenario.

Recognition of the importance of reducing emissions from destruction of forests has been belatedly recognised with REDD plus initiatives. However the crucial importance of reforestation, and improved forest management to rapidly sequester and store carbon whilst delivering other ecological co-benefits is still largely overlooked.

Growing more forests provides the only readily available means to suck CO₂ out of the atmosphere, and to restore the inevitable overshoot of GHGs to safer levels well below 450ppm (99% of other climate change efforts are focused on avoiding emissions, not removing existing atmospheric CO₂.)

New Zealand (NZ) was the first country to develop and implement carbon forestry under a government regulated framework and now has developed two such mechanisms; one called NZ ETS forestry is designed to be compatible with short rotation timber plantations, while the Permanent Forest Sink Initiative (PFSI) is designed as a 'best practice', dedicated long term carbon conservation scheme.

This article is about the PFSI, its origins, purposes and attributes as a scheme for dedicated carbon forestry which may well provide a useful model for other jurisdictions.

What is the NZ Permanent Forest Sink Initiative?

The PFSI is a Kyoto compliant carbon forestry scheme designed by the NZ government to encourage reforestation of marginal farm land by private landowners. It is also the world's first Kyoto compliant Annex 1 country carbon and conservation forestry scheme.

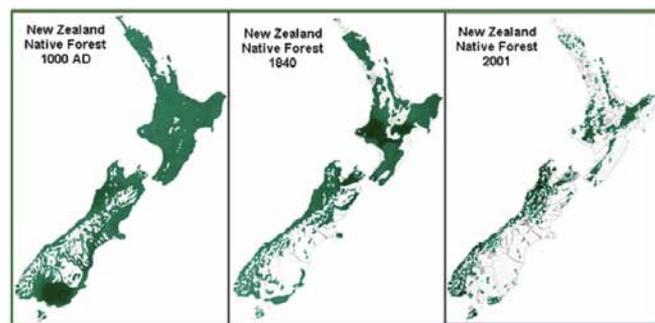
The PFSI rewards participants by assigning to them all sequestered carbon (whilst holding them to account for maintaining the stored carbon) and enabling the carbon to be traded in Kyoto compliant markets.

In return for earning carbon credits landowners undertake stringent obligations to develop and maintain a permanent carbon forest on their land in perpetuity.

Origins of the PFSI

The invention of the PFSI arose from NZ's ecological problems on the one hand, and its uniquely high agriculture sector emissions profile and LULUCF requirements on the other.

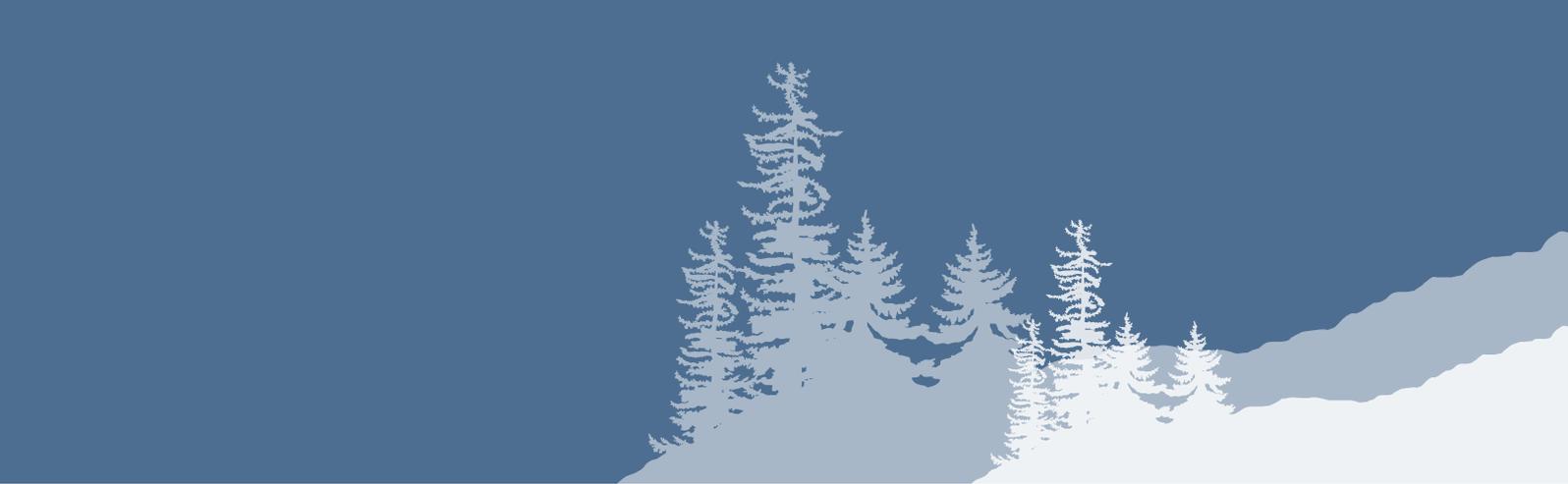
When the first humans settled New Zealand just 800 years ago 80 percent of the land was covered in pristine rainforest. Human settlement unleashed major forest destruction and species extinctions. Fires during the Polynesian settlement period erased a third of the forest cover, and half of the remaining forest was destroyed by 19th century European settlers. Today, remnants of forest are mainly restricted to high rainfall mountains, and are everywhere degraded due to depredations of introduced animal pests such as deer, goats and possums.



Indigenous Forest Cover loss in NZ following human settlement, 1000 AD-2001.

The destruction of forests by the first waves of Maori and European settlers released some 15 billion tonnes of CO₂ into the atmosphere, perhaps the highest per capita releases of CO₂ in human history.

Today NZ's economy (c. 4.5 million people) is largely dependent on agriculture and commercial timber plantations located on these former forestlands, and on tourism. A third of NZ - about 9 million hectares (ha) - is owned and managed by the Crown as conservation estate and includes almost all remaining indigenous forest. Across the productive land bank about 100 million livestock units are farmed on 14 million ha of pasture, and close to 1.8 million ha of plantations are managed for timber production.



Unsustainable Land Use and Environmental Damage

NZ is a very young country in geological as well as human terms. Much of the landscape has been uplifted by seismic and volcanic activity over the last few million years. Related to productive land uses NZ has three acute environmental challenges: extremely high erosion rates on steep farmlands (topsoil loss >20t/ha/annum on 700,000ha), faecal and nutrient pollution of streams and lakes in drainages of farmed areas, and loss of indigenous habitat, flora and fauna.



Soil erosion scars on steep hill country farmland following a high rainfall storm event. NZ has c. 1.2 million hectares of steep hill country pasture that is at risk to extreme erosion. Forests are highly effective in protecting against topsoil erosion (Top right forest area has very little soil loss)

NZ landowners work their land without any subsidies - in other words there has been no economic alternative to continuation of farming or conversion to short rotation timber forestry. Recovery of conservation forest cover onto these problematic lands could effectively solve all of these ecological problems, but an economic driver is required for this to happen.

Kyoto Protocol Marginalised Forestry

In 2002 NZ Government policy advisors conceived the PFSI as a NZ domestic policy initiative to encourage afforestation of marginal farmland by assigning tradable Kyoto carbon offset credits and liabilities to participating landowners.

The design had to be Kyoto compliant in terms of the definition of forests and forest rules. But equally importantly the people designing the PFSI knew that to generate carbon credits that would have value in the international carbon market, a number of key concerns about forestry needed to be addressed within the PFSI design.

In particular carbon forests had a negative reputation because of concerns about

- permanence (i.e. forest removals are reversed by harvesting or fire)
- additionality (i.e. forests can be business as usual timber plantations)
- verification and monitoring of carbon stocks
- compliance (i.e. enforcing protection and on-going storage of carbon)

The PFSI was designed to meet these concerns.

Key Design Features

The overarching feature of the PFSI is the restrictions on harvesting and the permanence obligations. Originally the PFSI was conceived as a no harvest regime for at least 99 years. Following consultation, provision was made for low intensity sustainable timber harvesting during the 99 year minimum period the participating forest is required to be maintained, subject to replacement liabilities on any lost carbon. Provision was also made to allow participants to withdraw after 50 years, subject to full replacement of carbon stocks. In reality it is most unlikely any participants would clear their forests after 50 or 100 years because of the prohibitive cost of carbon replacement.

As a result of being maintained for the long term, PFSI forests will sequester and secure high carbon densities. By comparison, sequestration by short rotation bioenergy plantations and industrial timber plantations might be as little as 10% to 30% of long-lived forests.

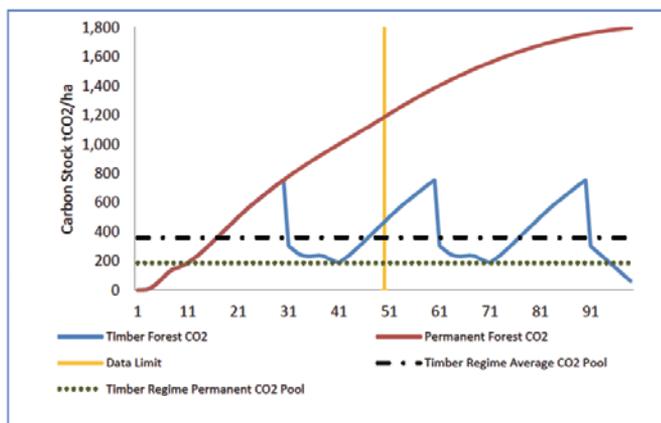


Figure 1 represents carbon stocks (t CO₂/ha) of planted radiata pine forest in NZ from time of planting to 100 years age. The timber regime is clear-felled every 30 years releasing stored carbon. Data on which the modelling is based is statistically 'rich' from 0-50 years and 'poor' from 50-100 years.

1. The Crown (NZ Government) is guarantor of the scheme and of the issued credits.
2. Each PFSI project is based on a contractual agreement between the Crown and the landowner, registered as a Covenant on the land title.
3. The Crown issues carbon credits for increased carbon stocks within the forest and the landowner will maintain a forest on the land for a minimum of 99 years.
4. There are strict prohibitions against clear fell harvesting for the 99 year period although some limited sustainable harvesting on a "continuous canopy basis" is permissible.
5. The landowner is responsible for any carbon lost from the forest for the duration of the agreement. In other words if there is harvesting (within the rules) or a natural event such as fire or wind-throw, then the forest owner must repay to the Crown the lost carbon.
6. The Crown has extensive powers to ensure the PFSI is complied with. This includes entering the land and establishing a forest where the landowner has failed to maintain one.
7. Registration is a straight forward and low cost process. Preparation of an application with high resolution mapping and registration fees may take less than 4 months to complete and cost less than USD \$1500 per project.
8. On-going (5 yearly) carbon measurement is required for projects >100 ha and the cost is typically in the range of USD \$4-5 per hectare per annum.
9. The Government maintains a carbon registry for each project under the NZ Emissions Unit Registry that records the assignment of carbon stocks.
10. Insurance offerings to cover against loss of carbon have been developed by several providers. Cost of fire and wind insurance offerings for full replacement value of carbon are available for <USD \$15/ha/an

Progress of the PFSI

In late 2006 the empowering PFSI legislation was passed unanimously by NZ Parliament, a rare achievement in NZ's multiparty politics. A year later when key PFSI regulations and the Government PFSI Covenant agreement were completed the registration of the first PFSI forest carbon conservation projects got underway.

Since the scheme began in 2007 about 55 projects (c. 14, 000 ha) have been registered with another 10 (c. 5000ha) in the pipeline. The projects comprise both indigenous forest recovery projects (70%) and planted forests (30%).

The Government undertook a public consultation and review of the PFSI in 2011 and not surprisingly the majority of submissions were supportive, although ETS plantation forestry sector submissions were not. There is strong support for the PFSI from leading environmental NGOs including Greenpeace, WWF, and Forest and Bird (NZ's largest environmental NGO), and strong cross-party political support continues.

It needs to be remembered that Landowners who register under the PFSI are making a major commitment; to maintain and protect their forest areas as permanent carbon conservation sinks while shouldering replacement liabilities and forgoing other commercial options such as clearing the land for farming or commercial timber plantations.

Uptake of the PFSI will be determined by whether carbon offsetting proves to be a viable commercial alternative to more conventional landuse options, and this rests on support provided through purchase of PFSI offsets. Participants need to know with some surety that carbon sequestered in their forests will be saleable into the future at an attractive price. The greater this surety the greater the uptake will be.

If the most ecologically problematic land types, amounting to ten percent of NZ's farmland were afforested for carbon and conservation over the next few decades the resulting sequestration could exceed 2GtCO₂ within 50 years, and could serve to offset the entirety of the agriculture sectors intractable emissions over this period.

The extent to which this might be achieved will depend on the market value of PFSI carbon units. If there is sufficient payment for the environmental services that PFSI conservation forests provide there is a major opportunity for the environmental damage resulting from human settlement in NZ to be healed. †

The author is Managing Director of Permanent Forests International Ltd (not to be confused with the Permanent Forest Sink Initiative (PFSI)), a NZ based company that specialises in best practice carbon forestry. www.permanentforests.com



Western Canada

By John Betts, WSCA Executive Director

It's Time to Get Rid of Payment Deductions for Quality

The BC silviculture sector has always worked with the threat and application of penalties for anything less than near perfect quality performance. Recently, after a few decades' hiatus, the planting quality inspection guidelines were reviewed and updated by the MFLNRO and contractors. Subsequently there have been successful workshops on implementing them, run jointly by the WSCA and the Forest Practices Branch. More are planned. With all this good will and cooperation it is perhaps time to ask the big question, what does fining contractors for quality infractions have to do with planting, brushing or spacing better plantations?

Very little in fact. It's doubtful any seedling has grown better after a contractor has been penalized. Inversely there is probably little evidence any plantations have performed more poorly because the silviculture quality inspection came in at a percentage lower than 100. I hate to think about all the angst and agonizing that has been spent tensely debating the disposition of a handful of seedlings in a sample plot, when in the long run the measurable performance difference is negligible; probably nonexistent.

This is not to say that planting or spacing trees properly is not important. Or that it is not worth the effort. It is, on both accounts. But I think the case can be made that penalties, in the end, have very little to do with accomplishing the goal of quality work.

Let's be clear. Fines do have a place in the silviculture contract. There should be fines for negligence, like poor stock handling and wasted trees. Or crimes like theft and fraud. In these cases the penalties are intended as punishment and as deterrents for intentional breaches of conduct.

But to think that fines have a role in reducing lapses in quality, or will address more systemic problems such as contractor incompetence, or inexperience, is misguided. Negative incentives, which are one way of characterizing quality payment deductions, are just as contradictory as they sound. And as any social scientist will tell you, they aren't that effective. They can be so weak, in fact, that some cynical operators will just consider them a cost of doing business, with the moral hazard that implies.

Quality fines also flunk the test of reasonableness. How reasonable is it to expect any contractor to perform to near perfection for this kind of work? It is doubtful in the real world that many of us could survive a random sampling of our performance that demanded near perfect quality, whatever that might look like. To be fined on top of that is gratuitous and unhelpful.

In the same vein how many other forestry activities suffer the benefit of deductions to payment based on such exacting scrutiny? Not only are quality fines unreasonable they are uncommon in the rest of our industry as well. We are planting and brushing trees. We're not making artificial heart valves.

Having said this much, it is time to acknowledge that fines are not the problem. They are symptoms of a deeper one. And that problem has to do with the correct purpose and use of the planting inspection system. Quality inspections were not created solely as ways of penalizing contractors. Although, I will argue later some clients do misuse the inspection system to this purpose.

Instead the silviculture quality inspection system is best used as a tool to aid in the constructive communication between the client and the contractor as to just what is expected and how it is to be achieved. Because of its methodology it introduces some rigour into the conversation. To ensure things are done right the inspections have to be current. Their results have to be communicated to the contractor and

their people on the ground as the work happens. This is the true purpose of the inspections when they are done sensibly: to correct mistakes and recognize good work. The quality percentages for success or failure are indicators that should only be used to support communication between the parties involved. Taking this constructive approach we should not be using the planting inspection system to link those percentages to payment, such as we have for decades.

In this context, for example, think of how absurd it is to have the so called 'pay plots' done after the fact: in some cases by a supposedly impartial 'third party.' What does this exercise accomplish? It is a misuse of the inspection process because it might as well be designed to fine the contractor. It takes place separate from the ongoing work. It occurs sometimes with different inspectors than the contractor has been dealing with. And obviously it has little to do directly with what really matters; getting the job done right when and where it was happening. It also wrongly assumes the rules of the inspection process are so perfect they can be applied in some kind of absolute terms independent of subjective interpretation or discretion; as if the inspectors were robots. This is nonsense. How loose is loose? How much air has to be in an air pocket? What is a proper site? This has to be described, adapted to the circumstances, agreed upon and executed during the work: not after it. Otherwise the 'pay plots' are just an exercise in finding fault.

And while I am at it, the unaccounted for tree provision is another invalid fine. Unaccounted for trees are just that: trees that are missing in the stats. There is no proof they represent wasted or stolen trees: which are the outcomes of criminal acts. Yet the contractor is more or less convicted and penalized accordingly, as if a crime had been committed. This conviction is done without any formal charge, or the necessary weight of evidence required for the illegal act implied.

Clients are human. And I would suggest that they are not immune to the psychological bias that payment deductions may introduce into how they deal with contractors. If things are going badly on a contract, is it beyond the pale to suggest that the frustrated client takes some consolation from the contractor at least paying some for the alleged lacking in performance? And if this is true, how far off is it to suggest that this bias actually encourages a tolerance for poor work—poor work that might otherwise not be put up with if the client had to pay full price? I also think it probably takes more time to manage for getting the job done right than to just manage for payment. If this is true, it introduces another skewing of the process. It is not too hard to imagine then the moral hazard effect this kind of behavior could have in a competitive market. It conspires to tolerate deficient performance rather than eliminate it, sending a perverse signal around quality and price. This is especially true in a low bid auction setting.

Contractors are human too. (And I think I have flogged that enough in other parts of this essay.) But being human, they want to stay in business and do a good job: at least the better ones do. The real incentive for them is to be asked back or to remain eligible to work again for their clients in the future. The fear of failure in that regard is sufficient incentive to ensure good work. Fines and penalties for quality problems are a distraction to the goal of quality work. In some cases they are an abuse of the client contractor relationship and represent a failure to understand how contract agreements in a responsible industry should actually work. If quality fines ever had any utility, the industry by now has outgrown it. Unfortunately the new revised rules still define the primary purpose of the inspection system is to determine quality and payment. There is still work to do to move to a new level of responsibility and end payment fines linked to the quality inspection guidelines.



Ontario Report

By Jessica Kaknevičius and Sarah Bros, R.P.F.

Can you see the Forester through the trees?

Silviculture contractors know the importance of a good silvicultural prescription. In most provinces across Canada, the responsibility for that prescription falls to the professional forester. In Ontario we are a licensed body with over 830 members. That number has declined by more than 17% over the last five years. The universities in Ontario that offer Forestry degrees have seen declining enrolment in the program for a number of years. In fact, in 1993 the University of Toronto closed its undergraduate program (Bachelor of Science in Forestry) due to low enrollment. These institutions have tried rebranding forestry to attract our youth into the program but this has had limited success. Additionally, the Ontario Ministry of Natural Resources (MNR), under Premier McGuinty, has announced that MNR will manage its responsibilities in the forest using a risk-based approach. This will be coupled with layoffs/early retirement within the MNR over the next few years. So who will be minding the forests in Ontario?

Silvicultural contractors are partners with professional foresters in the management and renewal of our precious natural resource. Foresters

rely on silvicultural contractors to implement our prescriptions. The members of the Ontario Professional Foresters Association (OPFA) recognize and value their partners in ensuring the protection and nurturing one of our greatest natural resources: trees. For this reason the OPFA have partnered with the Ontario Forestry Association (OFA) to expose and educate young people on the value of a career in natural resource management and professional forestry. As an example, the OFA has initiated a campaign to invite a professional forester into the classroom for National Forest Week, September 23-29 (www.forestcareers.ca). The goal of the *Invite a Forester* campaign is to encourage teachers to talk about forests in their classroom by bringing in a professional to engage students. This campaign is only a portion of the work carried out by the OFA, and accompanies their *Focus on Forests* program. Teachers are often faced with curriculum objectives that are outside of their expertise, and they value support from outside organizations who can deliver the right message to their students. By having a forester, or someone working in the forest, visit the classroom they can speak to their experiences within the industry. They can also highlight the way in which our resources are managed, from seed to forest to product, focusing on the sustainability of our forests. Educating classrooms about natural resource management is important for creating individuals who make educated decisions now and into their futures. Perhaps some of these inspired students may even choose a career in forestry.

As a partner, silviculture contractors are in a unique position to engage and encourage employees to further their education and consider a career as a professional forester. The OPFA has tasked a special committee (Career Awareness Committee) to “find the passion” in our young people and spark them to choose forestry as a career option. Working together, we can all ensure that forestry remains a viable and valued profession in our industry. If you wish more information about our initiative or would like to find out how you can help, please contact the OPFA at opfa@opfa.ca.

The Ontario Forestry Association is a non-profit, registered charity that is dedicated to raising the awareness and understanding of all aspects of Ontario’s forests, and to developing commitment to stewardship of forest ecosystems. Visit www.oforest.ca to become a member today and support forest education!

The OPFA is responsible for the regulation of the practice of professional forestry in Ontario and to govern its members in accordance with the **Ontario Professional Foresters Act 2000**, the regulations and the By-laws in order that the public interest may be served and protected. It is a member based, non-profit, non-political organization with approximately 1000 Registered Professional Foresters from all levels of government, industry and education.

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Nova Scotia

David McMillan, President, Nova Scotia Silviculture Contractors Association

In May a group of contractors and forest management heads got together in Truro, N.S. to discuss reactivating the association. The impetus was the shortcomings of the Registered Buyers Program which historically provided silviculture funding for small private woodlots. It may not be known throughout Canada that 60-70% of N.S. woodlands are privately owned by 30,000 owners. Since 1998, funding has been generated by a combination of landowners paying a percentage of wood sold, receiving mills paying a percentage of wood bought and the province paying a percentage.

Initially, the program generated substantial funds for silviculture treatments. However, in recent years funding has shrunk with wood sales plummeting and with no significant increases in base rates in 14 years and rate reductions in some treatments, the Registered Buyer System is now seen by contractors and woodlot owners as badly broken.

Also significant is the projected 50% reduction in clear cutting legislated to occur in 3-4 years, which will require significantly more wood to come from private woodlots. Most woodlot owners will not

harvest wood unless there are guarantees of followup treatments. Most contractors and forest workers have said they are ready to give up the woods unless there are significant improvements to wages, profit margins, a reasonable length of season and timely delivery of the program.

The average age of silviculture workers is 49 years. The gathering of 35-40 contractors voted to reactivate the association, elected a board of directors and put together a list of priorities. The association has met with our proposals to improve the Registered Buyer System with DNR senior staff and is now waiting for time study research to justify our needs.

There's no question the industry is hurting bad. The last big recession of the early eighties moved our logging industry to serious mechanization and some believe with a shrinking workforce it is inevitable that silviculture will see similar changes. The other question is will significant cost increases to silviculture treatments kill the economic benefits of silviculture investments?

Looks like the association will be busy.

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Society of American Foresters

By Steve Wilent

Seeing the Forest for the Tweets

I wish I could take credit for that headline, but it's not mine. I borrowed it from my colleagues Carlin Starrs and Tom Davidson, who have written an article entitled, 'Seeing the Forest for the Tweets: Making the Most Out of the Convention Using Twitter'; the convention being the Society of American Foresters' National Convention, to be held October 24–28 in Spokane, Washington. Starrs' is SAF's social media guru; Davidson, a forester and leadership consultant (www.DavidsonLeadership.com), writes the SAF Leader Lab column for *The Forestry Source*, SAF's newspaper.

While many natural-resource professionals are technology-savvy to some degree, others haven't yet fully embraced Twitter, Facebook, and other new-fangled forms of communication. Thus, while the convention will focus on "Resilient Forests," SAF aims to use social media to engage members in new ways — ways that are unfamiliar to some foresters — to help them explore and perhaps take part in discussions on that main theme.

First lesson: using hashtags in Twitter. "SAF has adopted use of the hashtag "#SAF2012" for this year's convention," write Starrs and Davidson. "This means that any twitter post related to convention, whether it's news about presenters, exhibitors, career opportunities, or special events, will contain the phrase #SAF2012. This will allow anyone interested in news about convention to search for #SAF2012 and instantly see posts from anyone who has news or questions about the convention. SAF staff will also be using the #SAF2012 hashtag during the convention to provide rapid-fire updates about last minute adjustments that may take place, including changes in event locations, times, and so on."

Starrs and Davidson also will lead a series of "Twitter Training" workshops designed to provide hands-on instruction, explain how Twitter differs from other social media, and show why it is a useful tool to have in a changing world. Armed with this training and Twitter on their smart phones or tablet computers, attendees will be able to join "virtual conversations" during convention sessions.

For my part, I'll encourage SAF members to join LinkedIn, a social networking website designed primarily for, but not limited to, people in professional occupations, forestry included. The discussions within the SAF group on LinkedIn have been lively of late, with topics such as "Can forest conservation and logging be reconciled?" and "Pursuing the 'locally produced' idea when discussing harvesting with the public." One question posed by a LinkedIn member—"Spent the weekend in the beautiful Canaan Valley in WV. While there I was asked if, as a forester, my goal was to cut down all the trees. Curious to hear how you respond to those kinds of questions?"—has drawn more than 30 responses, so far, all of them comprising a thoughtful dialogue. You don't have to be an SAF member to participate. Just go to www.linkedin.com and search for the Society of American Foresters group. By the way, *Silviculture Magazine* has a presence on LinkedIn, too, as well as on Facebook.

By the way, you don't have to be an SAF member to attend the convention. Spokane isn't all that far away, for those of you in B.C. and Alberta, and one presentation in particular may make the journey worth your while. Ken Zielke, a principal of Symmetree Consulting Group Ltd., a B.C.-based firm, will discuss "Climate Change Vulnerability Assessment and Adaptation Strategy for the Kamloops Timber Supply Area" (see www.safnet.org/natcon12/index.cfm). Symmetree and a team of researchers from the University of British Columbia have assessed the prospects for meeting multiple objectives and managing ecosystem processes on the highly diverse six-million-acre management unit, given the uncertainties of the future regional and global climate.

That's certainly something to Tweet about.

Steve Wilent is editor of *The Forestry Source*, the monthly newspaper of the Society of American Foresters. He also is a forestry and natural resources instructor at Mt. Hood Community College, in Gresham, Oregon. Contact him at 503-622-3033 or wilents@safnet.org.



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Gold Standard and FSC Land-use Carbon Powerhouse has High Relevance for Canadian Forest Sector

by Tanya Petersen, Pieter van Midwoud



Photo courtesy of CarbonFix Standard

The carbon market plays an increasingly important role in the forestry sector, but its history is dynamic. As far back as the 1990's the first afforestation projects were initiated with the aim of capturing the carbon resulting from the burning of fossil fuels. However, although the plan to capture carbon in forests might seem one of the logical instruments to combat global warming, issues around the permanence of the carbon stored, the fear of monocultures and the position of the European Emissions Trading Scheme to not include forestry credits have prevented this new mechanism from really scaling up.

Today, forests and other land use issues are more dominant in global climate change discussions. In particular the concept of REDD (reducing carbon emissions through avoided deforestation), which emerged in 2007, kick-started the visibility of forests and land use on the global agenda. It became clear to governments, the private sector and NGOs that a holistic and sustainable forest carbon project - one that addresses forest functions such as timber supply, biodiversity protection and water purification - brings far more value than just the carbon sequestration component. This philosophy has changed the discourse of stakeholders involved in forest carbon discussions.

One thing resulting from these new insights has been the creation of

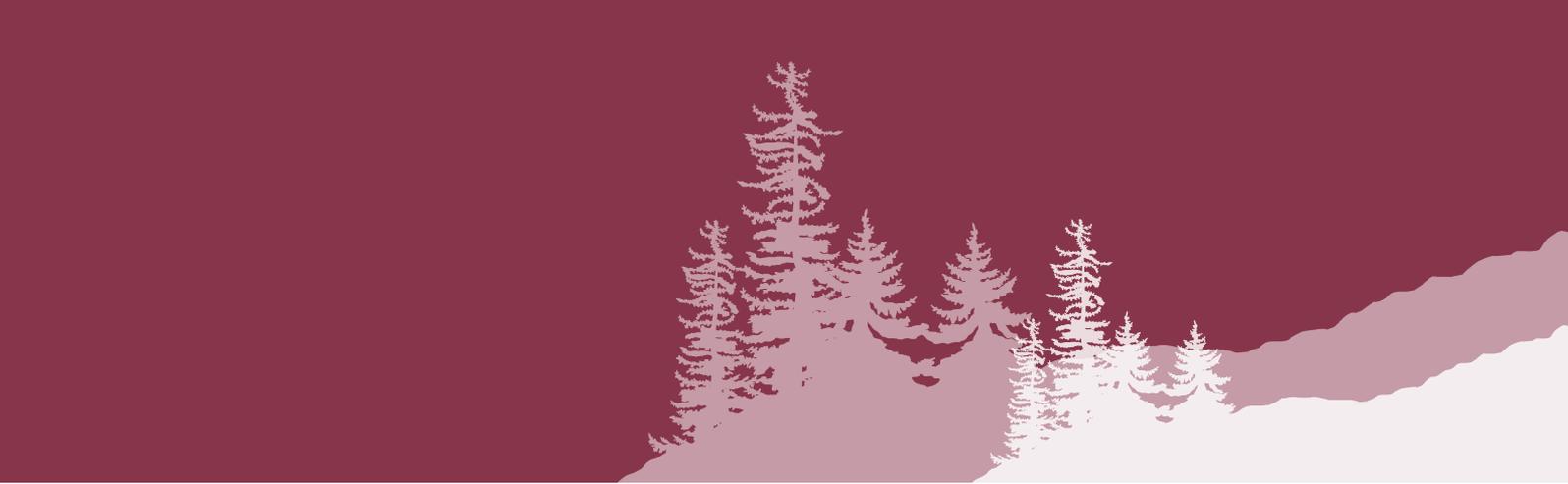
various regional and global quality labels with which a project – after certification – could demonstrate that its carbon project also included many ecological and social functions. The best known labels in this regard are the CarbonFix Standard, the Climate Community and Biodiversity Standard (CCBA) and Social Carbon. These standards that make sustainability claims are used in addition to the already operational labels for sustainable forest management, such as the Forest Stewardship Council (FSC).

On the 18th of September three of the leading standards in the market announced a groundbreaking cooperation. The Gold Standard, the most trusted global regulatory framework for the deployment of public and private capital into low carbon projects, supported by more than 80 NGOs, announced at its annual conference in Geneva that it will acquire The CarbonFix Standard to establish the foundation of its expansion into the land-use and forestry sector, building immediate capacity in afforestation/ reforestation whilst other land-use methodologies are developed.

The Gold Standard has also announced a Memorandum of Understanding with the Forest Stewardship Council (FSC). This Memorandum of Understanding aims to recognize their respective approaches to social and environmental safeguards and carbon certification. Future collaboration will see The Gold Standard incorporate and build upon elements of FSC's safeguarding and resource management requirements, and would enable FSC to rely on The Gold Standard's robust approach to carbon accounting and benefit sharing when FSC certified forest operations seek carbon finance. These groundbreaking agreements bring together three 'best in class' standards in the voluntary carbon market and sustainable forest management sectors.

The motivation for the three organizations to work together is clear: the land use carbon sector needs to establish clarity and trust. This will be addressed by partnering with, and building upon, the work of best in class market actors. The Gold Standard Foundation's CEO, Adrian Rimmer, explains: "Integrating CarbonFix into The Gold Standard consolidates the quality end of the carbon certification market, reducing consumer confusion around the proliferation of standards. Further, FSC is a sister organization that also has the strong support of WWF to define, drive and demonstrate best practice in its field. We have much in common and together can create something very special."

The current CarbonFix methodologies will form a core part of 'Gold Standard version 3.0', which will include new rules and procedures for the certification of land use and forestry projects to The Gold Standard. Rather than focusing on a single aspect of sustainable land-use – as REDD projects do – The Gold Standard will look at



Eucalyptus, Kibira Park, Burundi. Photo courtesy of Erin Kendall

the landscape as a whole including its many functions within and outside of the forest, all of which influence and interact with each other. With this truly innovative and holistic landscape approach, The Gold Standard wants to foster sustainable landscapes that are fully recognized for all of their functions – including sustainable agriculture, biodiversity, water services and forest products. The initial scope of Gold Standard land use and forests will be afforestation and reforestation, improved forest management and climate smart agriculture. There will be a technical alignment of the CarbonFix Standard with Gold Standard procedures, governance structures and infrastructure. From the outset, the creation of Gold Standard 3.0 will be as closely aligned as possible with FSC procedures and requirements, so that the administrative burden for projects that want to use both quality standards will be as low as possible. Existing CarbonFix projects will be hosted by the Gold Standard and may transition into Gold Standard projects if they meet the rules under Gold Standard version 3.0.

Pieter van Midwoud, Executive Secretary of the CarbonFix Standard, is also more than convinced about the value of this new cooperation. He says “CarbonFix and The Gold Standard are very philosophically aligned and consistently ranked number one in their respective scope areas for using carbon finance to drive sustainable development and for the most stringent project monitoring, reporting and verification in the carbon markets. It makes complete sense to become a key part of the Gold Standard’s scope extension into land-use and forestry”.

In parallel with the integration of the CarbonFix Standard, The Gold Standard will also begin developing a governance framework and suitable methodologies for other areas of land-use including sustainable agriculture and improved forest management.

“We are delighted to see and support a consolidation of carbon standards that recognize FSC’s spearheading role in defining, incentivizing and monitoring responsible forest management”, says Stefan Salvador, FSC Ecosystem Services Program Manager. “Establishing a partnership with The Gold Standard for many stakeholders is a ‘dream team’ constellation, as it brings together the two most highly respected standards in their respective fields, being best-placed to create the new benchmark for forest carbon projects.”

Reflecting its unique, holistic approach to certifying low carbon and sustainable development outcomes, The Gold Standard will work in partnership with FSC, stakeholders and market experts to develop robust Monitoring, Reporting and Verification (MRV) for assets beyond carbon, such as ecosystem services and biodiversity, in addition to other environmental, social and economic benefits.

One of the focus areas of The Gold Standard will be its integration into the different regional compliance schemes being established. Some countries, including Switzerland, the Netherlands, Ireland and Liechtenstein already explicitly endorse The Gold Standard and Australia and Costa Rica, for example, have accepted Gold Standard credits to be eligible under their VER schemes. This new powerhouse in the forest sector is hence set to also become an important player in the Canadian market. Already today various climate forest projects are implemented countrywide and some provinces have, or have announced that they will establish, their own compliance schemes. This is important news for Canadian foresters, as it will further speed up the market and incentives for increasing and sustainably maintaining Canada’s forest stock. †

Tanya Petersen is Director of Marketing and Communications at The Gold Standard Foundation, Geneva, Switzerland. Pieter van Midwoud studied forest and nature conservation policy at Wageningen University (Netherlands). He wrote his masters thesis at the Ministry of Agriculture on the credibility of the FLEGT process (on the illegal trade of timber), comparing it with similar cases in the diamond and meat sectors. He has been the head of the CarbonFix secretariat since 2007. p.vanmidwoud@carbonfix.info

Fighting Alien Invasions with Phytosanitary Standards

By Dr. Eric Allen and Margaret Gracie





Invasive species, like the red turpentine beetle, are foreign pests

1.0 mm

Alien invasions have ignited our imaginations for more than a century. H.G. Wells' 1898 novel "The War of the Worlds" sparked near panic when it was famously adapted into an American radio drama by Orson Welles in the 1930s. It later became one of the first alien invasion films of the 1950s. The popularity of such films continues to the present day, with movie-goers flocking to see films like "Alien", "Independence Day" and "Prometheus," proving our continued fascination with creatures who wreak havoc on our world.

But did you know that alien invaders are a real and increasing threat to our environment, economy and cultural values?

Invasive species in our forests have decimated whole species of trees, caused millions of dollars of damage and threatened the livelihood of forest workers. The problem has escalated in the last 30 years as the volume of global trade has quadrupled. The value of traded forest products has reached US \$200 billion annually as more types of wood products are being exported and more countries are shipping products internationally than ever before.

Foreign pests are imported and exported with the movement of global trade. These alien invaders have resulted in major changes in the composition of forests around the world. For example, the introduction of the red turpentine beetle, a North American insect, resulted in widespread tree mortality in northern China in 1999. More recently, the introduction of the emerald ash borer from Asia to North America has destroyed ash trees and is estimated to cost the U.S. \$1 billion per year over the next ten years.

In order to solve the problem of forest pests moving in international trade, we

must understand the pathways that they are associated with. Pests move with forest products that are traded as living plants, wood commodities in the form of logs, sawn wood, chips or manufactured products or as wood packaging – pallets, crates, etc. – that other trade goods are shipped on and in.

The damage caused by these alien forest pests can be significant. Each shipment that contains untreated wood packaging material has the potential to introduce a foreign pest into our forests, and these bio-invasions can affect entire forest ecosystems, with subsequent economic impacts. In 1993, the European Union banned the import of untreated and unseasoned sawn wood from North America to prevent the introduction of pinewood nematode to Europe, resulting in a significant drop in sawn wood exports from Canada to western Europe.

So what's being done to keep these alien invaders from catching a free ride to our forests?

Governments around the world recognize the importance of protecting plants from foreign insects and fungi. Following the principles in the International Plant Protection Convention (IPPC), countries work together to create phytosanitary (plant health) standards that provide guidelines for the development of import and export regulations. Canada is a leader in this field,



The emerald ash borer has invaded

thanks in part to the researchers at Natural Resources Canada who identify global forestry and quarantine research needs to help develop international standards based on science.

“The IPPC is an international convention that is currently signed by 177 countries. This convention is governed by a commission which has adopted international standards to prevent and to control the introduction and spread of pests of plants and plant products,” says Brent Larson, a Canadian working for the FAO as an IPPC Standards Officer.

In order to deal with the pest problems associated with wood packaging, an international standard was adopted in 2002 that has been widely implemented by the trading nations of the world. Many IPPC standards relate to practices in forestry.

“In 2009, the FAO forestry department identified the need to bring together the concepts of the IPPC and the forestry sector to enhance forest health in international trade,” says Gillian Allard, Forest Protection and Health Officer of the FAO. A group of international scientists, phytosanitary authorities and forest sector representatives worked together to develop a guide on implementing international standards for phytosanitary measures. Over 100 people from more than 45 countries collaborated on the book, which is now available as a free download on the FAO website.

The team had a strong Canadian representation, and these experts brought their considerable experience in forestry and plant health to the guide.

“The Guide to Implementation of Phytosanitary Standards in Forestry” provides clear, concise guidance to help keep forest pests from spreading around the world,” says Gillian. “Produced in six languages, it is aimed at forest sector workers throughout the world who are on the front lines of forest trade.”

Forest sector workers involved in all aspects of the trade – growing, planting, managing, harvesting, manufacturing, storing, trading and transporting – can

play a key role in preventing the spread of pests. Integrated pest management, a combination of prevention, observation and suppression measures, is the most effective means of dealing with forest pests. In order for this method to work, field staff must be trained to recognize pests.

Do you know which insects and fungi are harmful to our forests? Could you recognize alien insects and fungi in our forests and what would you do if you recognised one?

A large section of the guide is devoted to explaining phytosanitary terms in plain language and to informing readers of the most damaging pests affecting global forests.

“It’s important for us to recognize which alien species don’t belong in our forests, but it’s equally important to ensure that our forest products are free of potentially dangerous pests before we export them,” says Adnan Uzunovic, a Canadian expert from FPIInnovations who helped author the guide. “Careful observation begins in nurseries and during tree planting and continues in other phases of wood production and export.”

Phytosanitary problems can be reduced through monitoring growing stands for early detection of pest problems and choosing appropriate silvicultural, pest protection and harvesting practices (see *Silviculture Magazine* Spring 2011).

Sections 3.2 to 3.5 of the guide provide helpful guidance on how to prevent the spread of home-grown and alien pests in nurseries, planted forests and naturally regenerated forests. These tips include:

- Choosing the most suitable species for a site’s soil and climate conditions reduces stress on the plant
- Proper cleaning and sanitizing of equipment between sites helps to prevent the spread of pests
- Disposing of silviculture wastes from pruning or thinning by following local environmental or waste management regulations

- Notifying the Canadian Food Inspection Agency immediately if you find an unknown organism or regulated pest

Did you know?

A large variety of pests may move with plants for planting, including: aphids, scale insects, adelgids, bark beetles, weevils and moths; nematodes; foliar, seed, cone, root-rot and canker fungi; pathogenic water moulds; and bacteria, viruses, viroids and phytoplasmas.

The guide represents a strong first step in educating all sectors in forestry about plant health standards and integrating phytosanitary training into forestry schools. Ultimately, the project will result in healthier forests and parks as more people become aware of these invasive species and start taking action.

Information sharing between forestry workers and plant health regulators is already helping to prevent, detect and eradicate new pest outbreaks. A better understanding of the phytosanitary requirements of importing countries will enhance the safe movement of forest products and reduce economic impacts.

Everyone in the forest sector has a part to play in preventing the spread of forest pests. Take the new e-learning training course for forestry personnel on the FAO site at www.fao.org/forestry/foresthealthguide/76169. Talk about forest health with your colleagues. And learn to recognize alien invaders. The future of our forests depends on you. †

Dr. Allen leads the Forest Invasive Alien group at Natural Resources Canada’s Pacific Forestry Centre, which focuses on a variety of forest health-related issues. He works extensively on non-indigenous species that impact forest ecosystems. He chairs the International Forestry Quarantine Research Group and serves on the North American Plant Protection Organization forestry panel and the International Plant Protection Convention (IPPC) Technical Panel for Forest Quarantine.

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