branchlines

Volume 24#4 Winter 2013

Inside:

Wood pellets as feedstock for future biorefineries? 6
Climate justice 10
Re-examining fire history in southeastern BC 14
New equipment advances wood processing (*cover*) 18
Advanced biomaterials from wood 20

UBC Forestry
University of British Columbia

dean's message

In recent weeks, we have seen the start of a strong advertising campaign by the concrete industry attempting to discredit the use of wood in construction. Relying on photo-shopped images and applying information from developing countries to Canada, the concrete industry is attempting to argue that construction should be based on concrete and steel rather than wood. The arguments that are being put forward do not stand up to any rational or scientific examination. There is a place for both forms of construction, but the attacks by the concrete industry seem both unwarranted and illogical. We will continue to advocate for the use of wood in construction, and hope to build on our existing positions in wood building design and construction. Our recently purchased Hundegger® RobotDrive will help us develop new technological solutions in wood buildings, and we are grateful to a private donor and a CFI grant that enabled this to happen.

Much of what we do in the Faculty is only possible through our donors. In this issue, we feature Dr Peter Pearse, who has bequeathed a major gift that will provide invaluable assistance to our future Aboriginal students. Peter is a leading expert in forest economics, and his textbook on forest economics, now in its second edition, is known to many foresters. It has recently been translated into Chinese, and is likely to become a standard forestry textbook in China.

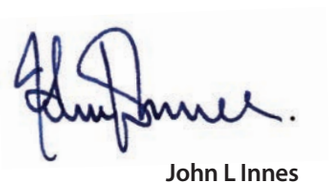
It is always interesting to read the section about our alumni. Ken MacDicken has had a remarkably varied career, and is currently responsible for the Global Forestry Resource Assessment organized by the Food and Agriculture Organization of the United Nations. These 5-yearly assessments represent landmarks in our understanding of global forest trends, and I for one will be quick to integrate the results of the 2015 assessment into my lectures on international forestry.

Some may wonder at the leading news item printed opposite. Isn't bamboo a grass? While it may be a grass, it shows many of the properties of wood, and it is appropriate that we should have someone (Greg Smith) looking into it. Bamboo can either be grown alone, as in parts of southeast China, or can be integrated into forestry and agriculture, as we are seeing in China, but also in other parts of the world, such as Ethiopia. With its short rotation times, bamboo offers many advantages, although it is unlikely ever to replace wood in some products.

We have also included a news item about our Master of Sustainable Forest Management program that recently achieved accreditation from the Canadian Forestry Accreditation Board. This program enables students without a forestry background to remedy this significant deficiency, and provides a means for them to move into a stream that will ultimately enable them to achieve the coveted status of Registered Professional Forester. With this program already proving successful, we will be introducing a number of other professional master's degrees in the coming years.

While it is perhaps invidious to single out any particular pieces of research presented in this issue of BranchLines, my attention was drawn to the article on fire scars (pages 14-15). I was particularly interested in the statements about how the evidence from fire scares does not support the existing fire-regime classifications. The discrepancy between the evidence and what is being used in the province is disturbing, and I believe that it extends beyond fire scars. There is sufficient evidence now available to begin seriously doubting some of the information that is currently being used to drive resource management in British Columbia. In medicine, we have moved to a much more evidence-based approach to policy decisions, and while there have been moves to adopt such an approach in forestry, they are yet to reach British Columbia (at least in their rigorously applied form). This represents a serious deficiency, and one that probably applies across Canada.

I would also draw your attention to the article on HIV/AIDS (pages 16-17). This represents the conclusion to a study that was first described in the first issue of BranchLines that I had the opportunity to provide an editorial for. It again emphasizes the broad scope of forestry, and one that I see growing. Healthy forests and a healthy population go hand in hand, and there is increasing evidence that forests have a role to play in ensuring that both urban and rural populations throughout the world achieve a healthy lifestyle.



John L Innes
Professor and Dean

forestrynews

G8 bamboo project

The UBC Wood Composites Group (headed by Dr Greg Smith in the Department of Wood Science) is leading a G8-sponsored collaboration with the University of Cambridge, MIT, and Cambridge Architectural Research on the development of structural bamboo composite building materials from the giant timber-bamboo, Chinese moso (*Phyllostachys pubescens* Mazel). UBC has recently signed onto a CleanTech Venture MOU that forms part of a record-breaking £5.6 billion trade agreement between Britain and China [1], to develop a standard classification in Chinese and English for components and composites that make up structural bamboo products. To develop this standard, the project team will be working with Chinese organizations including the research organization ICBR (International Centre for Bamboo and Rattan), and INBAR (International Network for Bamboo and Rattan).

Milled slat-based composites of moso bamboo can be found in a large variety of mostly non-structural, indoor applications including flooring, decking and cabinetry components, produced in China mainly for the export market. Although attractive and functional demonstration structures have been built from bamboo composites in China, few if any structurally engineered wood or bamboo products are used in building. Long considered to be the 'poor man's timber' the market reach of engineered bamboo-based building materials, such as structural composite lumber and engineered panels, has been heavily constrained by limited engineering data, structural building codes, limited or non-existent production capacity, a lack of consumer awareness and strong preferences for inorganic materials. This project aims to help redress this situation.

A full length article highlighting research findings at UBC will be published in Branchlines in Fall 2014.

[1] www.businessweekly.co.uk/cleantech/16226-cambridge

Exploring forestry and conservation in China

"Exploring forestry and conservation in China" is a 4-week intensive program offered through the UBC Faculty of Forestry in partnership with Nanjing Forestry University (NFU). This program provides opportunities for students to examine the current development of Chinese forestry, its wood industry, and conservation through lectures and field trips to nature reserves, local industry and plantations. Over the past 2 summers, 23 students (20 from the Faculty of Forestry, 2 from the Faculty of Science, 1 from the Faculty of Arts) have travelled to China as part of this study program.

For more information contact the program coordinator Xinxin Zhu in the Faculty of Forestry at xinxin.zhu@ubc.ca or visit www.forestry.ubc.ca/undergraduate/exchange-program/exploring-forestry-and-conservation-in-china/ where you can read reports from past-participants. The next cohort of students will be travelling to China through this program in the summer of 2014.

Appreciating sustainability and innovation in Japan

By Kenny Cheng

Kakegawa Castle

The 11th Pacific Rim Bio-Based Composites Symposium was held in Shizuoka, a city in Japan famous for its breathtaking views of Mount Fuji. The symposium attracted scientists from around the world, to present and discuss the latest research on wood and plant-based composites. The biannual symposium began in New Zealand in 1992 followed by Vancouver (UBC) in 1994. This year's conference theme was "bio-composites for an environmentally symbiotic society" to improve the lives of people. The first keynote speaker overviewed markets in Asia and Europe, pointing out the need to develop new high value added wood products. The second speaker supported this need but drew attention to the declining interest amongst young people in North America in the science that underpins such materials, namely wood science and technology. One unfortunate side-effect of this declining interest is that most university wood programs in North America, with the exception of UBC's, have either shrunk in size or have merged with other programs.

My contribution to the symposium was a poster on the use of low molecular weight resin to improve the outdoor performance of white spruce decking boards. Not only does the treatment act as a preservative, but it also helps keep the natural appearance of wood when it is exposed to the weather. The treatment is a novel way of protecting the wood without using biocides. At the end of the conference I was pleased to learn that I had won the best poster award. Following the conference I visited some important industrial and historical areas including Kakegawa castle (reconstructed using wood) and the World-famous Yamaha piano factory.

My time in Japan was a great experience for me. I now appreciate the role that education and international collaboration play in generating sustainability and innovation. In addition, I have a new sense of appreciation for Japanese culture and wood construction. The poster prize was a great honour for me as a graduate student, my laboratory group and UBC. I am grateful to Professor Phil Evans for helping me prepare my poster and guiding me throughout the conference. I am also grateful for the Faculty of Forestry's financial support that enabled me to take part in the conference.

Ptarmigan encounter

Over BC Day weekend in early August, UBC Forest and Conservation Sciences professor Kathy Martin and post-doc Michelle Jackson hiked to Mt Albert Edward on Vancouver Island in search of white-tailed ptarmigan. Armed with a tape-recorder, they played calls of chicks throughout their hike in order to attract the attention of ptarmigan in the alpine region. Hearing no responses, they were ready to head back down when a soft clucking was heard from the far side of an open meadow along the Albert Edward ridgeline. Kathy switched the tape to that of a male "challenge calling", and that immediately caused a scene! A male ptarmigan emerged from a rock pile and excitedly flew across the meadow toward the 2 hikers. Oblivious to Michelle and Kathy's presence, he ran up to within 1 meter of them, looking for another male who had supposedly encroached upon his territory. This close encounter with the normally-elusive white-tailed ptarmigan was a very special treat for their long but perfect-weather day hike.

The photo demonstrates just how cryptic ptarmigan can be! (Can you find the bird in the photo? Look for a red eyebrow and white legs with their winter feathers already grown in).

Public lectures January/February 2014

Dr Hugh Possingham, Australian Laureate Fellow and Professor in the School of Biological Sciences at the University of Queensland, will be giving a free public lecture in the Faculty of Forestry at 6:30 pm on Wednesday, January 22, 2014. The title of Hugh's talk is "Six common mistakes in how governments and other organizations allocate funds to nature conservation"

CANCELLED

Dr Colden Baxter, Associate Professor in the Department of Biology at Idaho State University, will be the invited Schaffer Lecturer in the Faculty of Forestry on Tuesday, February 18, 2014. Dr Baxter's public lecture, entitled "Fire and ice: responses by stream-riparian ecosystems to shifting disturbance regimes and some consequences for forest management", will be at 5:30 pm in room 1005 of the Forest Sciences Centre.

For further information on either of these upcoming public lectures, visit www.forestry.ubc.ca/events/.

A new path to becoming a Registered Professional Forester

The Master of Sustainable Forest Management (MSFM) program has been accredited by the Canadian Forestry Accreditation Board for the next 6 years.

This is a major milestone in the development and implementation of this new course-based master's program, and a first for forestry graduate programs in Canada. MSFM program graduates can apply to become Registered Professional Foresters (RPF designation) with member agencies of the Canadian Federation of Professional Foresters Associations, including the Association of British Columbia Forest Professionals.

Deb DeLong, RPF and MSFM program coordinator, reports that graduates from the class of 2013 are having good success finding employment in the natural resource sector, with a diversity of employers.

For more information about the MSFM program, contact Deb at deb.delong@ubc.ca or visit the UBC Forestry Course Based Masters website at http://cbm.forestry.ubc.ca/.

Indian Forest Service mid-career training

UBC Forestry and its consortium partners will continue training top-level officers of the Indian Forest Service for the next 3 years. The primary purpose of these programs is to provide senior officers with an increased knowledge of strategic planning, policy making and governance aspects of forest management. Each program starts in India with a 1-week orientation. Half of the participants then travel to the US and the other half to British Columbia to attend a 2-week training program. During the final week in India, participants share their experiences in both countries. The training programs are coordinated by a consortium consisting of UBC Forestry, the Maxwell School of Citizenship & Public Affairs at Syracuse University in New York, the Indian Institute of Management in Bangalore and the Indira Gandhi National Forest Academy in Dehradun.

Ten groups of 30 officers have already participated in mid-career training programs in British Columbia and 7 more groups will be trained under the renewed agreement. These programs are delivered through cooperative arrangements between the UBC Faculty of Forestry, BC Ministry of Forests, Lands and Natural Resource Operations, BC Ministry of Environment, and the Canadian Forest Service. As part of the training program, participants are introduced to the activities of the BC Forest Practices Board, Parks Canada, Squamish Nation, Cheakamus Community Forest, Municipality of Whistler, Stanley Park Ecology Society and many others.

By the end of the 2015, UBC Forestry and its partners will have trained more than 1,000 senior officers of the Indian Forest Service, which in total employs 2,700 officers

For further information contact Jorma Neuvonen, director of special projects in the Faculty of Forestry, at jorma.neuvonen@ubc.ca.

Wood pellets as feedstock for future biorefineries?

We face significant challenges with the continued use of fossil fuels such as oil, from concerns about carbon emissions contributing to climate change to on-going depletion of finite hydrocarbon reserves (oil, coal, natural gas) affecting the lifestyles of our children and grandchildren. Although it may take generations, it is inevitable that we will have to evolve from a finite, hydrocarbon driven global industry to a more sustainable, "carbohydrate based" society. Being a forest (biomass) rich province, BC's early transformation to a bioeconomy not only provides an opportunity for more effective utilisation of its forest biomass, it can also help catalyze the development of the markets, products and processes arising from this transformation.

The mountain beetle mediated death of our lodgepole pine forests is one of the consequences of climate change. By the time the infestation has run its course over the next few years, 15-17 million hectares of forest will have been lost, much of it occurring during the time when traditional wood markets, such as US housing, have been in decline. As the quality of the fibre and lumber derived from the beetle killed trees decreases, more residues will be generated during its traditional processing (more cracked lumber, sawdust, etc.). The silver lining in this loss of higher value applications is the increased availability of readily accessible feedstock (the residues) for BC's rapidly expanding wood pellet sector. BC's pellet production has grown from close to zero in 2000 to about 3.5 million tons a year in 2012. If this material had not been collected and pelletised, much of it would have decayed or burned, releasing its carbon into the atmosphere with no opportunity to use it to displace the products derived from oil (fuels and chemicals)

One of the biggest challenges limiting the large scale processing of biomass is its low bulk density and high moisture content, which limits its transportation over long distances. Densification processes such as pelletisation can enhance the bulk density of biomass 4-6 times higher than its native form, thus improving the transport/tradability of biomass over long distances.

Fifteen years ago, it would have

been difficult to imagine the export of wood pellets from British Columbia to Europe or Asia. However, a combination of higher energy prices, our desire to reduce dependency on imported hydrocarbons and the carbon reduction strategies of several nations have made the co-firing of biomass for electricity/heat production more economically and socially desirable. Densification of biomass has substantially changed the economics of moving biomass around the globe. During the past 15 years, global wood pellet production has increased from zero to 16 million tonnes. Canada and BC in particular, together with the USA, are the world's largest pellet exporters.

The pelletisation process involves compression of biomass particles of 2-3 mm size through the holes of a die to form cylindrical shaped pellets. During the process, the friction between the biomass particle and the walls of the die generates heat which raises the temperature *in-situ* above the glass transition temperature of lignin. The lignin softens and facilitates the binding of the biomass particles during the process. The resulting compacted, dense, drier wood pellets are predominantly combusted and used as a feedstock for co-firing applications in coal/biomass power stations, combined-heat-and-power, or for residential pellet stoves.

All of the current pellet applications make use of the intrinsic calorific/thermal value in the pellet with little regard for its potential as a feedstock for biorefinery applications. One of the attractions of biomass as compared to coal is that it can also be used as a feedstock for a biorefinery. Biomass has a much higher value as a feedstock for plastics, polymers, dyes, chemicals, etc than can be obtained from a typical oil refinery. According to the US Department of Energy, the 4-6% of a typical barrel of oil that is used as feedstock for polymers/chemicals provides the real value within a barrel, not the approximately 50% that goes into transportation fuels.

It was long assumed that the biochemical type of "sugar platform" approach of bioconversion, that is currently being commercialized using wood chip or agricultural residue feedstocks, would not work when using pelletised feedstock. It was presumed that the conditions used to make the pellets would degrade a substantial amount of the sugars present and would make the material very hard to process biochemically. A biochemical-based biomass-to-fuels-and-chemicals process typically involves the 3 steps of, pretreatment, (to fractionate and recover most of the hemicellulose sugars in the water soluble fraction while enhancing enzyme accessibility to the water insoluble cellulosic component), enzymatic hydrolysis of the cellulose to glucose, followed by fermentation of both the cellulose and hemicellulose derived sugars to various fuels and chemicals, while providing a highly reactive lignin fraction that could be used as a chemical feedstock.

"Although it may take generations, it is inevitable that we will have to evolve from a finite, hydrocarbon driven global industry to a more sustainable, "carbohydrate based" society."

Over the past few years, researchers (including recent doctoral graduate Linoj Kumar) at the UBC Forest Products Biotechnology/Bioenergy Group at the Faculty of Forestry (led by Dr Jack Saddler), in collaboration with colleagues at the Biomass and Bioenergy Group in UBC's Department of Chemical and Biological Engineering (including Drs Shahab Sokhansanj, Zahra Tooyserkani, Tony Bi and Jim Lim), have looked at the possibility of using wood pellets as a feedstock for an enzyme based biorefinery process. As mentioned above, it was anticipated that the conditions used to make stable and transportable wood pellets would make it harder for biochemical bioconversion. However, when softwood pellets and softwood chips were compared and subjected to the same set of steam pretreatment, fractionation, enzymatic hydrolysis and fermentation conditions, some surprising results were obtained. Unexpectedly, wood pellets were shown to be processed almost as effectively as "less dense" wood chips. At optimised process conditions, greater than 80% of the original carbohydrates could be recovered from the wood pellets. These sugars could be readily fermented to a range of fuels and chemicals.

Further work identified additional beneficial effects of steam pretreatment of the wood biomass. Typically, a considerable amount of energy is used to reduce the wood particles to a uniform size prior to pelletisation. It was found that steam pretreatment effectively disaggregated the feedstock such that this conditioning step was not required. Furthermore, steam pretreatment resulted in a pellet with enhanced transport properties including increased durability and strength. Thus, the integration of steam pretreatment into a single process step both enhanced wood pellet properties while facilitating the direct bioconversion of the resulting wood pellets to monomeric sugars. This work will have a major influence on the commercial viability of any future biorefinery operations. One of the disadvantages of using biomass (compared to coal or oil) is that logistical challenges (primarily due to its low density) make it difficult to achieve the economies of scale that occur in a typical coal-fired power station or oil refinery. Now that UBC researchers (and subsequently other groups in the US and Europe working on pelletised agricultural residues) have shown that pellets can be used as the feedstock for future biorefineries, companies are recognising that many of the logistical challenges that they were facing can largely be resolved by integrating a pelletisation step into their collection, processing and conversion of biomass feedstocks.

For further information contact Dr Jack Saddler at jack.saddler@ubc.ca or Dr Linoj Kumar at linojkumar@gmail.com.

Adapting the biogeoclimatic ecosystem classification to a changing climate

By Colin Mahony RPF

As an undergraduate in UBC Forestry from 2000-2002, I was indoctrinated with Dr Fred Bunnell's mantra: "don't do the same thing everywhere!" The premise behind this saying is that (1) ecosystems differ in important ways, so what works in some ecosystems won't work in others, and (2) mistakes are a big part of adaptive management, so it's important to hedge your bets. To put Dr Bunnell's saying into practice, my professors initiated me into the Biogeoclimatic Ecosystem Classification (BEC). Since my graduation, BEC has been a constant companion in almost every aspect of my forestry career in British Columbia.

BEC originated at UBC in the 1960s with the visionary work of Dr Vladimir Krajina. It was adopted in the 1970s by the BC Ministry of Forests, who continue to steward the program today. BEC integrates climate, soil, and ecosystem function into a structured knowledge system that is both a method of ecological inquiry and a repository for ecological knowledge. Similar to an online wiki, it has grown increasingly rich and detailed through the contributions of its users. After 3 decades as the foundation of forest management in British Columbia, BEC is now so deeply ingrained into research, education, regulations, and practice that it is difficult to imagine separating what we know about the forests from what we know about BEC. However, BEC wasn't designed with climate change in mind, and it faces an uncertain future.

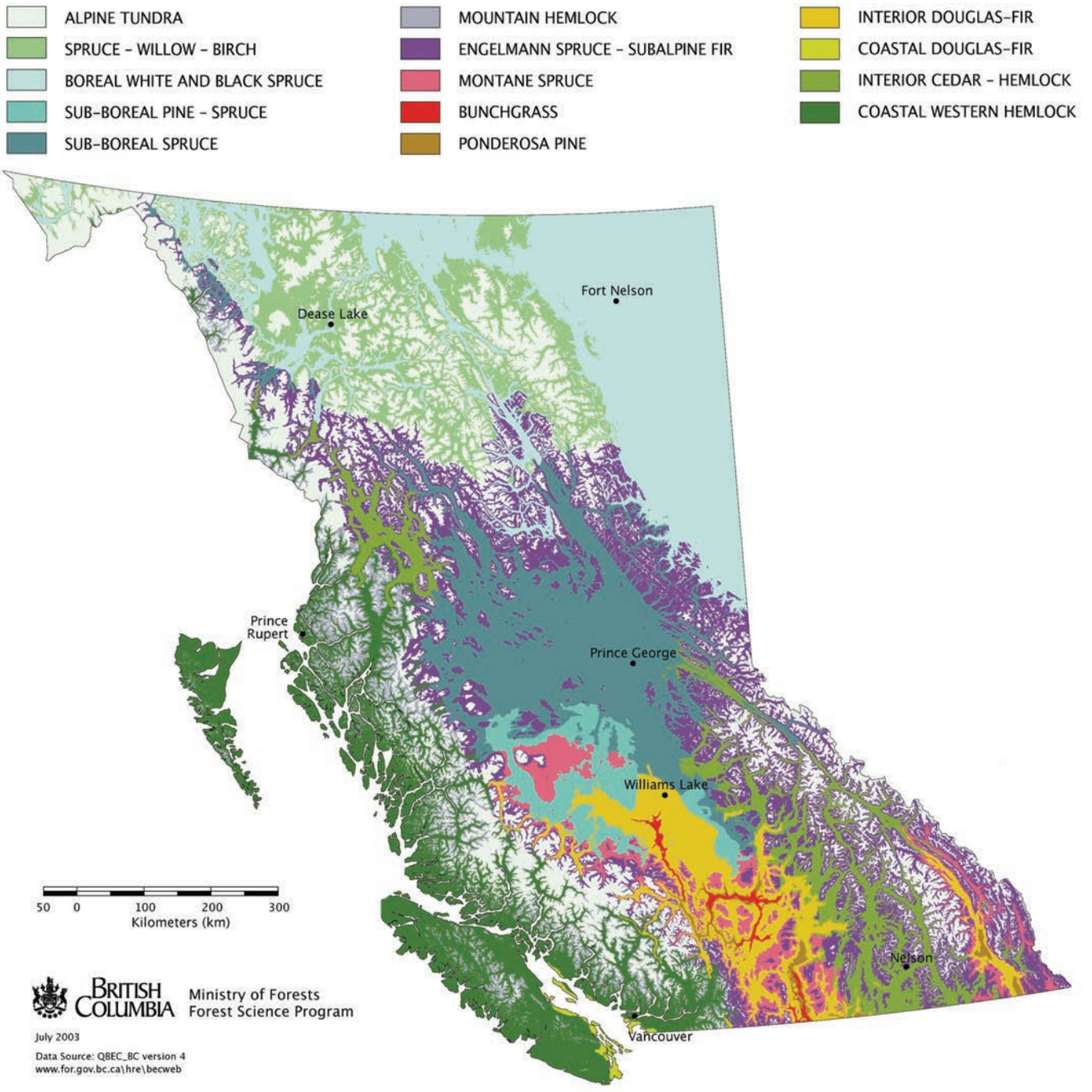
In many ways, BEC is our greatest asset as we grapple with how to adapt our forest practices to climate change. The hierarchy of 16 zones, 131 subzones and 221 variants making up the BEC climate classification are a common language for climate shared by hundreds of researchers, foresters and biologists throughout British Columbia. Simply stating the name of a BEC climatic unit such as "ICHdw1" will conjure in the mind of an experienced practitioner a suite of climatic attributes such as summer and winter temperatures, variations in the depth and duration of snowpack, and frequency of drought, and the effects of these conditions on plant and animal communities. For this reason, BEC is a powerful tool for understanding and communicating the ecological implications of climate change.

> **"In the face of climate change, BEC faces the same challenge as forest species and the forest economy: adapt or disappear."**

Despite these strengths, the BEC climate classification in its current form has a static concept of climate that doesn't account for historical or future climate change. In the face of climate change, BEC faces the same challenge as forest species and the forest economy: adapt or disappear. Adapting BEC will not simply be a matter of making incremental adjustments to the boundaries of BEC variants. Climate projections strongly suggest that the climate over the next few decades will change much faster than the rates at which biotic communities can reach equilibrium. Reliance on indicator plant communities – BEC's most elegant and powerful feature – is unlikely to be sufficient in the future. New approaches are required to describe the evolution of BEC climate units through time, and incorporate novel climates as they emerge on our landscape.

Drs Tongli Wang and Andreas Hamann from UBC Forestry's Centre for Forest Conservation Genetics broke the first ground by developing detailed climate data for BC and using it to identify climatic conditions associated with BEC units. They tracked these conditions in climate projections for the next century, essentially allowing the BEC variants to move across the map through time. This approach has had enormous impact on research and practice, and through partnerships between UBC Faculty of Forestry, the BC Ministry of Forests and the Pacific Climate Impacts Consortium (PCIC), has evolved into the core of climate change adaptation initiatives in BC forestry today.

This avenue of research inspired me to return to UBC Forestry as a graduate student to work with Drs Tongli Wang, Sally Aitken, and Suzanne Simard. To understand what climate change means for BEC in the future, our first step is to investigate historical climatic variability of the past 100 years. Our preliminary results suggest that on a year-to-year basis, most BEC variants spend more than half of their time experiencing the characteristic climatic conditions of other BEC variants. Our research also suggests that



between the 1960s and the 1990s there was a climatic shift in some climate variables equivalent to 1 BEC variant, and an overall climatic shift in central interior BC of approximately half of a BEC variant. BEC reflects a widespread recognition that ecological knowledge and management strategies in one area may not be readily transferable to other areas, ie "don't do the same thing everywhere". Our preliminary results indicate that the same caveats likely apply to the transference of knowledge from year to year and from one generation of practitioners to the next.

Looking to the future, there are many questions that need to be answered. Which BEC units are experiencing the most rapid changes in climate? When and where are new climate BEC zones and variants likely to emerge in the province? Are these projected conditions analogous to current climates in other jurisdictions such as the USA, or entirely novel? UBC Forestry's Dr Tongli Wang and his research partners at BC Ministry of Forests and PCIC have developed high-resolution historical and projected climate data for Western North America. This data set, available online as ClimateWNA, allows us to pursue these questions. Investigating climate change in the context of the BEC system is a fertile research area with urgent implications for forest management and conservation.

BEC is a rich intellectual legacy of past generations of government ecologists, university researchers and industry practitioners throughout British Columbia. It is an essential tool in the face of climate change, but it is also vulnerable to neglect. As a leader in ecosystem management research and education, UBC's Faculty of Forestry has an important role in ensuring that the knowledge embedded in the BEC system is adapted to 21st century realities.

Colin Mahony is a master's student working with Drs Tongli Wang, Sally Aitken and Suzanne Simard in the Department of Forest and Conservation Sciences. Colin can be reached at seadollar75@gmail.com.

Climate justice

What is climate justice? Impacts from climate change are increasingly experienced worldwide. Different segments of the population experience these impacts differently. This trend is captured in the notion of climate justice, an emerging scholarly topic and the impetus for a burgeoning social movement worldwide. Climate justice is based on the recognition that some groups are more vulnerable to the serious effects of climate change, depending on their position in society, and that those most vulnerable are often least responsible for contributing to climate change. These include: women (particularly in rural areas of developing countries), children, geographically vulnerable communities in the Arctic, small island states and Indigenous peoples. Domestically, differential impacts are associated with income, age, gender, geography, and Aboriginal status. An understanding of public attitudes about climate justice can aid decision makers in crafting policies and support for such policies.

To gain insights on this topic, Jodie Gates, an MSc graduate working with David Tindall in the Faculty of Forestry at UBC, and Shannon Daub at the Canadian Centre for Policy Alternatives, conducted a survey of BC residents to examine public understanding of the social aspects of climate change and to gauge public support for climate policies at a provincial level. BC is a particularly relevant case, given that it has the highest poverty level in Canada (as just recently reported in the media), and has already experienced some of the effects of climate change in the form of widespread forest fires, the mountain pine beetle epidemic, and glacial retreat.

Methods. An online social survey was conducted with a socio-demographically representative sample of 1006 BC residents. The main focus was on "support for climate justice", and "support for climate change policy initiatives".

Support for **climate justice** is an index comprised of 9 items; some examples include:

- People who are responsible for the most greenhouse gas emissions should also make the biggest reductions in their emissions.
- Policies to combat global warming must consider the differences between urban and rural areas.
- We need to reduce greenhouse gas emissions today so that future generations don't pay the price for global warming.

Support for **climate change** policies is an index that includes a variety of elements of possible public policy initiatives. Amongst 7 items were initiatives such as:

- Create job retraining for workers in fossil fuel industries that will be affected by global warming policies.
- Invest in reforestation efforts because forests prevent greenhouse gases from polluting the atmosphere.
- Invest in mass transit.

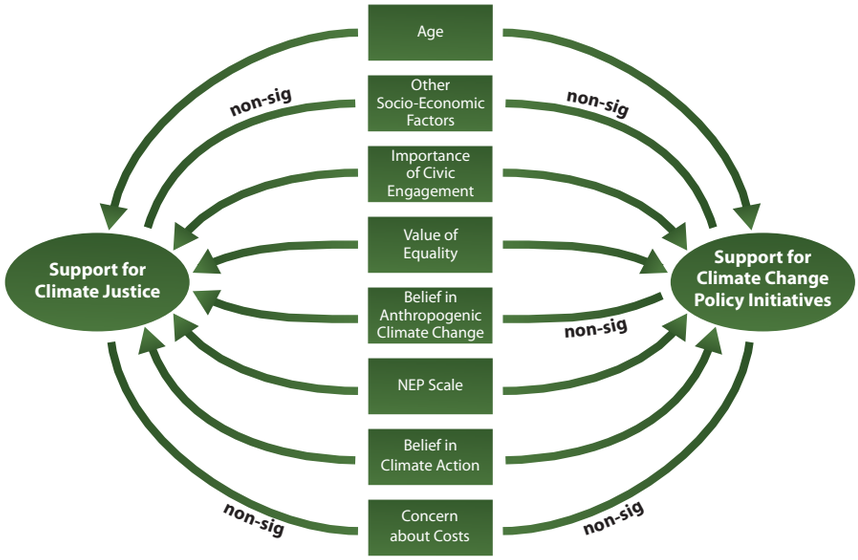
Respondents were asked about the extent they agreed or disagreed with the items. Indices were also created to measure several variables that we expected might influence people's support for climate justice, and policy.

Results. Multivariate analyses revealed: Age is the only socio-demographic variable to have a significant impact, with older people being more supportive of climate justice (CJ hereafter), and climate change policy initiatives (policy hereafter). People who think that civic engagement is relatively important are more supportive of CJ, and policy. Valuing equality is associated with support for both CJ and policy. Belief in anthropogenic climate change is a significant predictor of support for CJ, but not for policy. People who score higher on the NEP scale (a measure of the extent to which they are relatively more biocentrically oriented versus being anthropocentrically oriented) are more supportive of both CJ, and policy.

Belief in the efficacy of climate action is a significant predictor of both CJ and policy. Concern about the costs of tackling climate change is not a significant predictor of either CJ or policy.

Some Implications. Scholars working within the CJ perspective argue efforts to combat and address climate change must take social justice issues into account. From an ethical point of view, those who contribute more to carbon emissions should bear more of the cost for addressing climate change. From theoretical and empirical standpoints, if people don't think that policies designed to combat climate change are fair vis a vis their contributions and outcomes, they will be resistant to supporting such policies.

Results suggest a number of ways of framing policy initiatives to address climate change that may benefit from understanding the perceptions and values of the public, and also from the fact that some policy initiatives can address several different objectives at the same time, and policy makers can leverage these facts. For example, increased investment in public transit tends to decrease overall carbon emissions. At the same time, it helps to address issues of social inequality, as lower income people are more likely to utilize public transportation. And, because they are more likely to utilize public transportation, they tend to have smaller carbon footprints. So, public transit is a win-win in terms of social justice and reducing carbon emissions.



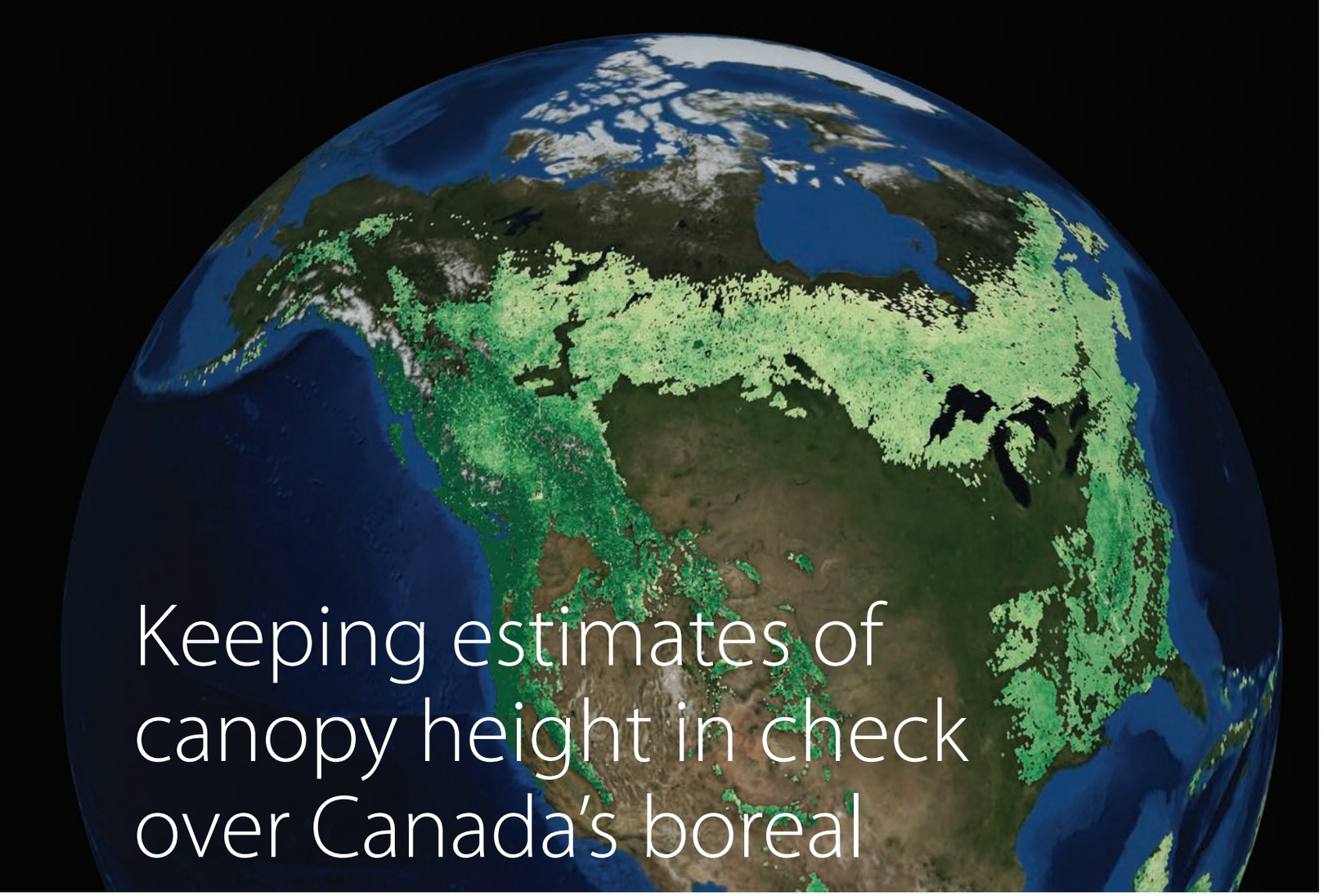
Factors explaining support for climate justice and climate change policy

Relatedly, we found that members of the general public who valued equality more strongly, also tended to support CJ, and policy. Thus focusing on this value can have payoffs for promoting climate change policy initiatives.

Another interesting finding is that when other variables are statistically controlled, belief in anthropogenic climate change is not statistically associated with support for climate change policy initiatives. This suggests that people can be persuaded to support climate change policy initiatives regardless of whether they believe in anthropogenic climate change.

Our research suggests that considering public perceptions and values can provide a variety of potential communication tools that might be used to promote climate change policy initiatives. Based on scientific evidence, as the IPCC has documented, it is very unlikely that climate change is not largely anthropogenic. However, a USA Today cartoon created by Joel Pett before the Copenhagen Climate Change Summit nicely illustrated the situation; the punch line reads: "What if it's a Big Hoax and we create a better world for nothing?" Indeed.

For further information, contact Jodie Gates, MSc, at gates.jodie@gmail.com, Dr David Tindall, Associate Professor in the Department of Forest Resources Management, at david.tindall@ubc.ca, or Shannon Daub, Canadian Centre for Policy Alternatives, at shannon@policyalternatives.ca.



Global estimates of canopy height produced by Dr Michael Lefsky, Colorado State University

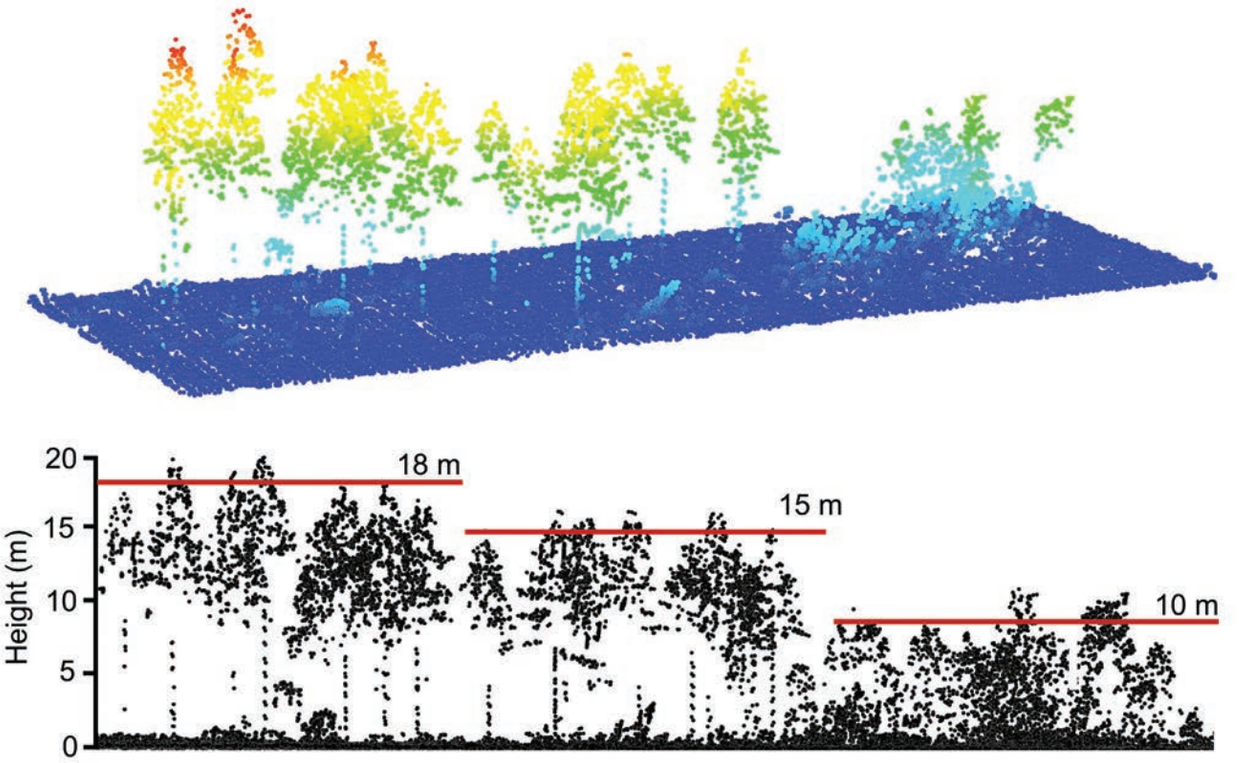
Keeping estimates of canopy height in check over Canada's boreal

Forests are a critical component of the global carbon cycle, with forest disturbances and regrowth acting as key pathways of carbon between the terrestrial biosphere and the atmosphere. Projected changes in forest disturbances and continued land conversion have the potential to alter these pathways and lead to increased carbon concentrations in the atmosphere. In order to forecast changes in the carbon cycle and how these changes could affect our climate, we first require an accurate estimation of how much carbon is stored in our forests and an understanding of how that carbon is distributed around the globe. Due to the vast extent and remoteness of many of the world's forests, in particular Canada's northern boreal forests, quantifying the distribution of carbon storage in forests is not feasible with field measurements alone.

In the past 2 decades, Light Detection and Ranging (LiDAR) has emerged as a remote sensing technology capable of measuring the 3-dimensional structure of forests, providing a potential means to estimate carbon storage in aboveground biomass over large areas. LiDAR systems, typically flown on airplanes, emit pulses of laser energy and record the timing of pulse returns to accurately locate objects in 3 dimensional space. By emitting millions of these laser pulses over forest canopies, LiDAR systems can provide a detailed look at the structure of forests from which information on canopy height, canopy density, and other 3 dimensional characteristics can be derived.

PhD candidate Douglas Bolton, along with supervisor Nicholas Coops, is using LiDAR data to better characterize the structure of Canada's northern boreal forests. As most of the northern boreal is unmanaged and not subjected to regular inventories, our understanding of structure in these forests is limited. Douglas uses transects of LiDAR data collected by the Canadian Forest Service in 2010, which span 25,000 km from the Yukon in the west to Newfoundland in the east. This massive LiDAR dataset provides an unparalleled look at the structure of Canada's boreal forests and has the potential to improve our understanding of carbon storage in aboveground biomass over this very large area.

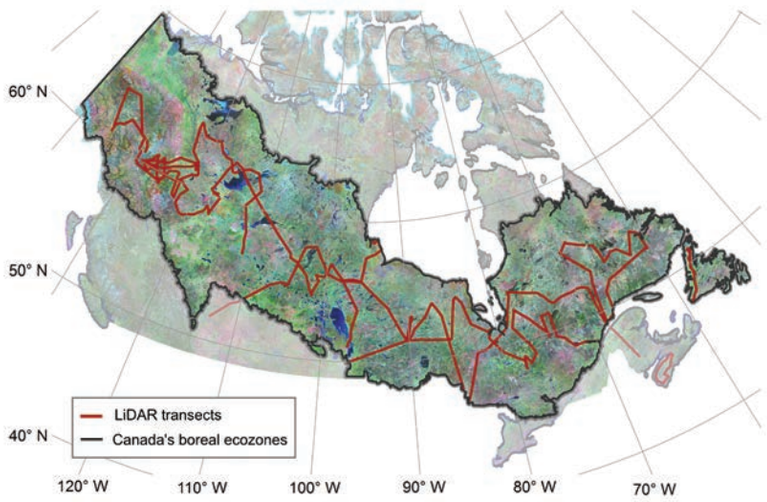
Recently, Douglas used this detailed LiDAR dataset to investigate the accuracy of products that estimate canopy height, a key indicator of carbon storage, across the entire planet. These canopy height products are derived from LiDAR data collected by the Geoscience Laser Altimeter System (GLAS), the first and only LiDAR system that measured forest structure from space. While the data collected by GLAS was globally distributed, only a fraction of the world's forests were sampled during the 7 year mission (2003-2009). To solve this issue, researchers at Colorado State University and NASA's Jet Propulsion Laboratory relied on additional data sources, such as landcover and climate data, to extrapolate canopy height estimates from GLAS to all the forests of the world. As these maps of canopy height provide a potentially valuable source of information on carbon storage in forests, Douglas was interested in how well they were able to characterize structure across Canada's boreal. By determining where large differences exist between published



Derivation of canopy height estimates from 3-dimensional airborne LiDAR data

maps of canopy height and estimates from airborne LiDAR, Douglas aimed to provide a better understanding of where future efforts to predict carbon storage should be focused and what techniques lead to the most accurate estimations of canopy height.

A number of key areas were identified across the Canadian boreal where large discrepancies existed between airborne LiDAR height estimates and height estimates from the published maps, with differences reaching as high as 12 metres in some regions. These discrepancies were an important finding, as they draw attention to areas where estimates of carbon storage could be highly uncertain. The areas of highest disagreement between height estimates coincided with areas of rough terrain, where spaceborne LiDAR has been demonstrated to be the least reliable. In addition, Douglas demonstrated the contrasting nature of the height estimates, as airborne LiDAR is rich in stand-level information while the coarse resolution products tend to represent average conditions over much larger areas. While an understanding of average conditions is suitable for certain applications, determining the impact of stand-level disturbances on the carbon cycle could be difficult when only average conditions are known.



LiDAR transects collected by the Canadian Forest Service in 2010 over the Canadian boreal

Quantifying carbon storage in forests will not only aid carbon modeling activities, but allow us to better manage our forests into the future. Using this information, conservation efforts and management plans could be tailored to maintain important stores of carbon in our forests. LiDAR continues to show significant promise for improving estimates of carbon storage in forests, but continued work is needed to determine the data, approaches, and environmental conditions that yield the most accurate results.

This research was conducted by Douglas Bolton (PhD candidate in the Department of Forest Resources Management), along with co-authors Dr Nicholas Coops (Forest Resources Management), and Dr Michael Wulder (Canadian Forest Service). The study was funded by the Canadian Space Agency, Government Related Initiatives Program, and the Canadian Forest Service in addition to an NSERC Discovery grant to Dr Nicholas Coops and a graduate scholarship to Douglas Bolton. The authors thank Dr Chris Hopkinson for his survey planning and data collection efforts and Christopher Bater for his work in developing the LiDAR dataset used in this study.
For more information, contact Douglas Bolton at doug.k.bolton@alumni.ubc.ca or Nicholas Coops at nicholas.coops@ubc.ca.

Re-examining fire history in southeastern British Columbia

Understanding the severity and frequency of past fires is critical to forest management practices that emulate natural disturbances for conservation and economic targets. With respect to wildfire management, this knowledge helps identify areas where fire exclusion has increased risk to property and ecosystems. With the climate changing, summers are expected to be hotter and longer. There is a great need for fuel and forest management to mitigate this risk, and restore forest structures that are less prone to severe fires.

Yet, research shows considerable errors exist in fire-regime classifications used for baseline mapping of historic fire regimes in the southern interior of BC. Under the guidance of Drs Lori Daniels (UBC Tree-Ring Lab) and Sarah Gergel (Landscape Ecology Lab), master's student Hélène Marcoux used tree-ring evidence from fire scars and tree cores to characterize the fire history of 2 watersheds adjacent to the town of Cranbrook in

southeastern BC. They then compared this field-based evidence to existing fire-regime classification systems found in the province.

Hélène found misclassifications to be most pronounced in mid-elevation forests which historically burned under mixed-severity fire regimes. Her results showed mixed-severity fires were prevalent not only in the valley bottom, but even up to elevations of 1700 m – the lower boundary of subalpine forests in this region. She found that over the past 300-400 years, fires were very frequent – with fires burning every 7 to 56 years on average at individual sites. Forests were also multi-aged, with 300- to 400- and even 700-year old veteran trees that survived multiple surface fires throughout their lifetime. In BC, there is a widely held belief that historically most fires were high-severity or "stand-replacing crown fires". Clearly, fires in these watersheds do not fit the traditional "high-severity" profile.

A growing body of evidence suggests mixed-severity fire regimes were historically more common than previously documented. Traditionally, fire regimes have been categorized as dominated by either infrequent severe fires in montane, subalpine and boreal forests or frequent low-severity fires in valley-bottom dry forests. The mixed-severity fire regime explicitly recognizes that interactions between topography, fuels, and weather in mountains lead to diverse effects within and among individual fires. Cumulatively, mixed-severity fire regimes result in complex landscapes comprised of stands that last burned at a range of fire severities and at intervals of years to decades, or even centuries since fire.

Differentiating between mixed- and high-severity fire histories is critical for achieving more ecologically sustainable forest management. Knowledge of fire regimes is used to guide silviculture towards retaining forest structures and composition consistent with historic disturbance regimes. The notion that high-severity fires were historically common helps justify the use of clearcut harvesting or low-retention silviculture systems. In contrast, emulating mixed-severity fires would require silviculture systems with more variable retention to generate patchy harvest patterns at various scales.

"Tree-ring evidence shows that fire suppression and changes in land-use over the past decades have largely eliminated frequent non-lethal surface fires."

Mapping the extent of western larch (*Larix occidentalis*) could help to improve our understanding of mixed-severity fire prevalence across this species range. Western larches were found only at research plots with mixed-severity fire histories, suggesting this fire-adapted species may serve as an indicator of mixed-severity fire. This shade-intolerant species requires a seed source shortly following disturbance when it has a competitive advantage over other species. Thus, population survival at a stand-level requires fires that leave large openings but also veteran tree seed sources in close proximity.

Tree-ring evidence shows that fire suppression and changes in land-use over the past decades have largely eliminated frequent non-lethal surface fires. With an increasing number of homes built in or near forests, societal demands for fire suppression and protection are increasing. While mixed-severity fires were common place in the past, this may not be true of the present. Fires are more severe today due to human-caused environmental change. Allowing some wildfires to burn, reintroducing fires with prescribed burns and mitigating fuels in some areas are important approaches towards this goal. Forests and communities such as Cranbrook are becoming more resilient because of these types of proactive management. It is critical that forest and fire policy incorporate emerging knowledge regarding the prevalence of mixed-severity regimes into maps and classification systems. Further research is needed in this province to understand the extent of the mismatch between actual fire history and that depicted in currently used fire-regime classification systems.

Further information can be found in a recent paper published in the Canadian Journal of Forest Research: www.nrcresearchpress.com/doi/abs/10.1139/cjfr-2012-0449 or email Hélène at marcouxhelene@gmail.com for a copy.

Coring a 700 year old western larch which helped researchers uncover discrepancies in BC fire-history classification systems

Men carrying charcoal made from wood

"We go with empty stomachs"

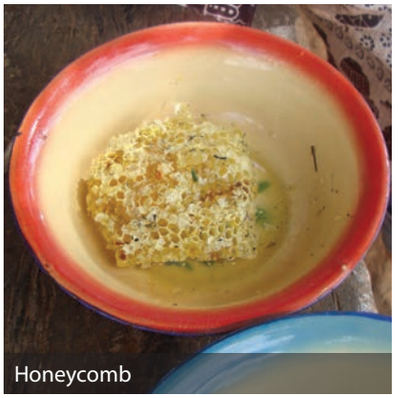
HIV/AIDS, forest resources, and household coping strategies in Malawi

The highest prevalence of the human immunodeficiency virus (HIV) and the world's most highly affected countries are found in Sub-Saharan Africa. The acquired immunodeficiency syndrome (AIDS) is a leading cause of death in Africa and worldwide for prime-aged adults – ages 15-49 – the very people who work to support families and build societies, and those usually the most productive economically. HIV/AIDS is having not only devastating and tragic social, economic, and political impacts throughout Sub-Saharan Africa, but ecological ones as well. Forests are fundamental to the health and well-being of rural people in developing countries as they provide medicinal plants, animal and plant food sources, gums and resins, construction materials, charcoal, and honey. This holds true across Sub-Saharan Africa. In this region, health care is also predominantly a forest-based service with traditional healers being the dominant providers of medical care in forested areas, often providing upwards of 70% of primary health care. Wild foods (eg, fruits, berries, leaves) can improve health, boost the immune system and help protect against opportunistic disease, and detoxify the effects of AIDS-related drug treatments.

Given the extent of the pandemic across Sub-Saharan Africa and that the majority of Africans already rely on forest resources for subsistence and to supplement their cash incomes, the links between HIV/AIDS and forest resources have not been well studied. Researchers in the Faculty of Forestry's Africa Forests Research Initiative on Conservation and Development (AFRICAD) are attempting to address some of these issues. We originally introduced the rationale, research questions, and preliminary findings for this study in 2010 in BranchLines 22(2). By bringing together aspects of sustainable forest management, population health, and rural livelihoods, the purpose of this study was twofold: firstly, to characterise how household dependence on forest resources changes through 3 phases (the period before HIV became a problem in the household, during HIV-related morbidity, and after AIDS-related mortality); and secondly, to explore the range of local forest-related coping strategies being used, and innovations that local people would like to try, to alleviate the HIV/AIDS burden on their household.

The data for this study were collected from 12 focus group discussions and 60 semi-structured interviews with members of unaffected and HIV/AIDS-affected households in villages in 4 districts in Malawi's 3 regions (northern, central,

"Rural households are being forced to cope and adapt to changing availability of important forest resources while also dealing with the devastating effects of HIV/AIDS"


Honeycomb

southern). Our final results demonstrate that the relationship between HIV/AIDS and dependence on forest resources appears to correspond closely with the stage of the disease. Firewood and water were consistently ranked as being amongst the most important resources, regardless of HIV-affectedness. During the morbidity phase, the need for medicinal plants increased substantially along with an increased need for wild foodstuffs (eg, fruit, bushmeat, and honey). There was a decreased need for these resources post-mortality. Timber use increased after HIV-related mortality, supporting earlier assertions that wood is increasingly being required for coffins in Malawi. The results are strikingly similar for both females and males, and respondents report that there are no longer any traditional gender roles for household due to HIV/AIDS. Therefore we question the thinking around gender-specific forest-related interventions for HIV-affected people, and ask what – given the gendered knowledge base that must surround resource use – do these changes in traditional roles mean for sustainable forest use in the future?

Rural households are being forced to cope and adapt to changing availability of important forest resources while also dealing with the devastating effects of HIV/AIDS. In this regard, the Malawian respondents employ a range of short-term, labour-related coping strategies such as walking further to collect firewood and using agricultural residues in place of firewood (eg, maize husks, pigeon pea stems). Other broad economic (eg, withdrawing children from school so their labour can be employed on the farm and to save money on tuition fees), social (eg, using demonstration projects to teach children how to plant trees around the homestead; teaching children to identify medicinal plants in the wild); and nutritional (eg, they "go with empty stomachs" by eating less or eating foods that don't require firewood or water) coping strategies are employed as well. Policy makers and development practitioners could foster several innovations and interventions including: distributing forest resources (especially firewood) to affected households, investing in agroforestry projects and the domestication of important medicinal plants, and indigenous fruits and vegetables, and strengthening indigenous institutions such as savings clubs and labour and draught power clubs (groups that share the costs and responsibilities for draught animals).

In response to recommendations from respondents, and in collaboration with the World Agroforestry Centre in Nairobi and with funding from the Banting Fellowship Program, Dr Joleen Timko, Managing Director of AFRICAD, has initiated 2 follow up studies to this original research. Joleen is evaluating the health and socio-economic impacts of 2 firewood-related innovations on participant households in Malawi: (1) the earthen, improved firewood cookstove, *Chitetzo mbaula,* on household fuel use; and (2) easier access to firewood trees (*Senna siamea, Eucalyptus camaldulensis, Moringa oleifera*).

For further information contact Dr Joleen Timko, Research Associate and Managing Director of AFRICAD in the Faculty of Forestry, at joleen.timko@ubc.ca.


A respondent listening to what was recorded


Poles, reeds, and grass for granary

New equipment advances wood processing

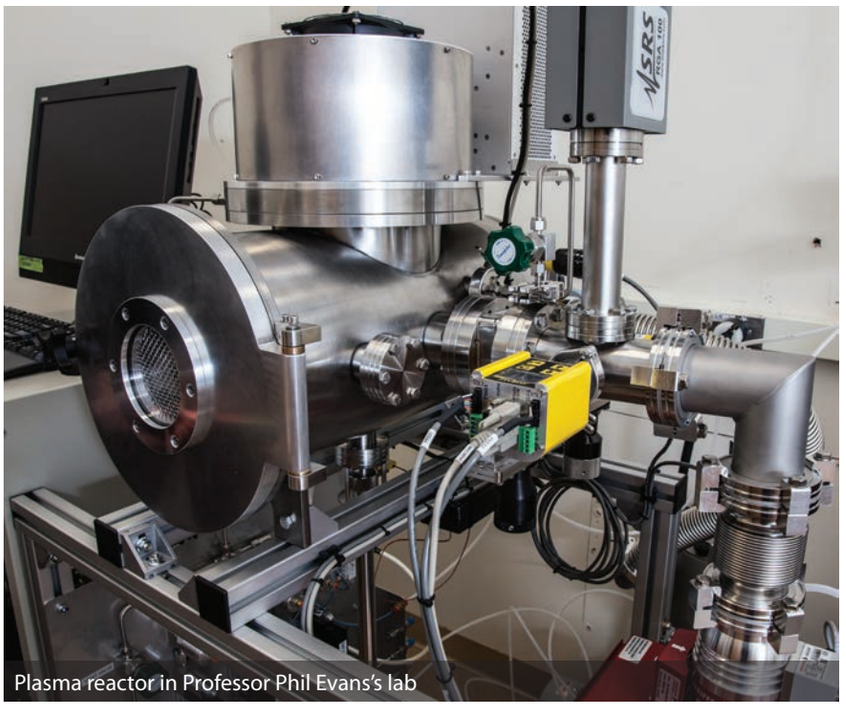
Samples produced by the Hundegger® Robot-Drive

Hundegger® Robot-Drive

The Canada Foundation for Innovation (CFI) is a funding body dedicated to furthering technological research infrastructure within Canada. The mandate of the CFI is to strengthen the capacity of Canadian institutions to carry out world-class research and development that benefits Canadians. Researchers are able to purchase state-of-the-art infrastructure with CFI funding to push back the boundaries of knowledge, explore the unknown and generate exciting outcomes that benefit society. Professors Phil Evans and Thomas Tannert from the Department of Wood Science at the University of British Columbia Vancouver (UBC), used CFI funding to purchase major equipment. Both pieces of equipment – although operating at quite different scales (macro v micro) – are designed to advance the field of wood processing.

Hundegger® Robot-Drive

Thomas's CFI grant, in addition to a matching donation from a private foundation and support from the equipment manufacturer, Hans Hundegger Maschinenbau GmbH, of Germany allowed him to purchase a Hundegger® Robot-Drive: the most sophisticated computer-numerically-controlled (CNC) timber processor available worldwide. The equipment, shown in the picture to the left, is the first of its kind in North America and is housed in the Centre for Advanced Wood Processing (CAWP) in the Department of Wood Science at UBC. By adding the machine to CAWP, the facility now provides an environment for truly multi-disciplinary research between wood scientists, civil engineers, and architects. The Hundegger® Robot-Drive facilitates the automated production of large timber


Plasma reactor in Professor Phil Evans's lab

cross-sections (from 20x50 mm to 300x625 mm) in any lengths and with unprecedented precision, speed, and flexibility. The unique 6-axis capability, together with the automatic tool changer (equipped with up to 16 tools), allows processing on all 6 sides of the timber parts without the need to rotate them. Further, the machine allows interfacing to sophisticated 3D design software providing direct data transfer to fabricate individual components or batches for whole buildings.

The Hundegger® Robot-Drive will play a crucial role in the research within the Chair in Wood Building Design and Construction at UBC. The machine will be dedicated to developing next-generation high-performance timber elements, joints, and components that can contribute to bringing Canada to the forefront of innovation in timber building design and construction. Architects and structural engineers show increased interest in CNC timber manufacturing processes as these can play a crucial role in expanding the use of timber as a structural material, specifically within the non-residential sector and in the context of the growing importance of sustainable buildings. The new research fields, unleashed by breaking the digital confinement in which many new timber engineering and architectural concepts are trapped, will contribute to bolstering Canada's role in wood building design and, consequently, generate direct and significant benefits to Canadian industries and communities.

The new technological solutions enabled by the Hundegger® Robot-Drive will be delivered to the public through the training of highly qualified personnel and through various types of outreach, including workshops for practitioners, demonstration projects, and technical assistance projects with wood products manufacturing companies. To this end, the British Columbia government has established an annual Wood First funding program for applied R&D, outreach, and technical assistance services that will increase interest in building with wood and promote the development of innovative new wood products. UBC's CAWP is one of 4 service delivery organisations within this program, thus the knowledge outputs emerging from research performed with the Hundegger® Robot-Drive will reach practitioners effectively.

Plasma reactor

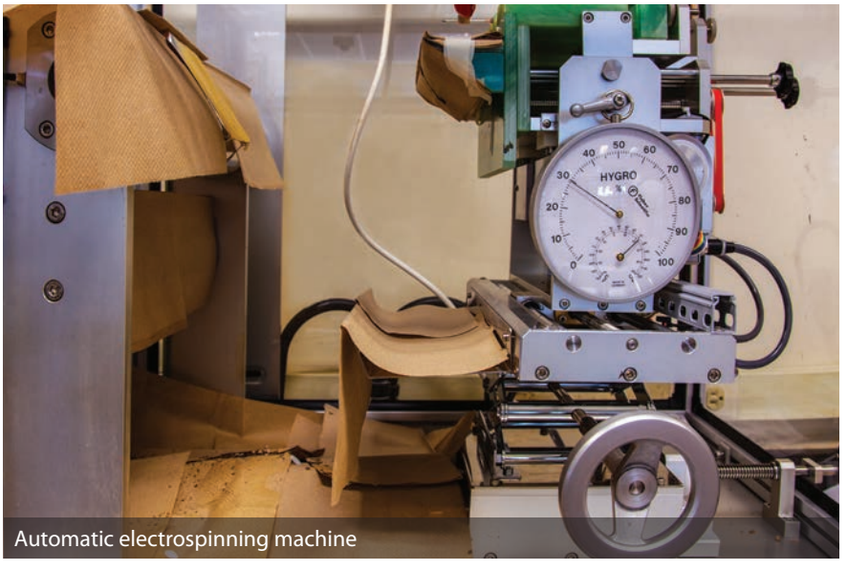
Thanks to CFI and the Centre for Biointerface Characterisation at UBC, Professor Phil Evans has worked with the Canadian company Plasmionique to design and build a unique plasma device. Plasmas are a highly energetic form of matter that usually only occur under special circumstances, for example in the upper atmosphere (as the Northern Lights) or around lightning. Plasmas can be created artificially by applying energy to gases or water vapour and they are used industrially to improve the adhesion of coatings to plastics and for the manufacture of silicon wafers for semiconductors. There are currently no industrial uses of plasma to process wood, but this could change with the arrival of the plasma reactor in Phil's lab.

The new device has some unique capabilities that have been designed with wood processing in mind. Firstly, it can generate plasmas from a range of different gases (air, oxygen, argon, ammonia etc) that will be able to impart distinctive properties to wood, for example, the ability of wood surfaces to self-bond. With this end in mind we have designed a rotating cage within the reactor which will allow wood flakes and fibres to be modified in-situ with plasma, opening up the possibility of manufacturing wood composites such as oriented strand board and fibreboards that don't require adhesives. The plasma device has also been designed to generate high energy plasmas potentially opening up the possibility of using plasmas to rapidly etch (in effect machine) wood including high density wood species that rapidly blunt conventional steel tooling. These applied uses of the device will be complemented by fundamental studies of the interactions of plasma with wood taking advantage of a mass spectrometer built in to the machine that can analyze the components of wood that plasmas etch from wood surfaces. This fundamental research will build on research by graduate students, Mario Ramos and Arash Jamali, who examined the plasma modification of wood using a small device that was purchased 10 years ago, again using CFI funding. The plasma device will be able to answer some of the questions that their research raised as well as opening up exciting possibilities to use plasma for the industrial processing of wood.

For further information contact Phil Evans at phil.evans@ubc.ca or Thomas Tannert at thomas.tannert@ubc.ca.

Advanced biomaterials from wood


Nonwoven lignin electrospun fibre



Automatic electrospinning machine

There is increasing interest in replacing non-renewable petroleum-based materials with products derived from renewable resources such as wood and grass. In fact, the lignocelluloses (carbohydrate polymers tightly bound to lignin) found in wood and plants are the most abundant raw ingredients available for the production of renewable materials. Recognizing the enormous potential for high value and novel products derived from wood, researchers in the Advanced Biomaterials Lab in UBC's Department of Wood Science have been focusing on chemically modifying the components of lignocellulose. Their research involves the production of advanced materials with a wide range of industrial applications. Some examples follow.

Cellulose membrane filters: A major drawback to the natural cellulose (carbohydrate) polymer is its limited solubility. However, cellulose acetate (produced by chemical modification) can be manipulated to form membrane shaped materials for separating and filtering biological components. The critical issue has been to produce membranes with uniform patterns and pre-determined pore sizes. Researchers in the Advanced Biomaterials Lab, including recent PhD graduate Reza Korehei, have produced sophisticated 3-dimentional cellulose acetate solid membranes through a new sol-gel transition process. Reza's research has demonstrated that the adjustability of pore size makes these membranes suitable for filtration of any specific sizes of biological compounds in high temperature and high pressure environments. Ultimately, the researchers hope that this work will lead to the availability of low cost, high performance industrial scale filters and catalysts suitable for use in potentially harsh environments.

Antimicrobial cellulose food film: Cellulose acetate is used in the form of a polymeric film for food packaging. Replacing the polymeric film with antimicrobial cellulose fibrous materials would be a significant benefit for the food preservation industry. Reza and his coworkers have used an electro spinning process to produce non-woven fibre mats of cellulose acetate with small inter-fibrous pore size and high porosity. At the same time, antimicrobial agents were incorporated into the cellulose fibres, greatly inhibiting bacteria growth on the surface of foods. These results are significant in the context of controlling and preventing bacterial infections in perishable foods during refrigerated storage.

Biomorphic ceramic cellulose foam: Reza is also looking at a new class of advanced cellulosic material known as "biomorphic ceramic cellulose foam". This material is created by coating a natural bio-material with ceramic precursors and heat treating to gasify the carbon biomaterials. The result is a ceramic material with the same structure as the biomaterial. The combination of foam forming and biomorphic ceramics can create a lightweight, high strength material that is resistant to temperature and chemicals. This ceramic material can be used in a wide variety of applications from light weight wall board and tiles to high strength, high temperature filters that can withstand corrosive environments. These cellulose ceramic materials have the potential to dramatically alter the interior home building market by creating a new class of high strength lightweight materials.

For further information contact Dr Reza Korehei (now a post doctoral researcher at UBC's Pulp and Paper Centre) at reza.korehei@alumni.ubc.ca.

development & alumninews

Resource economist **Peter Pearse** creates award for Aboriginal students

Dr Peter Pearse, the internationally recognized resource economist, is giving back to the university that set him on his way so many years ago. Dr Pearse recently bequeathed a gift of $250,000 to students in UBC's Faculty of Forestry, to fund awards for Aboriginal students.

"I feel very indebted to UBC for giving me my start, and I also feel very much indebted to Canada. I don't think there are many countries where a kid from the hinterlands – I grew up on a farm near Vernon – can end up with a world-class education. I want to give others in our society the kind of opportunities I had."

A professor emeritus of Economics and Forestry, Dr Pearse has educated generations of forestry students at UBC. Over the years, he has conducted several public enquiries, including Royal Commissions on British Columbia's forest resources and Canada's Pacific fisheries. His gift will support awards for Aboriginal students in the Faculty of Forestry.

In 1976, the provincial government called on Dr Pearse to investigate complexities relating to BC's forest policy. His sweeping recommendations resulted in new legislation including a new Forest Act, Range Act, Ministry of Forests Act and a revised forest tenure system.

He later investigated Canada's Pacific fisheries where salmon and other fish stocks were rapidly being depleted due to overfishing. Drawing inspiration from his forestry background, Dr Pearse came up with the idea of allotting fishers a percentage of the sustainable annual harvest, thereby eliminating the wasteful competition among fishers for as much as they can catch. This became the basis of the quota system, now integral to Canadian fisheries management.

His book on forest economics became a standard text on the subject and a revised edition, with a co-author, was published last year. In November, Dr Pearse traveled to China for the official launch of the Chinese translation.

Born in Vernon, he attended high school in Kamloops where an insightful school councilor and timely scholarship propelled him to explore the possibilities of secondary education. "I never thought about university. Nobody in my family had, but I thought it was time to get out and do something challenging, something outside my family comfort zone."

Dr Pearse enrolled at UBC where he studied forestry. "I enjoyed learning about our forests and how they can be managed". He won a gold medal for his efforts.

A scholarship took him to the University of Edinburgh where he earned master's and doctorate degrees in economics. Eventually, Dr Pearse was offered a position at his old Alma Mater, where he helped to develop UBC's innovative program on the economics of natural resources.

"Forests are valuable natural resources for both their commercial and environmental benefits, especially in Canada," Dr Pearse explains today. "And, in this country, we have chosen to hold most forests under government ownership – while we depend on private enterprise to make use of them. The challenge is to make sure that the interface between public and private results in good resource management. This can be a major challenge indeed."

Now retired, Dr Pearse is an occasional consultant on natural resource and environmental issues. His expertise has been recognized through numerous distinctions including the Canadian Forestry Achievement Award, the Distinguished Forester Award, the Queen's Golden Jubilee Medal, and the Order of Canada. The Vancouver Sun called him one of the province's leading intellectuals.

Looking back on his career today, Dr Pearse feels indebted to UBC and hopes others may share in his good fortune: "Call it a legacy of sorts. But I am determined that others, especially Aboriginal students, have a chance to study here at UBC. It just might change their lives. It certainly changed mine."

Alumni in action

One of the common questions raised by alumni is "What happened to my classmates after graduation"? Our students wonder "What can I do with my degree?" To answer both of these questions, this column features stories from our alumni, highlighting the various career paths our graduates have followed.

Ken MacDicken, PhD 1994

"Stay loose until rigour counts – be open to anything and look everywhere. Be open to international opportunities, even areas you don't think you're interested in because opportunities are there. UBC students have a solid background in forestry and should keep an open mind." – this is Ken MacDicken's advice for students and alumni, and it has guided him through a rewarding and well-traveled career.

Ken grew up in western Washington, near Snohomish, on a farm with woodlands where he spent quite a bit of his youth. When he began his degree at Washington State University, he had not yet considered forestry as a career. It wasn't until 3 years into his degree, when he left school and went to the Philippines with the Peace Corps, that he realized his path. While working with a tribe in shifting cultivation, he decided to return and finish his bachelor's degree in Natural Resources Policy and Administration, as well as a degree in General Agriculture and Forestry.

Once this was completed, he headed back to the Philippines to work for another year and then did a master's degree at the University of Hawaii. Though it wasn't on his radar, 7 years after completing his master's a friend who was on sabbatical from UBC visited him and suggested he do his PhD. Ken contemplated it and looked into different programs, including UBC, Oxford and Yale. His final decision – UBC. According to Ken, "In terms of real forestry, the quality of the faculty and the fact that it was in the Pacific North West – these all made UBC the best choice for me. I've not looked back and have been pleased with the results, contacts and experiences". Starting in 1991, he finished his PhD in 1994. During this time he commuted from western Washington, where he was living, and continued to work for several organizations. At one point he traveled to Bhutan for a 4 month assignment in the middle of nowhere. During the day he worked and in the evening, with no distractions and nothing else to do, he wrote his dissertation by the light of a wood stove and laptop with an external battery. He highly recommends this to others writing their dissertations, he accomplished quite a bit.

"In terms of real forestry, the quality of the faculty and the fact that it was in the Pacific North West – these all made UBC the best choice for me."

Ken's fondest memories at UBC Forestry are of the graduate student population and the faculty. "There were people from many different places and perspectives. Plus the faculty has such a broad range of skills and specialties; everywhere you looked there was something new to learn". He also still remembers his committee members fondly, including Drs Tim Ballard, Tony Kozak, Hans Schreier and Hamish Kimmins.

His career has included working in 34 countries during and after completing his degrees. The companies he has worked for include: Winrock International where he ran a regional forestry research network covering 13 countries in Asia and became Director of Forestry and Natural Resources; the Asian Development Bank as a forester for the Asia West region managing a portfolio of grants and loans of approximately $300 million; the Center for International Forestry Research (CIFOR) as the Deputy Director General; working as the Director of Research and Development for a large plantation company; and the World Bank Group as a forester.

His most rewarding work was with the Peace Corps, specifically, "the work that I did with the Mangyan hill tribe in the Philippines, because you could directly see that people benefited". He was able to set up a school, helped treat people who were gravely ill, and introduced a new forest fallow farm-

ing system that improved crop yields by some 40%.

For the past 3 years he has been working for the Food and Agriculture Organization of the United Nations as the Senior Forestry Officer and Team Leader for the Global Forestry Resource Assessment (FRA) in Rome, Italy. His team does the assessment for 234 countries and territories, so he continues to do some traveling, and meets with interesting people all over the world. The most rewarding part of his position is working to make the FRA, the only global data source about forest resources which is produced each 5 years, more relevant and useful for stakeholders and key forestry users. The next FRA is perfectly timed with Ken's retirement in 2015, at which time he is looking forward to moving back to his home in the Pacific Northwest, doing a bit of consulting and writing, and watching his 5 grandchildren grow.

Overall, Ken feels very fortunate, as many of the places he has worked in are ones that people pay a lot of money to visit. "There are many times that I've reflected seeing an amazing view or cultural setting, and felt like I've been the luckiest guy in the world because I'm getting paid to be and work there".

As for the secret to his success, he believes his wife Maria and family deserve a lot of the credit for where he is and what's he's been able to accomplish.

Reunions and events

Is your class celebrating a milestone reunion in 2014? Letters have been sent to members of milestone classes regarding reunion planning. So far we have heard from the classes of '54, '68, '84 and '89. We'd love to hear from the classes of '64, '74, '94 and '04. Contact Janna Kellett at janna.kellett@ubc.ca or 604.827.3082 for assistance with planning or to find out if a reunion organizer has already stepped forward for your year. Also, be sure to update your contact information with us to ensure you receive your invitation to the reunion.

Mark your calendars for the following events:

- February 13, 2014 – UBC Forestry Alumni Reception at the ABCFP Conference in Kelowna.
- March 9 – 11, 2014 – UBC Desert Days 2014 in Palm Springs, CA. Join *alumni UBC* for an exclusive cocktail reception to kick off the celebrations! Events include an Indian Canyons Guided Walking Tour, Classic Golf Tournament and Dinner and the BNP Paribas Open Tennis Tournament.
- April 27, 2014 – UBC Forestry Alumni and Friends BBQ & Tour at the Malcolm Knapp Research Forest at Loon Lake. This is the perfect opportunity to take a walk down memory lane for an afternoon as we spend time with students at field camp. All alumni, family and friends are welcome to this weekend event!

For more information on any of these events, contact Janna Kellett at janna.kellett@ubc.ca or 604.827.3082.

Industry night at UBC Forestry

Left to right: Bruce Blackwell,Peter Marshall, Rick Slaco and Domenico Iannidinardo

On October 30th, 2013, UBC Forestry hosted an Industry Night at the Forest Sciences Centre. Students, faculty and staff gathered to speak with various associations and companies and to hear 3 of our alumni share their experiences and career paths. The speakers were: Domenico Iannidinardo, BSF'01, Vice President, Sustainability & Chief Forester at TimberWest Forest Corp.; Ric Slaco, BSF'79, Vice President and Chief Forester at Interfor; and Bruce Blackwell, BSF'84 & MSc'89, Principal at B A Blackwell & Associates Ltd.

Domenico Iannidinardo shared his career path and spoke about the value of professional associations and co-op experiences. Ric Slaco spoke of the days to come, how the Forestry glory days are not past, but that there is an amazing future ahead, with lots of opportunity for new graduates. "There is a future in forestry in British Columbia and it starts with people like you".

Bruce Blackwell shared the importance of passion - it's something he looks for in employees and something he believes leads to success. Other key factors include hard work and communication skills. His words of advice to students were to keep their minds open, there is always the opportunity to learn. Things are always changing and they should seek to understand.

At the end of the session, students, faculty and staff mingled with the speakers to ask follow-up questions and visited various booths set up by forestry associations and companies.

Thank you to all of the participants and speakers for joining us!

New co-op coordinator

Tony Loring is the newly appointed Coordinator of Forestry Co-op Programs. Tony has a background in developing partnerships for Dalhousie's Atlantic PATH cancer study and work placements for Katimavik, Canada's leading national youth service-learning program.

Co-op provides academic credit for self-directed learning experiences outside the classroom. From improved curricula, increased enrollment, enhanced visibility and reputation in the community to contributing to the development of well-qualified graduates; co-op enriches the educational landscape.

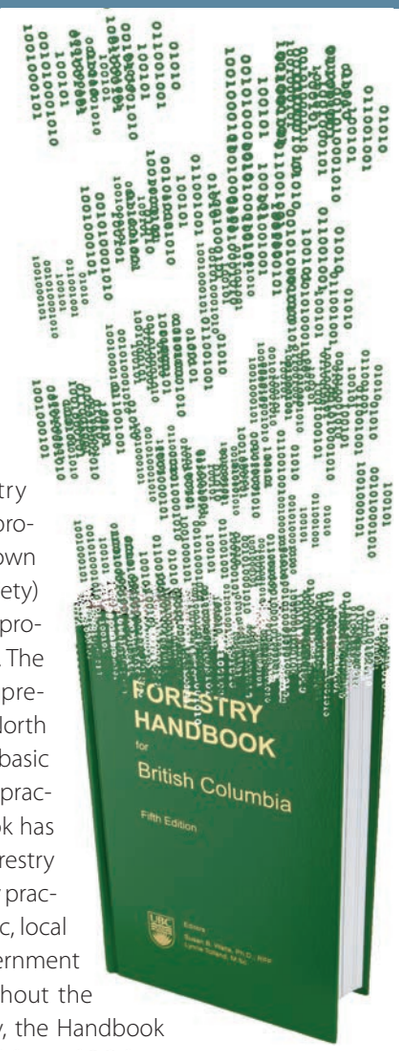
In addition to providing employers with trained workers, the Forestry Co-op Program brings fresh perspectives, the latest techniques and the enthusiasm of co-op students to the workplace.

If you are interested in hiring a co-op student, contact Tony Loring at tony.loring@ubc.ca.

Newsletter production

branchlines is produced in-house by the Faculty of Forestry at the University of British Columbia.
Editor: Susan B Watts, PhD, RPF, susan.watts@ubc.ca
Designer: Jamie Myers, jamie.myers@ubc.ca
© 2013 Faculty of Forestry
University of British Columbia
ISSN 1181-9936

5th Edition Forestry Handbook uploaded and available free…



The first edition of the Forestry Handbook for British Columbia was produced by the Forest Club (later known as the Forestry Undergraduate Society) in 1953. Subsequent editions were produced in 1959, 1971, 1983 and 2005. The 1953 Handbook was the first comprehensive forestry text of its kind in North America. Its purpose was to provide basic guidelines for all aspects of forestry practice. For over 60 years, the Handbook has been one of the most widely used forestry reference texts in BC, serving not only practicing foresters but the general public, local technical institutes, public and government libraries and school boards throughout the province. Perhaps more importantly, the Handbook has come to represent the technical face of BC forestry to many professionals and students from other parts of Canada, the USA and overseas.

The current (Fifth Edition) Forestry Handbook for British Columbia, published in 2005, can be purchased by ordering from our Faculty website (www.forestry.ubc.ca/forestry-handbook/). Now you can also access a digital version of this fifth edition from the same site. You can choose to purchase a hard copy for $45 or download the 2 PDFs on-line for free. Enjoy!

Questions concerning **branch**lines or requests for mailing list updates, deletions or additions should be directed to sue.watts@ubc.ca.

Forestry
University of British Columbia
www.forestry.ubc.ca

Return undeliverable Canadian addresses to:
Faculty of Forestry
University of British Columbia
Forest Sciences Centre
2005 – 2424 Main Mall
Vancouver BC CANADA V6T 1Z4