

branchlines

Volume 25#3 Fall 2014



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dean's message



Universities are curious places. On the one hand, they are institutions that change little over time. For example, lecturing has changed little over the course of the past 800 or so years. Although there are numerous enhancements designed to capture the steadily declining attention span of students, the vast majority of lectures still involve an individual standing before a class and transferring their knowledge to the students. On the other hand, universities are where cutting edge research is conducted, and are the birthplace for many of the world's most significant innovations. We see both sides of this in the Faculty of Forestry: the pressure to maintain a traditional approach, and the pressure to do something new.

BranchLines reflects some of these changes. We are now in our 25th year of production, and the format and content has changed significantly. It is now printed in colour, much longer, and available online. Stories from BranchLines are "tweeted" around the world, greatly extending its reach. Yet we still rely on faculty members and their students and staff to provide the content.

Change is also evident in the way we are delivering teaching materials. In a significant departure from the traditional lecture, we are developing online courses, with the biggest change being the development of Massive Open Online Courses (MOOCs). Details

of one such course currently under development are provided in this issue of BranchLines. The course is intended to have a global reach, and will look at the ways in which people in developing countries interact with forests and the resources that they provide.

Another sign of change is the evolution of the types of materials we cover in our teaching and research. You will find details in this issue of a new Master of International forestry program, which will accompany our Master of Sustainable Forest Management, now in its third year. After carefully analyzing adverts for forestry employees in a range of international positions, we realized that there is a lack of training in the skills that were being sought by employers, and the new Master's program will help fill this gap. The program will have its first intake in September 2015.

Another major change in the Faculty, still subject to Senate and Government of British Columbia approval, is announced in the first of the research articles in this issue. In 2015, we anticipate a launching of a new undergraduate program in Urban Forestry. Such a program is long overdue, and recognizes the fact that the world's population is becoming increasingly urbanized. The program will utilize our existing expertise, which is reflected in the number of articles in this issue dealing with urban forestry, and new expertise that we will be recruiting. This represents an important opportunity for the Faculty to grow, while at the same time satisfying the growing need for forestry professionals in urban areas.

During consultations, reactions to the idea of the creation of urban forestry program within the Faculty have been interesting. Some initial concerns were that we would only be training arborists, considered by many, incorrectly, as being solely concerned with the technical aspects of tree pruning. As the articles in this issue indicate, today's urban forestry professional has a much broader role, and must deal with range of unique

problems that their counterparts in rural areas rarely encounter.

Urban forestry professionals must be proficient with a wide range of skills, and may have to deal with much more complex planning issues than professionals in more traditional forestry. However, like their rural counterparts, they are likely to make a very significant contribution to society. We know that trees and parks add significant economic value to cities and towns because of the improved quality of life. Urban trees fulfil many other functions, providing habitat for urban wildlife, improving urban aesthetics, mitigating erosion and storm runoff, storing carbon and providing important recreation opportunities. In particular, study after study has shown the importance of urban green spaces, and particularly urban spaces containing trees, for the physical and mental well-being of urban dwellers. In our increasingly stressful urban lives, the opportunity to get into a greenspace provides not only a welcome respite, but has been demonstrated to have numerous health benefits. It therefore comes as no surprise to me to see signs throughout the State of Victoria in Australia (and particularly apparent in the city of Melbourne) with the catch phrase "Healthy Parks – Healthy People".

The new undergraduate program in urban forestry, and the new graduate program in international forestry, are two examples of how the Faculty of Forestry is evolving to meet the needs of British Columbia, Canada and the world. We are also working on a series of other initiatives that will be unveiled at the appropriate moment – watch this space!

John L Innes
Professor and Dean

forestrynews

2013 Annual Report

Our latest annual report can now be viewed from our website www.forestry.ubc.ca by following the publications link. If you would like to receive a paper copy in the mail please contact us at:

Faculty of Forestry, University of British Columbia, Forest Sciences Centre, 2005 – 2424 Main Mall, Vancouver BC, Canada V6T 1Z4.



Recent awards

Dr Joerg Bohlmann (Professor in the Department of Forest and Conservation Sciences) has been recognized by Thomson Reuters as one of the World's Most Influential Scientific Minds in 2014. The list reflects researchers whose published papers were most often cited by their peers.

Dr Shawn Mansfield (Professor in the Department of Wood Science), has been awarded the David J Gifford Award in Tree Biology from the Canadian Society of Plant Biologists. The award, which was handed out recently at Plant Biology 2014 (American Society of Plant Biologists), in Portland, Oregon, is given in recognition for "outstanding research contributions in tree biology,

primarily in Canada", with "special consideration... given to originality and independence of thought." The Award was established in 1988 and is made only periodically. Dr Mansfield is the second faculty member in the Faculty to have received this award, following Dr Robert Guy in 2012, making it the first time the award has been given to recipients from the same faculty.

Celebrating a quarter century

BranchLines, our Faculty newsletter, is in its 25th year of production and we are still going strong. To quote from Clark Binkley in this inaugural issue, "successful organizations listen and respond to their clients". We are still listening and, hopefully, still responding. In 1990 our initial circulation list (our clientele) included 2,500 alumni as well as employers, public and private managers, researchers and academics. Today we reach out to almost 4,000 alumni and over 1,000 other interested individuals and groups with our paper copy and electronic versions of the newsletter. Please make sure you keep your address up to date so that you can continue to stay in touch. Address changes for alumni can be directed to

janna.kellet@ubc.ca. Any other mailing list changes can be directed to Sue Watts at sue.watts@ubc.ca. We look forward to staying in touch with you.





Dr Joleen Timko has taken on the role of Program Coordinator for the new course-based Master of International Forestry (MIF). Joleen is also a Lecturer in International Forestry and the Managing Director of the Africa Forests Research Initiative on Conservation and Development (AFRICAD). Joleen received her PhD from UBC Forestry and her Masters from UBC's Resource Management and Environmental Studies program. Her research program on forests and livelihoods in developing countries (mainly in Sub Saharan Africa) focuses on the dynamic driving forces and leverage points that occur at the forest-livelihoods interface. She conducts applied, policy-relevant research that addresses poverty, sustainable livelihoods, human health, and conflict, while maintaining a consistent focus on cross-cutting themes such as gender, climate change, and tenure. Joleen regularly collaborates with Indigenous and tribal communities and band councils, and is presently working with First Nations in Canada's north, and a dozen tribal and ethnic groups in Malawi, Ghana and Ethiopia. Along with teaching in the MIF program, Joleen is teaching UBC Forestry's first MOOC (massive open online course) through the edX platform in 2014. See opposite page for further details. Joleen is also an editor of the peer-reviewed open-access journal Madagascar Conservation & Development.

Joleen Timko can be reached at Joleen.timko@ubc.ca.

New Master of International Forestry program

The Faculty of Forestry's newest professional degree program, the Master of International Forestry (MIF), opens for registration in October 2014 with the first cohort of students arriving in September 2015.

The MIF is designed for early/mid-career professionals (preferably with 3+ years of work experience) who wish to expedite their careers and advance to leadership positions. The program is targeted at individuals who want to engage productively – and to become leaders – in an international forestry context with international agencies and secretariats, finance institutions, transnational forest products enterprises, government ministries, consulting firms, environmental NGOs, and advocacy groups. In order to meet the rapidly changing needs of the international forestry job market, the MIF program will provide training in those skills identified in over 200 forestry and environmental job postings. The program aims to produce global citizens who are 'agents of change and innovation'.

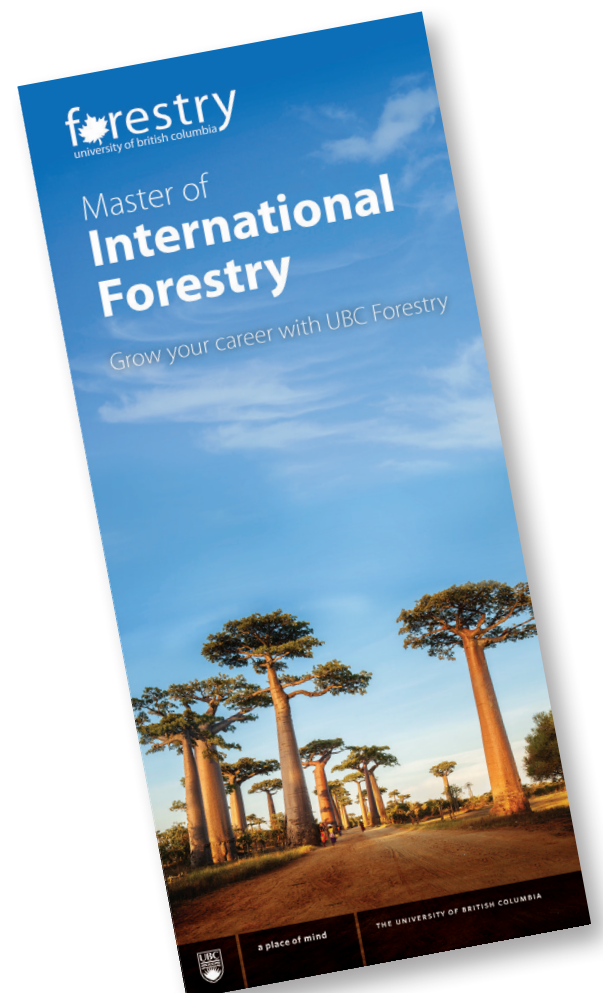
The MIF is a full-time, 10 month course-based master's degree that provides valuable skills relevant to a career in rural development, forest conservation planning, sustainable resource management, and conservation policy development, diplomacy and negotiation. Students will be prepared for forestry work in both developed and developing countries, in natural and plantation forestry, and with subsistence and industrial forestry.

Students will take a suite of courses as partial fulfillment of their degree requirements. These courses will include: international forest governance and policy; international forestry institutions, diplomacy and negotiations; natural resources economics; forest business enterprise; social, community and indigenous forestry; natural resources planning; and forests and society. Immediately following the completion of course work in the spring

of 2016, students will undertake an international internship/directed study.

While students will receive refresher courses on foundational knowledge such as soil or forest sciences, students in the MIF program will mostly contend with the very immediate and complex interactions that occur between the political, economic, social and environmental spheres in a forestry context. Specific attention will be paid to international forest governance, policy, corruption and institutional reform. The MIF is unique in that it also offers a course exploring international forestry institutions and the diplomacy and negotiations that occur at the highest levels of international forestry planning.

More information about the Master of International Forestry degree can be found at www.forestry.ubc.ca. Dr Joleen Timko, MIF Program Coordinator, can be reached at joleen.timko@ubc.ca.



Massive Open Online Course



MOOCs have been gathering momentum over the past few years. The term MOOC was coined back in 2008, and stands for massive open online course: massive in that there is unlimited enrollment (with courses regularly engaging thousands of students from around the world), open in that they are free for anyone with an internet connection to take, and online. MOOCs integrate accessible and freely-available online resources, the facilitation of a leading practitioner(s) in a field of study, and social networking of potentially several thousand “students”. Because MOOCs are completed entirely online, the making of a MOOC is very demanding compared to traditional courses and requires the coordination of often several people including content experts who generate the course material, those responsible for recording and producing the audiovisual materials, and those advertising the MOOC, among others.

MOOCs can be considered a disruptive alternative to traditional education. The education system is beginning to be full of choices and is becoming ever more global. Universities are experimenting with MOOCs as a way to gain visibility and traction in a world where university degrees are becoming increasingly personalised. Although no credit is offered for completion of

MOOCs just yet, students can opt to pay a small fee for a verified certificate upon successful completion of the course. For students from developing countries in particular, these certificates can be very important in their university education or professional experience. Two exciting aspects of MOOCs relate to the size and composition of student cohorts, and what this means for pedagogy. MOOCs generally have very large, dispersed student cohorts that can self-organize their participation according to learning goals, prior knowledge and skills, and common interests, often resulting in real life “meet ups” of students within the same city or town. The online environment also provides a unique opportunity for educators to conduct experiments, exploring how students learn best and what keeps them motivated, and how faculty can best teach using a variety of novel tools and techniques (such as assignments amenable to grading thousands of students at a time).

UBC formally entered the world of MOOCs with 4 courses offered through COURSERA in 2013. Four new MOOCs are now being launched through edX (www.edx.org). One of these, Forests and Livelihoods in the Developing World is being led by Dr Joleen Timko (the Faculty of Forestry’s Lecturer in International Forestry and the Master

of International Forestry’s Program Coordinator). This university-level MOOC course is about the complex interactions that occur when people in developing countries use forest resources in their daily lives. It will cover a range of fascinating and current topics located at the livelihoods-forest interface, such as the role of forests for medicines and wild foods, as sources of fuelwood and charcoal for energy, and the complex links between forests and diseases such as HIV/AIDS and malaria. Several guest lecturers are involved in this course, including current faculty members as well as alumni.

MOOCs tend to be shorter than a standard 13-week term course, and this one is no different. It will run for 6 weeks beginning in January 2015, with 6 weekly modules: (1) Forests, Poverty and Livelihoods – An Overview; (2) Conservation of Protected Areas in the Tropics; (3) Human Health and Forests; (4) Agroforestry; (5) The Role and Contribution of Small and Medium-Forest Enterprises: Global Perspectives; and (6) Community Forestry. The core of the course will consist of weekly videos explaining the key topics, with links to online resources that students can use, as well as an active student discussion forum with students from around the world.

This course should appeal to a wide variety of people as it will touch on forests and conservation; international development; human rights and social justice; medicine and human well-being; and small-business. Students from developing countries may have lived much of what will be discussed in this course and may be able to offer their experiences to deepen other students’ understanding of the course material. Those not from a developing country will gain a much better appreciation for the multitude of ways that people in developing countries directly and indirectly use forest resources to support their livelihoods.

For further information contact Dr Joleen Timko at joleen.timko@ubc.ca.

Climate proofing our cities: New roles for urban foresters?



Why do we need to climate proof our cities?

With the risk of developing urban heat islands in our rapidly growing and densifying communities, and global warming likely to raise average temperatures by over 4°C this century (according to IPCC), the livability, resilience, and even economic viability of future cities is in question. The majority of the world's population now lives in urban areas, all of which will need to adapt to multiple impacts and hazards of climate change, such as heat waves, flash-floods, forest fires, sea-level rise, intense storms, water supply contamination, and electricity black-outs. Even our existing urban forests are threatened by climate change through drought, diseases, pest infestations, wind damage, and fire, which in turn threatens our safety and quality of life. Despite this gloomy prognosis, the state of climate change awareness and action in many cities, world-wide, remains 'too little, too late.' It takes decades to establish or restore

a resilient mature tree cover that can shelter people from these impacts and survive changing growing conditions. Public awareness of the local risks of climate change also tends to be low, with limited understanding of the crucial role a healthy and robust urban forest plays in protecting our communities. Some forward-thinking cities in BC and elsewhere have begun to develop climate change adaptation plans and long-term urban forestry strategies.

Urban forests and foresters to the rescue?

Green-space systems play a major role in creating safe, livable, attractive and sustainable cities, and are becoming even more important in adapting urban environments to changing conditions. They provide numerous key ecosystem services and protective functions, such as moderating heat-waves, stormwater flood reduction, and biodiversity conservation, while preserving cultural and historic

heritage, property values and much-needed aesthetic and psychological relief. Urban forests play a vital role in reducing the demand and expense of air-conditioning in a warming world, and thus helping to mitigate climate change by reducing energy use. Large-scale urban and peri-urban forests and wetlands also play a key role as carbon sinks, renewable sources of bioenergy, and attractive corridors that encourage wildlife, pedestrians and cyclists. In addition, they reduce air pollution and provide many recreation, health and wellbeing benefits, which reduce current and future health costs for all of us.

Clearly then, foresters and allied practitioners in landscape architecture and arboriculture have much to offer in climate proofing our cities. If we are to establish the necessary large-scale, healthy urban and peri-urban green infrastructure, we will need urban forestry well integrated into our cities' development plans and policies. Urban foresters of the future should be work-

TD Bank recently reported that Toronto's urban forest was worth about \$7 billion, based on what it would cost to replace its current services to the local economy."

ing shoulder to shoulder with engineers, architects, and city planners, in development of new towns and managing or retrofitting existing communities.

What do urban foresters need in order to play these important roles?

To develop an effective urban forestry strategy for any city, we will need a new kind of 'urban forester'. They will require an expanded toolkit of skills and qualifications, enabling them to plan future scenarios and convince developers, senior officials and city councils to make far-sighted decisions and investments in green infrastructure. Urban foresters will also need to become more effective in community engagement, in order to build citizen awareness and policy support, negotiate contested views on protecting property values, and involve people in caring for public and private greenspaces. However, in many countries, a wide gap exists between these holistic educational needs of future urban foresters and the state of current urban forestry training. There is currently only one Urban Forestry degree offered in Canada (at Fleming College and the University of New Brunswick).

What is UBC doing about this?

Recognizing this crucial need, UBC's Faculty of Forestry (with support from other faculties) is planning an innovative and holistic urban forestry program – Bachelor in Urban Forestry. Focusing beyond just street trees, this program aims to graduate greenspace managers and landscape planners who know about climate change adaptation and mitigation; can balance social, ecological and economic demands; understand systems (ecological, infrastructural, hydrological, etc) across the urban/rural interface; and have strong skills in management, data-gathering, science, policy, and communications. The degree program will be first offered in September 2015 for regular and transfer students from Canada and

worldwide (see www.forestry.ubc.ca). As part of this unique program, UBC students will draw from cutting-edge research and smart tools, in learning new ways to engage communities and decision-makers on urban forestry, while being exposed to community visioning techniques in planning for future climate change scenarios.

In an attempt to inspire young people to become more involved in climate change solutions, a research team, led by Dr Stephen Sheppard, at the Collaborative for Advanced Landscape Planning at the Faculty of Forestry is using a place-based educational videogame to excite high-school students about issues such as urban forestry and sea level rise. The Future Delta 2.0 videogame enables real-time interaction with Delta, BC's local climate change scenarios in the students' own 'backyard'. It encour-

ages exploration of possibilities, such as tree hazards and hot-spots in areas without a healthy tree canopy; drought and fire risk in Burns Bog; and potential bioenergy solutions. The research team co-designed the game with students and teachers from Delta schools and early findings suggest that gameplay in simulated local future scenarios can be both fun and motivational in engaging students in choices vital to their future.

While we may not necessarily teach future urban foresters how to design a videogame, we do need to give them a range of innovative tools and holistic skills to better plan and manage the resilient greenspace network that is vital in climate-proofing our communities.

For more information, please contact Deepti Mathew Iype, Research Scientist at the Collaborative for Advanced Landscape Planning (CALP) at 604-822-8912 or deepti.mathewiype@ubc.ca. Dr Stephen Sheppard, Professor (Forest Resources Management/Landscape Architecture) and CALP Director can be reached at stephen.sheppard@ubc.ca.

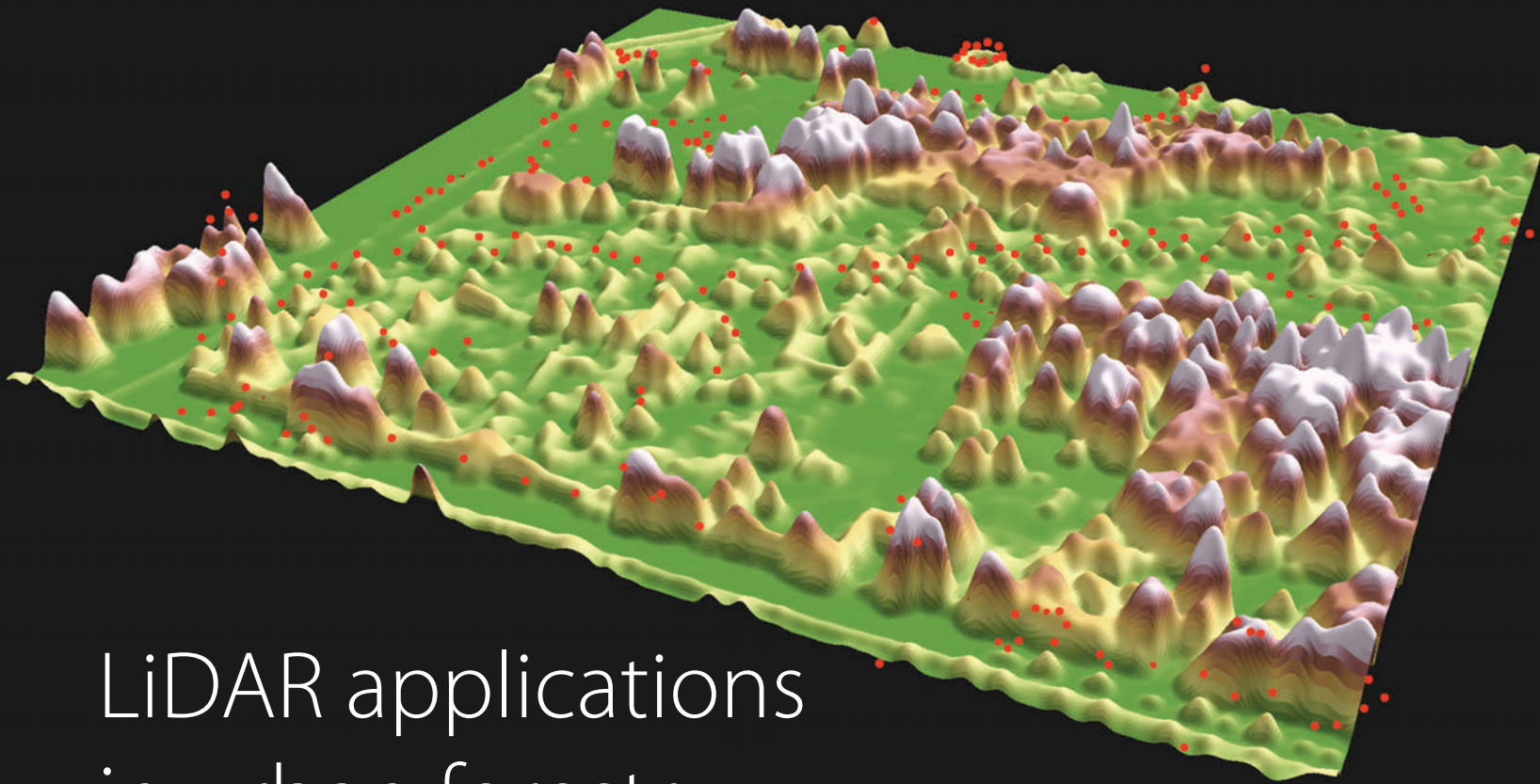


Future Delta co-design with Delta students



Act 3: Beach Grove (street view)

A screen-shot of the Future Delta videogame (Boundary Bay street view)



LiDAR applications in urban forestry

A canopy model derived from the LiDAR points. The red points float above trees that are maintained by the city

The trees that make up an urban forest represent a significant asset to a city government. The city of Surrey in British Columbia is responsible for the upkeep of over 75,000 trees, with between 3,500 and 5,000 more being planted every year. The resources expended to maintain these trees are considerable: last year the watering budget for Surrey's trees alone was \$750,000. Urban trees are susceptible to disease, poor drainage conditions and drought, and every year many need to be felled and replaced. Yet the methods employed by most cities for tracking the health of their arboreal investments are rudimentary. During the summer dry season, city workers have access to limited sources of information, such as soil condition spot checks, for applying watering regimes to drought-stressed trees.

Andrew Plowright is a graduate student at UBC's Faculty of Forestry whose research focuses on the potential of advanced remote sensing techniques for evaluating urban tree health. By acquiring data remotely (usually by aircraft or satellite), large areas can be covered in shorter periods of time and at a lower cost than field-based methods. Furthermore, remotely sensed data gets added value by being reused for multiple applications within a city, such as urban planning and civil engineering.

High density airborne LiDAR (Light Detection And Ranging) data was acquired over the city of Surrey in March of last year. LiDAR is an exciting technology that is used to measure the distance to a target by emitting a pulse of light and analyzing the time it takes for that light to be reflected and returned to the sensor. A moving LiDAR system on board an aircraft can emit hundreds of thousands of these pulses a second, covering large areas with a cloud of precise distance measurements, often referred to as "LiDAR points". These points can be used to produce highly accurate 3D models of the surveyed terrain.

For most forestry applications, LiDAR points are generally used to acquire stand-level metrics, such as mean canopy

height, density and diameter at breast height within a given plot. While these statistics may be useful for characterizing large swaths of continuous forest, information on a tree-by-tree basis is required in an urban context. This presents several challenges: within a city, the points belonging to an individual tree must be distinguished not only from surrounding infrastructure such as buildings and power lines, but also from neighbouring trees. While the conical shapes of conifers are easy to make out, sprawling deciduous trees with large, uneven crowns can be much more difficult.

For this reason, it is critical to develop algorithms for tree top detection and crown delineation that can intelligently adapt to the unique structure of an urban environment. Once the trees have been correctly outlined, however, it is possible to extract a wealth of information from the raw LiDAR point cloud. This includes estimates of tree height, crown width, crown density and the tree's exposure to light, all of which are indicators of a tree's health.

While this information in itself can be useful for coordinating tree maintenance, Andrew's project in the city of Surrey aims to go beyond simply mapping tree health. By using spatial statistics, he will investigate patterns of tree condition across the city. By locating areas where tree growth is sub-optimal, city managers can identify factors that can contribute to tree stress and strategize future tree planting accordingly. Andrew hopes that this project will demonstrate the potential of remote sensing in urban forestry, and open up interesting new LiDAR applications within an urban setting.

Andrew Plowright is a graduate student working with Dr Nicholas Coops in the Department of Forest Resources Management. Andrew can be reached at – plowright.andrew@gmail.com.

Balancing forest environments and high-density housing

Urban forestry research is currently focusing on quantifying the myriad benefits of trees in urban neighbourhoods. Much important research is focusing on quantifying the positive benefits of urban forests in terms of climate change mitigation, such as their ability to mitigate the urban heat island effect, sequester carbon dioxide, provide shade to reduce energy needs to condition buildings, and even provide a renewable bioenergy source. However, most urban forestry research has focused on cities rather than suburbia; furthermore, the impacts of climate change on our suburban forests, and potential conflicts with mitigation strategies (eg trees shading potential solar energy cells on roofs) are poorly understood. This leaves communities with little guidance to support decision-making about suburban forestry in a changing climate.

Sara Barron is a doctoral student under the supervision of Dr Stephen Sheppard in the Department of Forest Resources Management. She is also the inaugural holder of the Future Forests Fellowship for doctoral research in the Faculty of Forestry at UBC. Sara's research focuses on urban planning and retrofitting to balance forest environments and higher density suburban housing. She will use an innovative methodology to explore the balance between the needs of trees and people in suburban environments facing climate change. Her research will test the physical arrangement and intermingling of forest and sustainable suburban residential components to understand where there are synergies, and where there are conflicts. For example, as our climate changes and hotter summer temperatures are expected, it will be increasingly important to cool buildings passively without increased reliance on air conditioners, and to mitigate heat island effects and associated health effects, which have already caused many deaths

internationally. To meet greenhouse gas reduction targets aimed at slowing climate change, we must change the way our neighbourhoods perform. Sara argues that suburban forests are a vital component of this performance.

Suburban development in North America, with its associated high vehicle miles travelled and high household energy use, is a major contributor to climate change. Vehicle emissions accounted for about 33 percent of United States emissions in 2007 and are continuing to rise. Not only are suburban developments creating more vehicle traffic, the buildings are using more energy per capita. Recent studies have found that greenhouse gas emissions per person for building operations were nearly twice as high in suburban development compared with compact urban development.

Suburban development is also associated with using a lot more land per dwelling unit than urban development. Land cover changes associated with suburban growth have been linked to decreased ecological functioning and habitat loss that threatens whole ecosystems. For example, development in southern Vancouver Island over the past century has reduced the extent of near-natural Garry Oak ecosystem cover to between 1 percent and 5 percent of its original size. Higher densities free up additional land that could be (but rarely is) used exclusively for ecological and natural systems.

Increased driving, higher energy use, and excess land consumption are all suburban problems contributing to our climate crisis. All can be mitigated through a combination of good suburban design and a healthy suburban forest, as Sara sets out to demonstrate through her research.

For further information contact Sara Barron, doctoral student with Dr Stephen Sheppard, at sara.fryer.barron@gmail.com.



Existing suburban lane with laneway houses



Visualization of laneway if suburban forests were prioritized

Tree management at Loon Lake – from field to 3D



Karen McCloskey surveying trees at Loon Lake

With the rise in metropolitan growth, urban forests are growing in importance. From boulevard trees and designed greenspaces, to more ‘natural’ parks and the wildland-urban interface, urban forests exist in a continuum of ‘wildness’. As a field of practice, urban forestry is also broad in its scope, combining elements of conventional forest management, arboriculture, along with fundamentals of landscape design and community planning. Arborists focus on individual trees whereas foresters view stands and landscapes of trees. The job of an urban forester is to combine these perspectives to view forests at multiple scales.

UBC’s Loon Lake Research and Education Center (or ‘Loon Lake’, as it is known by many) has embarked on a long-term tree management project. Nestled within the UBC Malcolm Knapp Research Forest, Loon Lake provides a great example of complex management decisions in the wildland-urban interface. It features a number of high value buildings and recreation infrastructure surrounded by the coastal western hemlock forest. First built as a forestry education camp in the 1940s, Loon Lake and its surrounding forest interface have seen many transformations over time. Wildfire in the 1860s, harvesting in the 1940s and development of the camp facilities has shaped the forest environment. One notable change

since the 1940s – the forest has grown much taller and denser.

With safety as an overarching goal, the Loon Lake tree management project aims to meet key aesthetic and recreation objectives. This includes identifying candidate trees for long-term retention, improving view corridors from buildings, removing fuels to reduce fire risk, and developing options for new canopy walkways and ziplines. Led by graduate student intern H el ene Marcoux, the first phase of the project involved creating a spatial inventory of trees within the 7 ha area surrounding the Loon Lake facility. In total, 1700 dominant and intermediate trees were tagged, assessed, measured and surveyed with the help of summer undergraduate interns – Karen McCloskey, Kamto Chung and Riley Patterson. The tree inventory provided the basis for the second phase of the project: developing different management strategies using spatial tools, including 3D visualizations.

To cut or not to cut? This is a familiar question when it comes to highly visible urban forests, which can lead to contentious tree management situations. The use of 3D visualizations is a powerful tool that can help inform decision making and allow stakeholders to view changes to wildland-urban forests before they even happen. Using the tree inventory data, H el ene built species-specific 3D tree models with accurate dimensions (height, live crown ratio) to populate a 3D scene of Loon Lake in ESRI City Engine software. Using this base model, H el ene developed tools to ‘harvest’ or ‘prune’ individual or groups of trees within the 3D Loon Lake scene. Despite its urban centric name, City Engine software has the potential to be a powerful tool in urban forestry, with the added benefit of being highly compatible with other common GIS applications. The project may also serve as a valuable teaching tool for UBC’s upcoming urban forestry bachelor degree program.

Management of trees and forests within urban landscapes is a growing profession and research area. According to United Nations “World Urbanization Prospects of 2014”, 54% of the world’s population lives in urban environments. This number is expected to rise to 66% by 2050, meaning an additional 2.5 billion people will be living in urban areas. Architects and designers have long since recognized the value of 3D visuals in displaying planning options. However, the dynamic nature of forests makes 3D visualizations more challenging and all the more reason to include them in decision making. Part of urban forestry is about designing forested landscapes that people can safely enjoy. New spatial tools which empower and include people in the management process are critical to this end.

For more information contact Paul Lawson (Director of the UBC Research Forests) at paul.lawson@ubc.ca or H el ene Marcoux at marcouxhelene@gmail.com.

Using satellites to detect forest disturbances

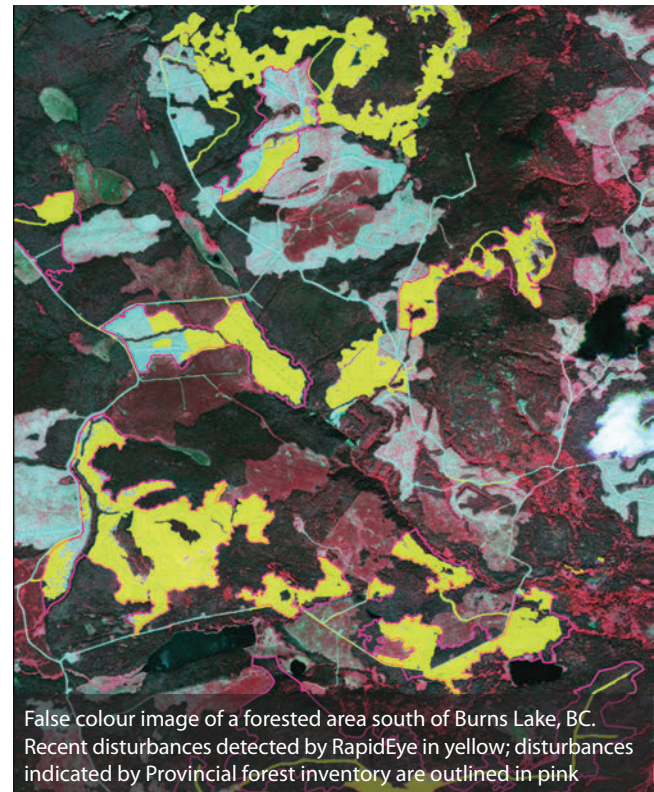
Mapping British Columbia's forest resources is an immense undertaking. With over half of the Province's land base covered in trees, detailed forest mapping products are an invaluable source of information with applications in natural resources management and conservation. Yet the availability of up-to-date full coverage forest map products is limited. Furthermore, conventional forest inventory methods tend to rely on data gathered from ground surveys or interpreted aerial imagery; both of which are expensive to produce at regular intervals. Remote sensing technologies can provide a cost effective alternative to these expensive and labour intensive survey methods. Products derived from processed satellite imagery are beginning to play a major role in how we study and monitor our forests.

Satellite-based remote sensing technologies used to capture detailed imagery of the Earth's surface are a potential solution for acquiring timely and accurate maps of forests. These technologies have offered major advancements in our ability to map and monitor forest cover and composition and are used in many forest-mapping applications. Although many remote sensing technologies are now routinely used to monitor forests, even some state-of-the-art remote sensing technologies may fail to capture certain events at regular intervals.

Acquiring satellite imagery of the Earth generally results in a trade-off between the spatial detail of the imagery and the temporal frequency at which the imagery can be recaptured; meaning sensors capable of providing detailed imagery, depicting features such as tree crowns and roads, is recaptured less frequently. On the other hand, sensors capable of capturing frequently updated imagery tend to be of lower spatial resolution, with limited ability to resolve specific ground features.

In 2009 the German company RapidEye (now operated by Lethbridge's BlackBridge) set out to solve the dilemma associated with achieving detailed satellite imagery at more frequent return intervals. RapidEye operates 5 identical earth-orbiting satellites that work in unison to capture comprehensive imagery of the earth. The 5 sensors are capable of re-capturing imagery over the same area at daily intervals, making them ideal for monitoring forest disturbances or natural disasters. Researchers at UBC's Integrated Remote Sensing Studio are using this type of satellite imagery to answer important ecological and operational questions regarding our forests.

John Arnett is a recent Forestry graduate who has been using RapidEye imagery to detect and map forest disturbances in British Columbia. John's work focuses on the detection of forest disturbances at frequent temporal intervals at a variety of locations across the province. John has been able to develop simple algorithms that can accurately detect forest disturbances using the data recorded by the RapidEye sen-



sors. The detected disturbances may then be used to update forest inventories, inform conservation policy, and monitor the extent of damage due to fires.

In 2013 a trial run was performed to test the accuracy of John's algorithm on a sample of 4000 km² of forested lands in British Columbia. This trial included test sites in the Okanagan, the Burns Lake area, and on Vancouver Island. The study compared the accuracy of the algorithm against 2 datasets; (1) the provincial forest inventory; and (2) a set of 500 manually interpreted sample locations, which served as ground-truth data. The results of the trial showed that while only 50% of the satellite-detected forest disturbances actually aligned with the government dataset, approximately 90% of the detected disturbances aligned with the manually interpreted data. Overall this study revealed major inconsistencies in the provincial forest inventory, while the automated satellite detection provided a much more accurate depiction of change across the landscape (as shown in the figure above). This type of research provides insight into how emerging technologies can offer major advantages over conventional inventory forest methods and is paving the way for a growing body of research involving remote sensing and forests.

John Arnett completed his MSc in the summer of 2014 under the supervision of Dr Nicholas Coops. John can be reached at arnett.jtt@gmail.com. Funding for this research was provided in part by the Natural Sciences and Engineering Research Council of Canada.

Exploring support for political action on climate change

Research supporting the anthropogenic nature of climate change has been piling up at an increasing rate over the past decade. Recent work indicates that scientists have reached a stronger consensus than ever before. Despite this, there appears to be a lack of political will to take a stance against actions that magnify climatic change, or promote solutions to address climate change. If the problem has been identified and substantiated, why is there a marked lack of ameliorative climate policies? Why is there a gap between science and policy?

Public opinion and support for political action on climate change can be viewed as 2 prominent variables in this pervasive lack of action. Politicians, who set policies, are incentivized by reelection. Thus, in democratic institutions, there is intense pressure to follow public preference on an issue. Recently, in regards to climate change, there has been a decline in public concern in many countries. This decline of concern has been attributed to the multitude of scientific literacy, sociological, and psychological barriers that climate change presents. These barriers have been seen to produce what has been called a communication failure in regards to the urgency of climate change as an issue. Gabrielle Schittecatte is an MSc student under the supervision of Dr George Hoberg in the Department of Forest Resources Management. The goal of her research is to explain how these variables affect peoples' perception of climate change frames, and in turn how this perception of frames affects support for political action on climate change.

Framing

Framing is a way to organize ideas in order to make an issue reverberate with the core values of specific individuals. It can be viewed as the manipulation of rhetoric, images, and symbols associated with an issue in order to produce a desired response. In essence it allows individuals to make sense of an issue given the way it is presented or spoken about. In political science one can see framing as a political strategy to be used to increase concern and public support for a particular issue. As such, framing allows actors in the political system to push forward their special issues, make them more appealing to the public, and perhaps raise the issue on the government's decision agenda. Although framing, by highlighting or deemphasizing certain aspects of an issue can make an issue salient, in the case of climate change the way in which it is predominantly framed creates barriers to increasing widespread public support and concern.

Barriers

Various barriers have been proposed to explain peoples' perceptions of climate change including scientific literacy, cultural identity, and moral tribalism. These barriers, paired with the manner in which climate change is framed, generate difficulties when looking to increase public willingness to support political action on climate change.

Where science fails to go the distance

It is often thought that people are unwilling to support political action on climate change because they are incapable of understanding the complex scientific mechanisms that cause and influence climate change. For example, the public irrationality theory posits that this lack of understanding and comprehension leads to a lack of concern over climate change. However, this line of thought has been criticized and repeatedly refuted. In fact, it has been found that increasing numeracy and literacy relating to climate change actually enhances denial of climate change amongst certain groups. This denial is generated by a form a motivated reasoning associated with cultural-identity protective cognition, in which individuals will conform the evidence to their cultural group's identity. This motivated reasoning leads individuals who become more informed on climate change to channel their newfound knowledge to support their preconceived ideas on climate change rather than coming to new conclusions.

Cultural identity

The form of protective cognition that individuals engage in with climate change frequently relates to their cultural identity. Cultural identity relates to how an individual perceives society, and the ways which they wish society were organized. Cultural identity is a 2-dimensional framework that varies on 2 dimensions: egalitarian-communitarian and hierarchical-individualistic. A person's placement within this scale affects how they perceive risk, including those associated with the environment. Individuals who fall closer to the hierarchical-individualistic end of the spectrum tend to perceive environmental risk as less concerning, which is inherently tied to their perception of climate change. Furthermore, when an individual amalgamates information on an issue such as climate change they will likely not deviate from their cultural group's beliefs even if they decide that climate change is a pressing matter. This is because there is more to lose socially by defying one's group than speaking out to uphold one's group opinions. Supporting political

action on climate change then, is an issue that revolves around who we are and rather than what we believe.

Moral tribalism

Similar to the motivated reasoning that occurs via cultural identity is the perception of climate change due to an individual's moral foundations. The emerging field of moral psychology has found that there are 5 pairs of terms that together make up the moral foundations across the globe: care/harm, fairness/reciprocity, ingroup/loyalty, authority/respect, and purity/sanctity. Individuals with different political beliefs commonly hold different foundations in higher regard. Current climate change frames appeal more to individuals that hold a liberal political ideology (and their moral beliefs), than those who hold a conservative ideology. This creates further polarization and politicization of the perception of climate change, making it less likely that enough public support exists to motivate politicians to create climate policies that halt or slow down its effects.

Research

Divestment Campaign

Gabrielle will use the current fossil fuel divestment campaign sweeping across North America as a case study to assess in what way the barriers referenced above affect perception of current climate change frames and



Public support is one of the most important resources social movements mobilize in their efforts to overcome cultural inertia and the interest of powerful actors.”

– Paul Stern

subsequently, the way in which this affects support for political action. The fossil fuel divestment campaign involves numerous post-secondary institutes, cities, and towns, all of which are being asked by the campaign to liquidate their investments in fossil fuel companies. This campaign is an interesting case study as it uses both moral and economic climate change frames, 2 frames that are generally presented as opposing one another. The campaign focuses on the idea that “if it’s wrong to wreck the planet, then it’s wrong to profit from doing so”.

Methods

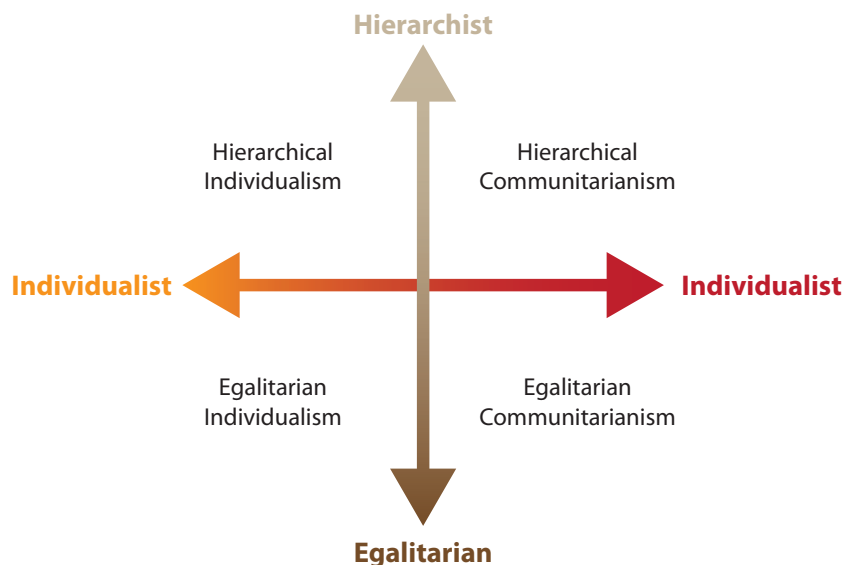
Gabrielle sampled students from prominent post-secondary research institutions across Canada. Online survey questions were used to collect demographic data, assess the respondents’ political ideologies, cultural identities, and environmental perceptions. Respondents were then randomly directed to 1 of 3 versions of the survey. The first presented

economic frames of climate change used by the divestment campaign, the second presented both moral and economic frames, and the third, to be used as a control, presented no frames at all. The respondents’ agreement with these frames was assessed, after which all respondents were directed to questions relating to support for political action on climate change. Respondents were asked how willing they might be to engage in active political support for climate change, knowing that they might have to invest time or money.

Coming soon

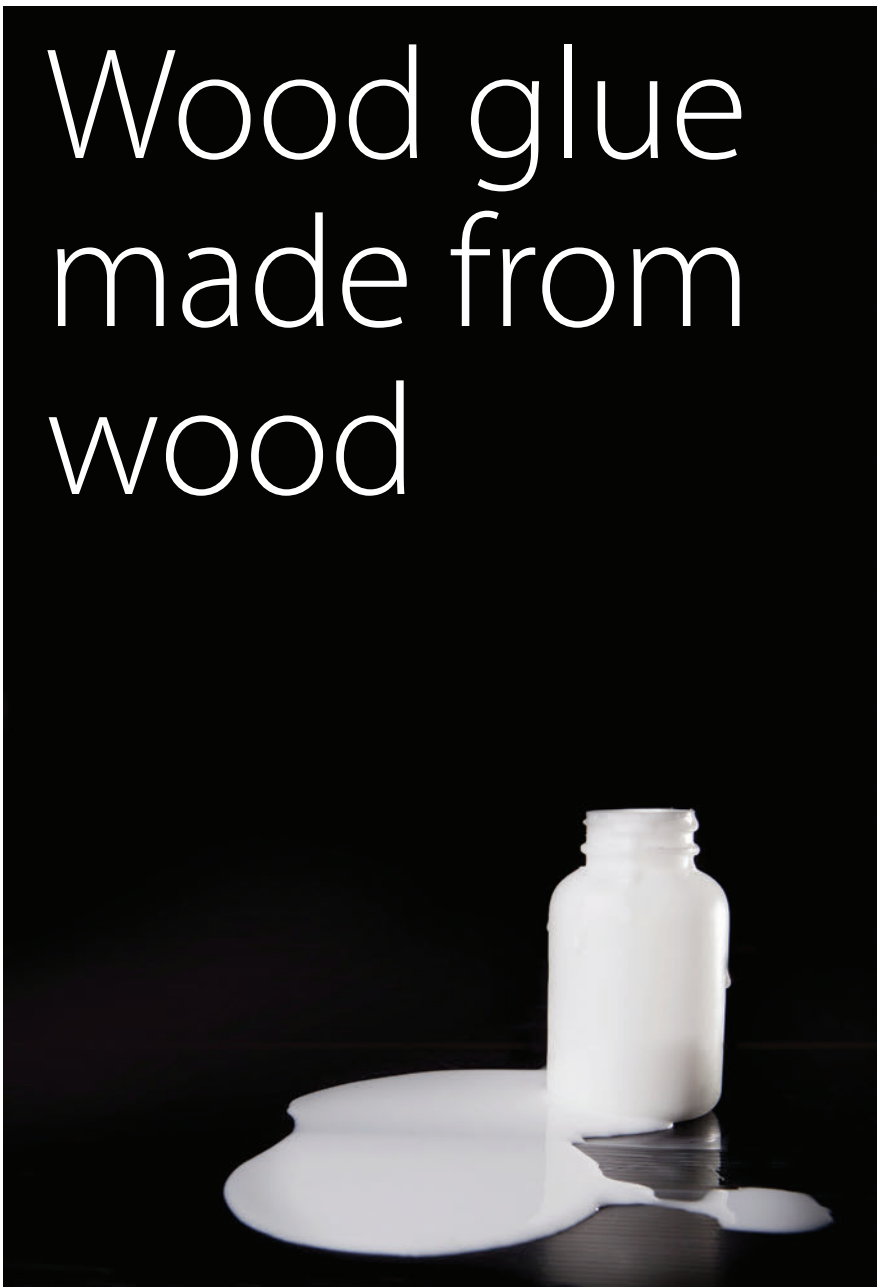
The results from this study are currently being tabulated. Gabrielle hopes that this research will lead to a greater understanding of how personal characteristics (such as cultural identity, morality, and environmental valuation) affect the way people relate to different frames of climate change; specifically those designed as moral appeals, or economic justifications. Furthermore, she hopes to gain insights into how different methods of framing climate change may affect an individual’s willingness to support political action on climate change including mobilization of public support. This type of research is essential to our understanding of the mechanisms that influence communication between groups of people (scientists to the lay public and politicians. Understanding constructs that influence communication is relevant not only to the issue of climate change, but generally in inspiring engagement and action in the public.

Gabrielle Schittecatte can be reached at gabrielle.schittecatte@forestry.ubc.ca.



Orthogonal cultural-identity framework. Where an individual falls within these quadrants often determines how they perceive and interpret information and risks

Wood glue made from wood



Nearly everyone is familiar with the appearance of wood after it has been burned. Perhaps you think of coals left over in the fireplace or barbeque with their characteristic charred surfaces. Such blackening and cracked surfaces occur when wood is exposed to high enough temperatures to cause combustion. However, when wood is heated rapidly to hundreds of degrees in less than a second the samples do not combust in the same way. In fact, by heating wood with laser energy, some of the wood surface is converted directly into gaseous products, but the bulk of the wood surface deforms as if it was melted. New faculty member Dr Scott Rennekar (Associate Professor in the Department of Wood Science) and his former research group at Virginia

Tech, discovered that the surface of such “burned” wood could be used as glue or “resin” to make a 100% wood composite, such as plywood, without the addition of any other additives.

Scott learned early in his career that wood is composed of polymer substances - materials similar to those used to make plastics and adhesives. However, unlike most plastic materials, trees do not melt into puddles during forest fires, and will burn before the material softens and flows. But when wood is heated with high enough concentrations of energy over extremely short time periods there is not enough time for the normal degradation process to occur. This method of heating can be achieved by rapidly scanning the wood surface with a laser for

short periods of time. Such a form of heating will totally disrupt the surface structure of the wood. With funding from the United States Department of Agriculture, Scott and his research group have studied how the modified surface of rapidly heated wood can be used to make “resin-free” composites.

Making a laser-bonded wood composite is a similar process to making plywood, but without the adhesive. Wood adhesives are traditionally sourced from fossil resources, are manufactured by resin suppliers, and shipped to the production site. Using laser bonding rather than adhesives within the wood composites avoids significant fossil resources. With laser bonding technology, the wood surfaces are modified directly on site prior to going into a heated press to activate the bonding. After a short time period a bond is formed that can reach the strength of natural wood. Also of note is the fact that the wood does not need to be dried to the same conditions as required with traditional composite manufacturing. Furthermore, after laser modification the samples do not need to be pressed right away – and there can be a waiting period from a few minutes to a month without a change in adhesive performance. Based on this unique approach, Scott’s former institution filed a patent on the process and is looking into commercial partners.

Scott Rennekar admits that although the process is very simple, there are a few technical challenges to overcome in order to develop this process commercially. Lasers are often used in industrial applications where high energy is applied over a small area for either cutting or welding. In the case of wood composites, lasers need to be moved over large areas. This type of processing can be achieved by physically moving the laser focusing head or swinging the laser beam using optical mirrors. However, the production of plywood occurs at a rate of meters-per-minute and a specialized processing line is required for this purpose. Additionally, the laser-bonded specimens are sensitive to moisture which limits their potential applications. As Scott and his research team were

looking into potential bonding mechanisms they stumbled across a solution to this issue. Giving the composite a simple thermal treatment by heating in an oven stabilizes the bond-line. In fact, after heating the samples the bond-lines can withstand being boiled in water for several hours.

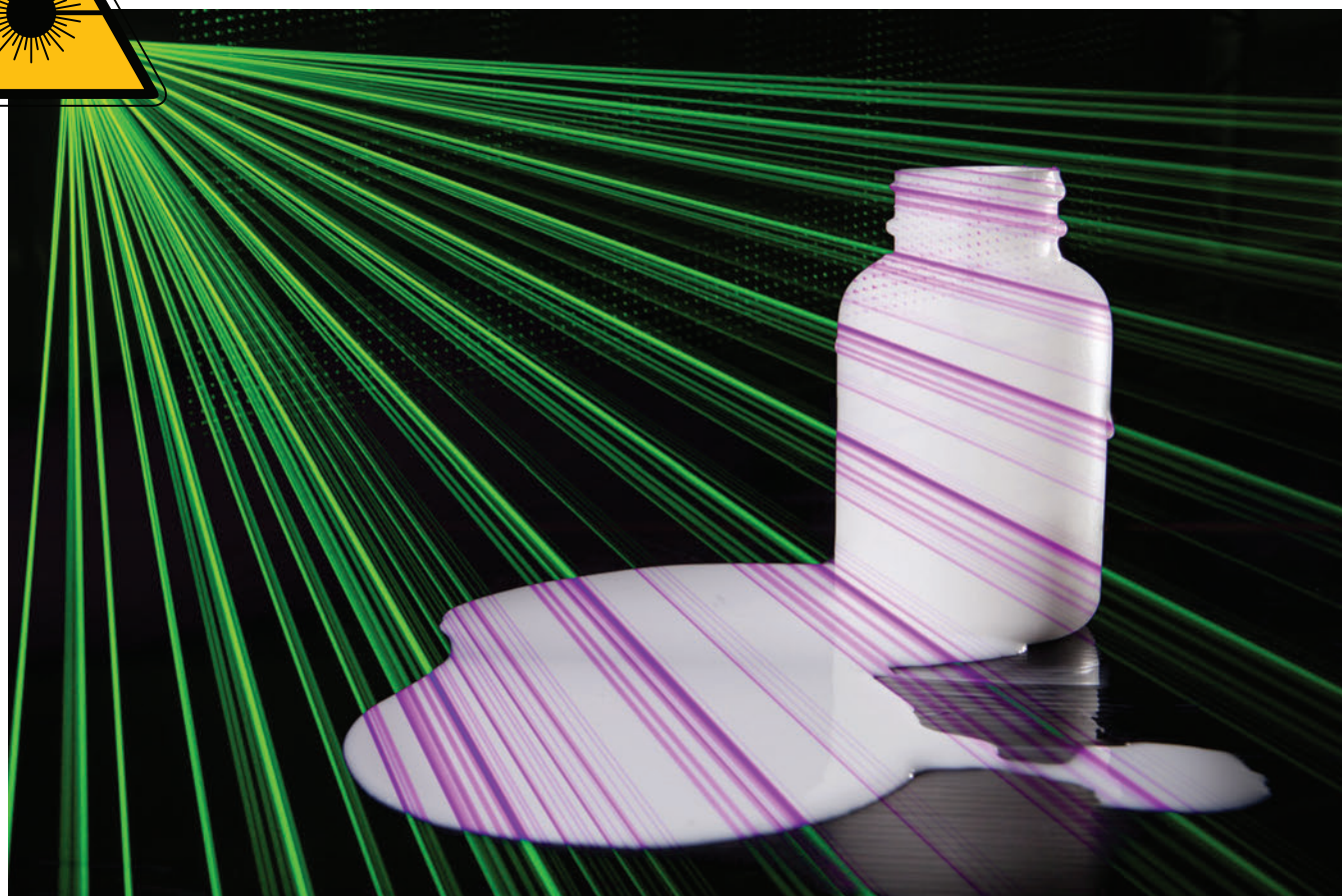
The idea of making wood composites directly from a single material is an exciting prospect to help increase the sustainability of the forest products composites industry. However, a laser bonding process is reliant on electrical energy and needs non-fossil based resources, such as co-generation of electricity from wood or hydroelectric power, to make the process more sustainable than current products. Based on publicly available resin pricing data from the past decade, the energy cost for the laser bonding technology is similar to traditional resins. One of the difficulties of breaking in a new technology is that adhesives such as phenol formaldehyde are approaching a 100 year history of performance. However, resin pricing can fluctuate significantly. One of the most important aspects of using

wood as a resin source is a reduced reliance on the often volatile chemical commodities market and a reduction in use of the chemicals (often considered to be toxic) currently used in adhesive formulations. The green building materials market has grown significantly over the past few years and it is evident that consumers want safer materials that have smaller environmental footprints. Technologies that utilize wood as the main “feedstock” would be a boon for producers who could then walk away from petroleum derived product. Woody biomass has a very stable long term outlook, is drought tolerant and does not interfere with food production.

Scott Rennecker and his research group at UBC will continue to investigate the conversion of wood into bio-adhesives and bio-plastics. Scott believes that controlled degradation of biomass can lead to new composite materials from our forests, fields and trash heaps. Laser modification causes the wood surface to reorganize into a soup of biopolymers, but the majority of the ingredients after laser modification are the basic polymer products

found in wood, such as cellulose and lignin. The fact that an adhesive can be created from the most abundant polymers on Earth, means that materials such as sawdust or old cardboard have the potential to be converted into sustainable biomaterials with minimum additives. Scott’s research group will reveal how the treatment of wood and waste biomass with laser or thermal energy can be controlled to produce valuable materials. As a coffee drinker, Scott makes the analogy that prior to a good cup of coffee, the coffee beans need to be roasted in order to bring out the complex flavors that satisfy the palate. In a similar fashion, the degree of thermal treatments can be controlled to convert biomass into products that satisfy needed performance attributes. At UBC, Scott and his research group are ready to track down these chemical changes and exploit them to create useful materials from biomass that will serve the expanding world population.

For further information contact Dr Scott Rennecker, Associate Professor in the Department of Wood Science, at scott.rennecker@ubc.ca.



Good deeds in bad times



The role of business in the environmental and social arena has long been discussed. On the one hand, business (referred to here as a collective of commercial entities) is considered responsible for a myriad of environmental and social problems; and on the other hand, business entrepreneurs are also expected to innovate our way out of a host of grand challenges facing us. Amidst these divergent perspectives, a dominant concept, broadly known as 'corporate responsibility', has emerged. Corporate responsibility encourages businesses to go beyond regulatory requirements and voluntarily engage in sustainability oriented activities—primarily in social and environmental realms. Much is written on this topic by its proponents, opponents, and non-aligned onlookers covering an entire gamut of its promises and perils, rhetoric and realities, and use and abuse.

Concern has steadily grown, however, about the sustainability of sustainability oriented voluntary activities, especially during periods when companies' financial resources have

dwindled. During periods of financial prosperity, it is understandable that businesses would allocate a little here and spend a little there on discretionary activities. But a resource crunch would, intuitively speaking, force a company to tighten its belt and focus on core business activities. So, while doing well allows a company to be good, doing poorly might impede good behavior. Rajat Panwar is a newly appointed assistant professor of sustainable business management with a joint appointment in the departments of Wood Science and Forest Resources Management. He pondered this idea carefully when the US economy was hit hard by what would later be known as the Great Recession and which also engulfed many other countries.

Rajat is particularly interested in understanding the effects of the economic downturn on small companies whose actions heavily depend on current financial performance as they often lack a large pool of slack resources to draw from during a lean period. Beyond this somewhat theo-

retical motivation, he was also drawn to small companies because of the enormity of their collective role in social and environmental sustainability and the proactive roles they have recently been taking in sustainability efforts.

With this motivation, Rajat set out in 2012 to examine the fate of ongoing voluntary environmental and social initiatives during the Great Recession from a sample of small manufacturing firms representing wood products (SIC 24), furniture (SIC 25) and paper (SIC 26) sub-sectors. He assessed the effect of the recession in 4 separate categories—initiatives oriented toward customers, employees, community, and the environment. The table below outlines specific initiatives within each of these categories.

And, guess what?

On the customer front, companies within all 3 sectors reported that the affordability of their products went down. In other words, prices went up for the same quality of products. Quality of customer service remained

Initiatives evaluated within each category

Customers	Employees	Community	Environment
Product affordability	Compensation levels	Cash contributions	Energy efficiency
Customer service quality	Workforce diversity	In-kind contributions	Waste management
Education and incentives for recycling	Non-salary benefits	Support to non-profits	Proportion of eco-labeled products

the same for companies within the wood products and furniture sectors, but paper sector companies significantly increased their efforts to improve quality of service to customers. Paper sector companies also significantly increased their efforts to either educate customers about recyclability of their products or offered higher incentives for recycling; but wood product and furniture companies made no changes in their ongoing education efforts (or lack thereof).

With respect to employee matters, compensation for workers in wood products and furniture companies remained at the same level as before the recession, whereas paper companies paid marginally higher salaries than before. Wood products companies in fact also cut some of their workers' non-salary benefits. Across the board, companies did not change their efforts to improve workforce diversity. Given the somewhat homogenous nature of the forest products industry workforce, diversity initiatives therefore remained at a very low level.

Community connections have always been important for forestry companies. Notwithstanding this importance, wood products companies significantly cut back their cash and in-kind contributions to communities, as well as their support to non-profits. However, furniture and paper companies didn't report any change in this regard.

And, now a little encouraging news for those who care for the environment (well, we all do). Study results defy all conjectures that were spread through media reports about the environment being a secondary consideration for companies during the recession. Notably, wood products, furniture and paper sector companies took more measures to increase energy efficiency and also improved their waste management systems. Paper and furniture companies even increased the proportion of eco-labeled products within their overall production output.

Apparently, effects on ongoing initiatives were not uniform across firms in all sectors; financial impact was not uniform either. In fact, companies in the paper sector reported better financial performance during the recession period than before. But do study results tell more than what reads above? First off, it seems that companies pursued environmentally oriented initiatives during the recession as a cost cutting strategy. The adage that "greening pays-off" seems to be an underlying motivation for environmental initiatives. This being said, it is also likely that ongoing environmental initiatives were just difficult to scale down or discontinue because companies had already invested enough resources

to develop environmentally oriented business systems and a pull-out was not feasible. This latter scenario has potentially important implications— companies' sustainability oriented voluntary actions can be better sustained when they form the core of a company's business model. The stronger the tie between sustainability initiatives and a company's core strategy, the more resilient these initiatives are.

Rajat Panwar recently shared these results at the annual meeting of the Academy of Management in Philadelphia. At the end of his talk, a colleague asked what his ultimate take away message was. Rajat does not recall his exact answer, but really his message was this: "Competitive forces can make good deeds resilient to bad times". But, there is another take away message that excites the activist- in- Rajat: firms' environmental initiatives improved during the recession. Rajat is cautious in acknowledging that it could have happened not because firms care for the environment, but because they can cut costs and save money through some of these initiatives. "So what", he exclaims, "When the wind of change blows, some build walls, others build windmills". And, Rajat is thrilled that many forest sector firms saw the economic crisis as an opportunity and built "windmills".

Dr Rajat Panwar is an Assistant Professor of sustainable business management holding a joint appointment in the departments of Wood Science and Forest Resources Management. He can be reached at rajat.panwar@ubc.ca.



Bringing science to bear on Drybelt Fir

If forestry is defined as the science, art and business of creating, maintaining and managing forested landscapes, then in dry Douglas-fir forests we have traditionally relied on the art and business. It is time to bring some science to bear.

At UBC's Alex Fraser Research Forest we are engaging this problem with a broad scope of research on the Knife Creek Block. Diverse research interests and diverse funding sources are focussing on the common objective of understanding the forest inventory at multiple scales, and then designing silvicultural strategies to bring the forest into a more resilient condition that will provide the multiple benefits society expects.

Before fire suppression the forests of the Interior Douglas-fir zone (often referred to as Drybelt Fir) experienced periodic low intensity fires that reduced understory vegetation, while maintaining an overstory of thick-barked trees. The resulting forest structures provided space for understory shrubs and grasses, snow interception for ungulate habitat, and fuel conditions that promoted resilience by limiting fire intensity over time. With the onset of fire suppression came a reduction in fire frequency allowing the forest to develop along a different pathway. Understory density increased, and competition for growing space caused a loss of tree and stand vigour, resulting in increasing mortality through bark beetle attacks.

Periodic selective logging within this area has left a forest with few overstory trees, and ample space for understory vegetation to establish resulting in dense Douglas-fir regeneration. Without fire, the understory dominated the growing space.

This understory vegetation is presently a fire hazard and is so dense in many cases it has virtually stopped growing, putting the forest in a state of suspended animation. With the history of previous 'selective' logging, the forest is highly variable, some areas have marketable trees, others none, some with a mix from one extreme to the other.

Projects to remove some of the understory to reduce fire risk or increase growth have been limited due to treatment cost and the difficulty of linking treatments to the myriad of structures remaining. Many of the stands are considered critical for mule deer winter range – but they are at risk. What to do?

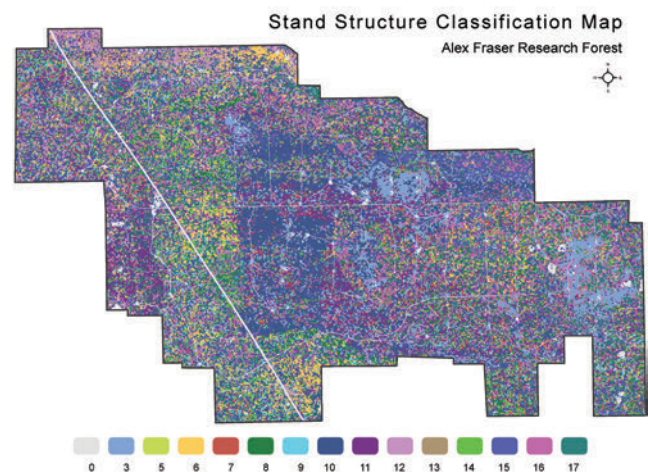
We see a future where the disturbance formerly supplied by low-intensity fires is replaced by thinning and regeneration under the Single Tree Selection Silvicultural system. An integrated approach to management and utilization is needed to allow an economically viable cycle of events resulting in truly sustainable management in this vulnerable area. The first step is to get a better understanding of

the diversity of the stand structures in question. The next step is using that information to develop treatment and harvest regimes that will both reduce fire risk and promote growth and resilience of the remaining stems. Finally, stand inventories and prescriptions can be used to determine the products to be cut and identify a sustainable harvest over time. In the case of Knife Creek much of the inventory can only be sold as biomass so we can use this information to develop a business case for utilization of what is currently considered waste.

Bringing in the science – making sense of the variability

Ian Moss (Tesera Systems Inc) has coordinated the collection of LiDAR and Colour Infrared (CIR) data with financial support from Cariboo-Chilcotin Beetle Action Coalition. Ian has used LiDAR and CIR metrics to map microstands (see figure below). The project, funded by the Forest Analysis and Inventory Branch with assistance from Tolko, is focussed on a proof of concept, ie, will these microstands work to create a viable management regime for stands beyond this project? Microstand delineations (from 0.5 to 3 ha) provide a more robust and realistic inventory that allows us to connect with individual tree and stand growth and yield for forecasting – a key for sustainable management.

Once microstands have been associated with stand structure classes, treatment regimes can be attributed to them.



What is next?

Ground correlation of microstand attributes is underway to corroborate the utility of the microstand variables. As well, Tree Lists, and Stand and Stock Tables will be added to the microstands to identify treatment options and begin the grouping of microstands into Treatment Units. To understand the future growth in the various units, growth and yield



A typical stand of dense Douglas-fir understory with scattered mature trees

curve generation is being pursued using PrognosisBC and TASS III. This information can then be fed into Forest Estate and Stand Level models to identify opportunities over time (a component of making a business case for utilization). As well information on treatment response and return on silvicultural investment is needed.

Other initiatives:

Ground sample calibration

Peter Marshall (UBC Forest Resources Management) has re-measured 30 permanent sample plots with support from the Forest Analysis and Inventory Branch. To make use of the LiDAR information, ground plots are needed for calibration. In the Knife Creek block of the Alex Fraser Research Forest 30 fixed area permanent sample plots were used in conjunction with 76 prism (variable radius) plots that were extracted from a cruise of 3 experimental stands to calibrate the output.

Harvesting in mule deer winter range

Michaela Waterhouse (BC Ministry of Forests, Lands, and Natural Resource Operations) is collaborating with Research Forest staff to monitor the effects of the 30-year re-entry to a replicated study on harvesting in mule deer winter range.

Ken Byrne (FP Innovations) is studying the costs and productivity of the mule deer winter range harvesting.

Dominik Röser (FP Innovations) and Ventek Energy Systems Ltd are developing a feasibility study on pre-commercial thinning with a small biomass harvesting head from Finland.

Forest health and disturbance

Allan Carroll and Lori Daniels (UBC Forest and Conservation Sciences), as well as graduate students Wesley Brooks and Marc-Antoine Leclerc, are looking into forest health, disturbance and resilience utilizing the LiDAR data, microstand data, and cruise plots established in the mule deer winter range harvesting project.

Fire risk

Janice Burns (UBC graduate student at East Finland University) is contemplating the use of the LiDAR data to provide a risk assessment procedure. Since LiDAR has 3D forest structure data and can be used to measure vertical fuel continuity, a possible future application is to develop a method of fire risk assessment based on the horizontal and vertical continuity of fuels, and the volume of crown fuel estimated from the LiDAR data. The intent is to create a product that would be useful operationally.

Extension

Bryce Bancroft (Symmetree Consulting Group) along with Ken Day (Alex Fraser Research Forest) and Research Forest staff are developing extension materials with support from West Fraser Timber Ltd. The purpose of the extension is to continue the dialogue around the state of our Drybelt Fir forests and the opportunities in front of us.

In summary

For the Drybelt to be managed effectively economic outputs are needed, thus an added step is to commercialize biomass in the local market, and to use scale appropriate harvesting and forwarding approaches. If all the dots are connected there should be entrepreneurial opportunities that will be sustainable. Policy issues regarding stumpage and stewardship are needed to make long term management in the Drybelt a reality outside the Research Forest. It may take changes to tenure or a novel approach to selling crown timber but we need to get the conversation underway. When science meets art and business, we will be ready for change to emerge.

For further information on this project, or other projects, at the Alex Fraser Research Forest contact Ken Day (Research Forest Manger) at ken.day@ubc.ca.



Fire damaged landscape in the Kootenay region of BC

Nudging the forest industry toward climate change adaptation

By Ngaio Hotte

The latest figures from Statistics Canada show that British Columbia's Carbon Tax is working: Since 2008, fuel use has fallen by 16%, the Province's GDP growth has outpaced the national average and income and other taxes have been cut by \$760 million. The results are a victory for British Columbians and for the planet.

The Carbon Tax takes an economic approach to reducing the effects of climate change by making fossil fuel consumption and associated emissions more expensive. As a result, individuals choose to reduce their

fossil fuel use in favour of alternatives. But can economics also be used to encourage adaptation to unavoidable effects of climate change?

Dr Harry Nelson, Assistant Professor in the Department of Forest Resources Management believes that it can. His project, *Economic Instruments to Support Climate Change Adaptation in Forestry*, funded by Natural Resources Canada, is taking an economics approach to encouraging climate change adaptation.

"We can expect to see bigger and more costly wildfires and more pest

outbreaks across the landscape in the future," Dr Nelson says. "Add to that projected changes in distribution and mortality rates of some commercially important species and our forest industry could face some real problems." In partnership with a team of advisors from BC's Ministry of Forests, Lands and Natural Resource Operations and supported by input from forestry practitioners, the *Economic Instruments Project* is exploring how different types of economic instruments – financial, behavioural, informational and regulatory – can encourage forest managers

and companies to take a pro-active approach to addressing the risks of climate change to Canada's forests.

"When people hear the word 'economic,' they typically assume we're talking about financial incentives and disincentives, such as prices, taxes, credits and risk-sharing programs," explains Dr Nelson.

Other, more subtle economic instruments can also target behaviours in order to influence spending, purchasing and investment decisions. Behavioural instruments can be as simple as changing the order in which information is presented or the default options for participating in programs. The idea that economics can be used to shift human behaviour is central to the field of 'behavioural economics,' which explores the combined effects of psychological, social, cognitive and emotional factors on the economic decisions of individuals and institutions and the impacts of those decisions. In contrast to traditional economics, which assumes that people make rational economic decisions, behavioural economics acknowledges that in reality, people often make imperfect choices that produce imperfect outcomes. Consider, for example, the cases of housing or stock market bubbles and crashes.

Behavioural economics brings the discipline of economics back to its classical roots in psychology, where it resided before economists adopted the prevailing neo-classical approach that is more strongly influenced by the natural sciences. Behavioural economics was popularized by Richard Thaler, University of Chicago and Cass Sunstein, Harvard University in their 2008 book, *Nudge: Improving Decisions about Health, Wealth, and Happiness*. The book offered examples of subtle ways in which governments and other institutions can influence people to make choices that will lead to longer, healthier lives. Thaler and Sunstein offer the example of changing the default option for employee health or pension programs, so that all individuals are automatically enrolled. While many employees would benefit from participating in a pension program,

many simply do not "get around" to voluntarily enrolling. Applied to forestry, a behavioural approach could frame public information about wildfire protection measures in terms of avoided losses rather than gains, based on the knowledge that people tend to be more sensitive to loss.

Informational instruments help individuals to make more informed choices by presenting relevant material at the time the decision is made. Natural Resources Canada's EnerGuide program uses this approach by providing an energy rating on new appliances at the time of purchase. In a forestry context, informational instruments can be used to raise awareness about wildfire risk and actions to reduce it (eg Colorado's Wildfire Ready campaign, Canada's FireSmart program) or provide information about the relative risks of wildfire in forest stands across the landscape (eg Victorian Government's Bushfire Management Planning program, US Forest Service Climate Change Performance Scorecard).

Finally, regulatory instruments can offer support for planning or other economic approaches. For example, building codes (eg US National Fire Protection Association wildland fire building codes, California Building Code) can establish minimum standards for assessing fuel sources and for the protection of life and property. Voluntary certification standards, similar to those available from the Forest Stewardship Council and the Sustainable Forestry Initiative, may offer another option to encourage adaptation activities in the future if they begin to incorporate climate

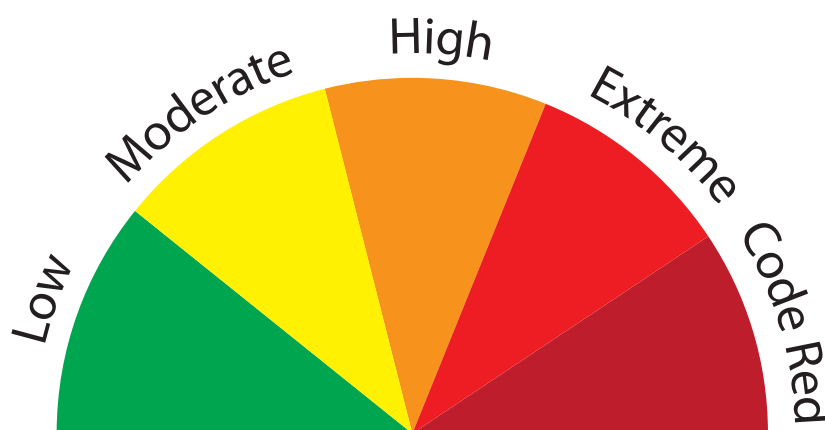
change into their standards.

The first phase of the *Economic Instruments Project*, which included a review of existing economic instruments in Canada, the US and Scandinavia and a series of interviews with forest industry experts the BC government, First Nations and industry, was completed in December 2013. The research team then hosted a workshop with 25 experts to identify critical climate-change related risks to forests and economic instruments that may be of greatest interest in the context of BC. Of these, 3 specific case studies were chosen to determine how specific instruments could be used to encourage adaptation. These case studies focus on municipal development permits (eg building codes) and financial incentives for climate-based seed transfer and area-based wildfire planning and management.

The case study results will be presented to forestry experts in a final workshop in November 2014.

"We're really excited to hear the response from the policy-makers and practitioners about this research," says Dr Nelson. "The opportunity to work closely with people to help make things change on the ground, that's exciting. That's where adaptation will happen."

Ngaio Hotte is a Resource Economist in UBC Forestry's Department of Forest Resources Management. Also contributing to the project are Robyn Hooper (MSc 2013), Colin Mahony (PhD student with Dr Sally Aitken in the Department of Forest and Conservation Sciences) and Paul Kovacs, Director of the Institute for Catastrophic Loss Reduction in Ontario. Dr Harry Nelson can be reached at harry.nelson@ubc.ca.



development & alumni news

Catalyst Paper President and CEO Joe Nemeth establishes scholarship



Joe Nemeth is a veteran in the pulp and paper industry. His career has seen him in positions of increasing responsibility at some of the best-known companies in the business: Fletcher Challenge, Fortress Paper, Canfor and Canfor Pulp Products. He was appointed CEO of Catalyst Paper in October 2013.

Recently, Joe and his wife Jacqueline established a scholarship for undergraduate students in Forestry as a way of giving back to the community. As a second-generation forester, Joe is grateful for the opportunities that have come his way.

Joe's father, also named Joe, came to Canada as a refugee from Sopron, Hungary, in 1956. As a member of the Sopron Division of the Faculty of Forestry, Joe studied first in Hungarian, then gradually in English. When he graduated in 1960, he decided to remain in Canada, as did the majority of Soproners, and work for the Inventory Department of the Ministry of Forests.

"At that time, all the validation surveying was done on the ground," Joe says. "Every summer from April to September, we lived in remote forestry camps throughout the province. By the time I was 10 or 11, I was following my dad around in the woods. That's when I developed my passion for the forests."

But it wasn't a straight line from those forest walks to studying at UBC. "I also really enjoyed music, and I was accepted in the University of Victoria's music program, playing trumpet.

After a year in the music program, I realized that my real passion was forestry." He transferred to UBC, received a Bachelor of Forestry in 1987, and went on to receive an MBA from the University of Western Ontario.

Joe recently joined the UBC Forestry Advisory Council, which provides advice to the Faculty on curriculum matters and research priorities. He is looking forward to speaking with students about their lives after graduation, and offered a preview of some of his key points.

"If I were up in front of a group of students to talk about their careers, I would tell them to pursue a career that they love and are good at. This would inevitably support them being both happy and successful in life."

"Then I would tell them that there are many great reasons for having a career in forestry. Here are 3: First, it's a green, renewable industry. Our main input, wood, is a renewable resource that comes from sustainably managed forests. And the production processes at our mills are almost 100% closed loop. For example, we recover and re-use almost all of the chemicals in our kraft pulp process."

"Second, it's a high-tech industry, with billions of dollars invested in cutting-edge IT infrastructure. This means exciting career opportunities in operations, finance and IT where a big part of the job is working with new technology and leveraging its potential."

"Third, we are currently actively hiring and will continue to do so over the next 6-7 years. Half of the forestry industry's workforce is age 53-65 and is heading for retirement. At Catalyst, for example, we have 1600 employees and estimate that we will be hiring over 150 people per year for the next seven years."

Joe and his wife Jacqueline have stipulated that their award should go to students who have strong academic standing as well as demonstrated leadership skills or community service. "I believe that your interpersonal skills and ability to work well with others is a key to your success," he says.

Joe is motivated by a sense of responsibility in establishing this scholarship. "I've been fortunate to be given great career opportunities in my life that have worked out in my favour," he says. "And because of that, I feel morally obligated to give back."

The Faculty thanks the Nemeths for their generous support. If you are thinking about how to support Forestry students, please contact Emma Tully, emma.tully@ubc.ca or phone 604.822.8716 for more information.

Alumni profile – Christian Walli, BSF'77



Raised in eastern Switzerland, Christian Walli was initially involved with forestry at a young age – his uncle was a forester and his father was in forest harvesting and logging. However, he didn't follow this career path until he was approximately 19, when he came across a piece of paper at work one day that discussed forestry in Canada. At the time, Christian was intrigued by

working in Nakusp, British Columbia, cruising as he had no official forestry training. There he eventually started one of the first private forest nurseries, a bare-root nursery. "I guess they automatically thought if you come from Switzerland you are into tree-growing, it's in your blood like chocolates and skiing".

Realizing he needed more formal training, he decided to attend UBC and received a Bachelor of Science in Forestry in 1977. As a mature student and married, he enjoyed his time with his class mates, though didn't participate in all of the extra-curricular activities. His fondest memories were of Professor Oscar Sziklai and Professor Phil Haddock and their ability to look outside of UBC to see what others were doing in the field. Christian was very interested in harvesting and later silviculture and enjoyed class trips to Sweden and Austria, where he had the opportunity to meet visionary foresters.

After graduating his education continued as he became the assistant to the Chief Forester at Canfor, a role for which he is grateful as was able to

observe everything that took place at the chief forester level. Moving to Kamloops in 1979, he started working as a silviculturist and later became the General Manager and developed the Balco Canfor reforestation nursery, seed orchard and research division. In 1988 Christian became the Chief Forester at Brinkman & Associates Reforestation Ltd. Since 1993 he has been contracted out to Tree Canada as their BC Community Advisor. At the time Tree Canada was looking to plant over 600,000 trees and was unsure how to handle the project. Christian's experience in the nursery business was a natural fit. Now, 20 years later he is semi-retired, but still works as the Community Advisor through Brinkman & Associates and continues to play a large part in the growing awareness of urban forestry in BC.

When asked what he is most proud of, Christian looks at first at his part in the nursery program and now the urban forestry program as top of the list. His role in creating awareness of urban forestry throughout BC has included helping organize the Canadian Urban Forestry Conference this year being held in Victoria at the end of September and supporting UBC's Urban Forestry Program, (see pages 6, 8, 9 and 10 of this issue). He believes that awareness is a key factor as "the interesting thing of it all is that so many foresters are involved in urban forestry, but it's never been properly recognized". He added "if you don't know something, you won't protect it. It is important that the education system incorporate a practical side, such as trips to nature centers, so that children can learn about trees and animals in forests and learn how to protect them. More teachers should take students out and plant trees because when you plant a tree you get a sense of ownership, this to me is very important".

"The interesting thing of it all is that so many foresters are involved in urban forestry, but it's never been properly recognized"

the vastness of Canada and the forestry sector.

Since he was "lucky to have a beautiful wife and partner that would go along with his dreams" Christian and his wife moved to Canada and he started

Alumni social in Nelson, BC

On Friday, August 29, alumni and guests gathered at the Best Western in Nelson, BC to listen to the 20 students from the Forestry Master of Sustainable Forestry program present their ideas around the issues of forestry in the Nelson area. Each presentation was followed by a discussion on the issue with the audience. Afterwards students, alumni and guests mingled and discussed their experiences, both in Nelson and in forestry, at an alumni social at the Touchstones Nelson Museum of Art and History.

Thank you to all of those who joined us for this year's event.



MSFM Lecturer and Coordinator Deb DeLong with MSFM'13 alumni

Volunteer opportunities

We are seeking individuals working in different sectors of forestry who are passionate about their work to volunteer for our **Tri-mentoring** and **eMentoring** programs. In your role, you will guide a pair of junior and secondary student mentees to better understand, discover and navigate their career paths. You will also have an opportunity to meet the next generation of employees, develop coaching skills and network. The time commitment is 10 - 15 hours (including 2 events) over a 7 month period beginning in October, 2014.

If you are interested in the program but live and work outside of the Vancouver Lower Mainland, you can be an **eMentor** and connect to your mentees via telecommunication channels (eg Skype or email).

The University of British Columbia is also looking for volunteers for their **Broad-Based Admissions** (BBA) alumni readers to help play a vital role in helping to shape the community of students and future alumni. We are looking for alumni for the 2015 admissions cycle to read personal profiles for the faculties (or schools) of Applied Science, Forestry, Kinesiology, Land and Food Systems and Science. Please note the deadline to apply to be a BBA reader is Monday, October 13, 2014.

For more information on these opportunities, contact Janna Kellett at janna.kellett@ubc.ca or 604.3418648.

Mark your calendars for the following forestry alumni events

September 29, 2014 – **Our changing urban forests: Sustainability, health and climate change**, Victoria BC – Will you be in Victoria on Monday, September 29th? If so, join us for a panel discussion, moderated by Dean John Innes, on how communities such as Victoria are addressing the form and function of their urban forests.

October 9, 2014 – **Alumni Reception at the IUFRO/SAF/ CIF World Congress**, Salt Lake City, UT – Are you attending the International Union of Forest Research Organizations World Congress/ Society of American Foresters and Canadian Institute of Forestry Annual General Meeting event in Salt Lake City in October? If so, or if you are in the area, join us for an alumni reception hosted by Dean John Innes.

For more information on these events, or to RSVP, contact Janna Kellett at janna.kellett@ubc.ca or 604.341.8648.

Newsletter production

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