

branchlines

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 forestry
university of british columbia

dean's message



Having 150 Heads of State gather in a single place to make statements about their country's intentions over climate change is a hardly an everyday event. But this is what happened on the outskirts of Paris in December 2015. Most of those countries had previously indicated how they planned to tackle the problem of rising greenhouse gas emissions, making pledges to cut emissions by various amounts by various dates. Over the following 2 weeks, government bureaucrats worked diligently to draft the 31-page Paris Agreement. A great deal has already been written about this document, with some noting the absence of firm commitments, and others celebrating that countries could actually agree on anything related to climate change.

There were actually multiple events in the Paris area in early December. At the site of the negotiations, there were large exhibition areas where individual countries could emphasize what they are doing to combat climate change. Many countries put on impressive displays. For example, at the large USA stand, senior scientists presented their research on climate change throughout the 2-week period. China organized a series of events describing some of the work that is being done there to try and limit the increase in greenhouse gas emissions, and UBC Forestry research on low-carbon cit-

ies in China featured prominently in these events.

Off-site, there was also a lot going on. Several conferences were organized immediately before the negotiations, or actually during the negotiations. They included the Forests and Livelihoods: Assessment, Research, and Engagement network conference and the Global Landscapes Forum, 2 high-profile events at which current UBC Forestry personnel and also many of our alumni were well-represented.

Much of what was finally agreed depended on careful preparatory work, and UBC Forestry was involved in this. We hosted the Indigenous Peoples' International Roundtable on Forests and Climate Change, an event that was coordinated by Dr Janette Bulkan. This worked on some important messaging related to the involvement of Indigenous Peoples in the negotiations and in the implementation of any agreements, and it was gratifying to see these messages reflected in the final Paris Agreement.

Will these efforts lead to a significant action on global climate change? It is always difficult to say, and countries may in the future abandon any past commitments, especially if they have a change of government. Some clear statements were made, and it was encouraging to hear a substantial number of world leaders mention the role of forests in their statements. There is clearly recognition that forests can play a role in the abatement of climate change, but this of course will require that they, and the products they produce, are well-managed.

Although forestry didn't feature much in the official side events, a very

strong message was the importance of considering forests as a part of the landscape, rather than as isolated components. Deforestation is primarily an agricultural problem and to deal with it, foresters need to work more closely with farmers and others. Essentially, cross-sectoral approaches are needed to rural planning, to rural development, to national land-use policies, and to forest conservation. If forests continue to be considered separately, then many of the challenges that they face globally will remain unresolved.

It was also very evident that while governments may have been responsible for the negotiations, the majority of actions have been and will be taking place at other levels: by the private sector, by cities, by civil society and by consumers. Governments agreed in Paris that it was important to keep global temperature increases 'well below 2°C above pre-industrial levels', but their current pledges will not achieve this goal, and they did not specify how it would be achieved. It seems likely that it will be up to others, including the forestry community, to achieve these goals.

John L Innes
Professor and Dean

forestrynews

Recent award recipients



Congratulations to **Taylor Wale** for winning a Skills Awards for Aboriginal Youth presented by the Forest Products Association of Canada and Canadian Council of Forest Ministers.

Taylor is a third year student in our

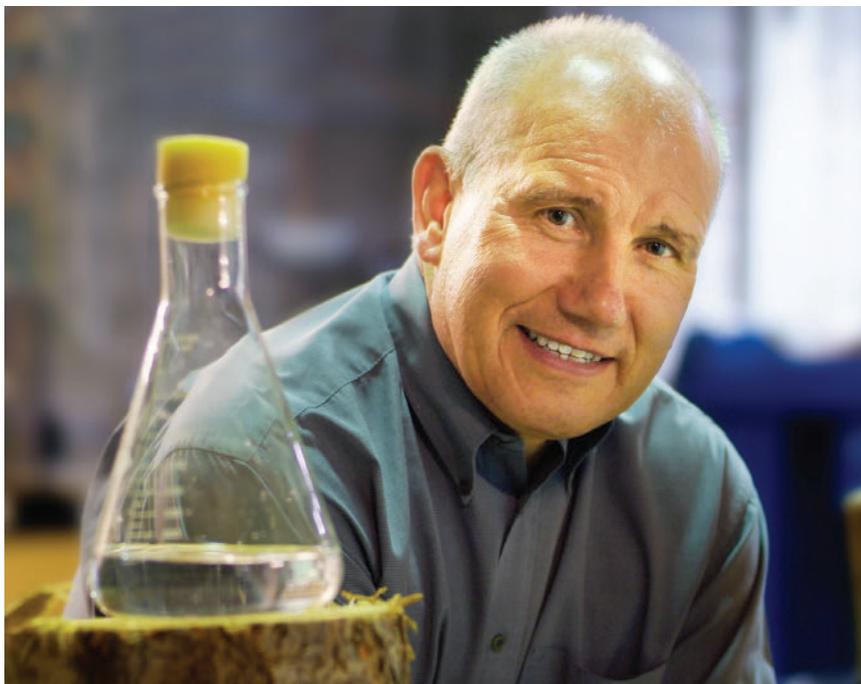
Natural Resources Conservation program. Her career goals are to work in sustainable natural resources management, to become a registered professional biologist, and ultimately to work in the field of community Aboriginal

conservation planning near her home territories of Northwest BC. Taylor has demonstrated a commitment to the Aboriginal community at UBC's Faculty of Forestry. She has helped organize and has participated in many indigenous-led functions at UBC's First Nations House of Learning as well as at the Faculty of Forestry. She serves as an Aboriginal Youth Ambassador helping to create a supportive environment with her peers at the Faculty of Forestry.

The award recognizes First Nations, Métis or Inuit individuals aged 18 to 30 who are enrolled in an apprenticeship program, college or university, with strong academic standing, and a demonstrated commitment to their field of study and a career in the forest sector.

Taylor's prize included a trip to Toronto to receive her award at the Council for the Advancement of Native Development Officers' Annual National Conference.

Congratulations Taylor!



Dr Jack Saddler has been named as the 2015 recipient of the Green Fuels Industry Award by the Canadian Renewable Fuels Association (CRFA).

"The award is presented to an individual for outstanding dedication to the advancement of renewable fuels in Canada. Dr Saddler is a world leader in the conversion of forest residues into liquid fuels and chemicals. He sees the opportunity in Canada for biofuel and biorefinery technologies to bring about major changes to our sustainable energy future" (CRFA, December 2015).

Dr Saddler received his award in early December at a special ceremony as part of the Canadian Bioeconomy Conference in Vancouver.

Congratulations Jack!

Indigenous Peoples' International Roundtable on Forests and Climate Change

In the run-up to the UN Conference of Parties (COP 21) of the UN Framework Convention on Climate Change in Paris, an Indigenous Peoples' (IP) roundtable, co-organized by WWF International's Forest and Climate Program and UBC's Faculty of Forestry, was held on October 6-8, 2015. Dr Janette Bulkan, Assistant Professor of Indigenous Forestry, coordinated the UBC participation.

Twenty IP representatives from Canada, South America, Asia and Africa participated in the strategy sessions. Eight students proficient in English-French and English-Spanish provided interpretation services over the course of the roundtable, including a public forum with members of the University community and the wider public and a field visit to Squamish First Nation territory.

The objectives of the meeting were: to learn about the challenges and threats faced and addressed by different IPs around the globe regarding recognition of collective rights; land titling and land tenure status; drivers of deforestation and forest degradation; financial, social and political sustainability of community initiatives for forest management and conservation; the status of national climate change policies and activities; and to review the global negotiations on climate change and discuss strategies for policy and advocacy.

The roundtable provided opportunities for First Nation representatives to share information on British Columbia's provincial carbon tax scheme and other forest and climate change related initiatives. In turn, global South IP representatives reported on challenges and successes, including the selection of the Wapichan IP of Guyana for one of the UN Development Program's Equator Initiative 2015 prizes. Peru presented the concept of RIA (Reducing Emissions from Deforestation and forest Degradation, REDD+ Indígena Amazónico), a regional approach on how REDD+ should be developed in the Indigenous territories in the Amazon region, soon to be funded by the Dedicated Grant Mechanism, a special initiative of the World Bank's Forest Investment Program.

Participants discussed concrete messages for the Paris COP21: inclusion of respect for collective human rights in the new agreement; promoting the participation of IPs in all levels of negotiations and implementation of agreements; and the recognition of the potential role of traditional knowledge in climate change mitigation and adaptation programs.

For more information on the Indigenous Peoples' International Roundtable, please contact Dr Janette Bulkan at janette.bulkan@ubc.ca.

Prepping for Paris

UBC's International Forestry Student Association (IFSA) held a very successful panel discussion in the run-up to the Conference of Parties (COP 21) of the United Nations Framework Convention on Climate Change in Paris. **"Prepping for Paris. What does COP 21 mean to you?"** was organized and hosted by the IFSA-UBC in the Faculty of Forestry to help inform students and the wider public on the pressing issues of global climate change. The panel discussion aimed to reveal the climate negotiation process and to combine expert opinions with the perspectives of engaged youth. The speakers included Jennifer Allan (International Institute for Sustainable Development), Kristy Buckley (Meridian Institute), George Hoberg (UBC Forest Resources Management), Kahlil Walji (IFSA) and Jesse Way (current president of IFSA-UBC). A video of the evening can be viewed on YouTube. Look for the title **"Prepping for Paris IFSA-UBC"**.

Further information about IFSA-UBC can be found on Facebook at www.facebook.com/IfsaUbc/ and Twitter at <https://twitter.com/ifsaubc>.



Bhutan: Ecological economics and gross national happiness



Sustainable development, a global mantra since the 1987 publication of *Our Common Future*, has demonstrated some success, but recent indicators of accelerated climate change, increased loss of biodiversity, continued deforestation and degradation, and increased biogeochemical flows, suggest that some critical boundaries necessary for the flourishing of life on earth are in 'overshoot', giving rise to some serious rethinking of options for sustainable development.

One of these options, Ecological Economics, presents an approach that insists on a perception of the human economy as embedded in the Earth's biogeochemical systems. In other words, the needs of the environment get first priority in decision making, the needs for human well-being, second priority, and the needs for the economy (to act as efficiently as possible to supply human needs) given third priority, after consideration of the first and second.

Ecological Economics is a major departure from mainstream political and neo-economic thinking. An example is found in Bhutan, a tiny forested country in the Himalayas, which exemplifies policy priorities aligned

with Ecological Economics.

D'Arcy Davis-Case, a doctoral student in UBC's Forests and Communities in Transition Lab, co-supervised by Drs Rob Kozak and Janette Bulkan, is studying the ways in which the Bhutanese priorities (similar to Ecological Economics) are reflected in community forest policies and manifest at the field level.

Bhutan is a paragon of environmental stewardship. It has placed the natural world at the heart of its public policy; enshrined environmental protection in the constitution; received international acclaim for its commitment to biodiversity; pledged to maintain at least 60% of its land area under forest cover (it is now at 72.5%); and designated more than 59% of its land-base to national parks, reserves, sanctuaries, protected areas, and biodiversity corridors.

The religions of Bhutan, Vajrayana Buddhism and Hinduism, both hold traditional beliefs of reverence for all sentient beings. These beliefs are promulgated as fundamental values for harmonious co-existence between humankind and nature. Therefore, it is not surprising that Bhutan maintains these values in their constitution as well as in all sector policies. Nor is it surprising that success is measured by Gross

National Happiness.

Bhutan sees economic growth as essential, but not an end in itself, believing that equal importance must be given to spiritual, emotional and cultural needs as much as the material well-being of society. They are pursuing a 'green economy' to achieve zero emission in the transport sector, to achieve clean sources of electricity and to maintain organic agricultural practices.

However, since 2008, when Bhutan democratized and opened its doors wider to modernization and globalization, there has been 'trouble in the mountains' such as: illegal logging by rural communities; over-exploitation of non-timber forest products; land deforested for agriculture and livestock; and illegal exploitation of wildlife. These troubles have been directly related to the speed of the modernization, one example being the construction of 10 large hydro-electric projects since 2000.

Community forests in Bhutan have not been immune to these 'troubles', but their presence has helped to fix them. The first community forest was established in 2000 and there are now 600 of them, with close to one-third of all rural households belonging to Community Forest Management Groups. Within these country-wide groups the 'troubles' are quickly resolved, suggesting that community forests contribute substantially to the management of the country's natural resources, as well as upholding the traditional beliefs espoused in community forest policy. Despite the growing pains, changing circumstances and troubles of transition, Bhutan's version of Ecological Economics remains relatively robust.

For further information on this project, contact D'Arcy Davis-Case at darcydc@telus.net or Dr Rob Kozak at rob.kozak@ubc.ca.

Satellite remote sensing for grizzly bear management

The grizzly bear (*Ursus arctos*) is an integral part of culture for First Nations in southwest British Columbia as well as an umbrella species for other wildlife in the area. As such, grizzly bear population status forms an integral component of ecosystem management for the Environment Program at St'át'imc Government Services (SGS) in Lillooet, British Columbia, an organization delegated to implement St'át'imc agreements by the St'át'imc Chiefs Council. The SGS Environment Team is dedicated to delivering the best available traditional knowledge and science into the decision-making processes for natural resources and sustainability.

This goal requires knowledge of currently available grizzly bear habitat locations and connectivity between them. Because the St'át'imc traditional territory covers over 2 million hectares in the heart of threatened grizzly bear populations, much of it over treacherous terrain in the Coast and Cascade Mountains, establishing a detailed land cover map is not feasible with field crews. Satellite remote sensing offered an opportunity to classify areas 0.1 ha in size as one of 13 relevant classes (open coniferous forest, moderate coniferous forest, dense coniferous forest, grassland, broadleaf forest, shrubland, herbaceous meadows, cropland/human maintained grassland, barren land, developed land, ice, clear water, and turbid water) across the entire traditional territory and the provincial Grizzly Bear Population Units listed as threatened in southwest BC.

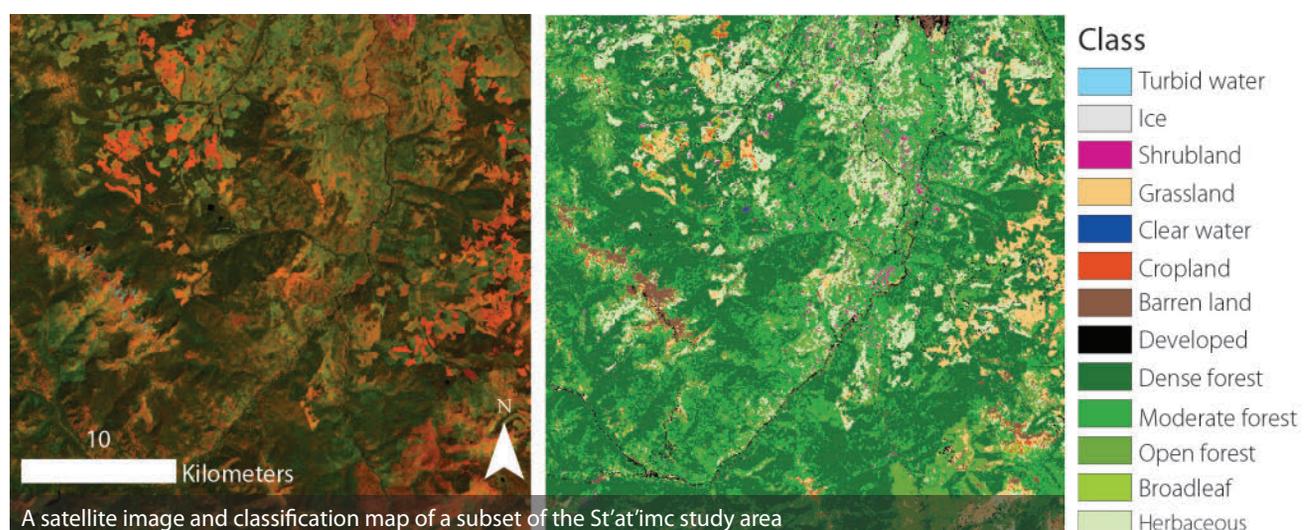
Under the supervision of Dr Nicholas Coops (Department of Forest Resources Management), Curtis Chance (a research assistant at the time and now an MSc student) used Landsat satellite imagery to map land cover across the study area to inform land-use decisions relevant to grizzly bear management. Landsat imagery is advantageous to other types of satellite imagery as it is freely available, has a moderate spatial resolution of 900 m² pixels, revisits an area every 16 days, and

has an archive extending over 40 years. Curtis was able to produce cloud-free images of the area during the growing season for almost all years between 1984 and 2014. These images were processed through a pixel-based classification to map the current land cover composition as well as the vegetation change tracker algorithm to detect disturbances over this period.

This classification process resulted in a detailed land cover map with an accuracy of 73%. Vegetation covered 76% of the area, with moderately dense and very dense forests covering 45% of the total area. Meadows of herbs, shrubs, or grasses totalled 11% of the entire area. The most common non-vegetated class was barren land, which accounted for 17% of the area. Of the vegetated area, 23% had been disturbed.

An additional topographic wetness layer derived from a fine-scale digital elevation model further classified each vegetation type as dry, wet, or very wet, indicating the locations of wetlands, some of which are vital grizzly bear habitats. By combining these products with known grizzly bear locations from radio collars, large carnivore specialists from the provincial government and SGS can determine how bears respond spatially to the distributions of different land cover types, as well as how they respond temporally to changes of land cover. Models being developed from these analyses will inform land use decisions and policy for resource managers in the St'át'imc traditional territory.

This project was a partnership between St'át'imc Government Services and UBC, and was funded partially by Natural Resources Canada Science and Technology Internship Program. In addition to Dr Nicholas Coops (UBC), this research was also supported by Dr Sue Senger (Environment Lead for SGS). For further information on this project please contact Curtis Chance at curtis.chance@alumni.ubc.ca or Dr Nicholas Coops at nicholas.coops@ubc.ca.



The forestry, agriculture, bioenergy nexus

By Hosny El-Lakany

Forest and agricultural landscapes have long provided humans with food, fiber and energy as well as a range of other ecosystem services. In developing regions, about one third of traditional biomass energy is supplied from forests, with two thirds from other sources including crop residues, livestock manures, and especially trees interspersed in agricultural cropland and grasslands. More than half of global wood removal is consumed as wood fuels for subsistence use or informal trade.

Bioenergy development potentially offers poor countries many advantages. Yet there are also concerns about food security, which are likely to be exacerbated with accelerating climate change. Meanwhile, humans have been converting forestland to cropland for millennia, to the extent that today many forest ecosystems are at risk. Increased demand for agricultural and forest biomass, is seen as a major additional threat.

Although biofuel development has reinforced perceptions of conflict between food, energy, and other ecosystem services, synergistic interactions are also possible from the perspective of food security and sustainable landscape management. The evolving paradigm in sustainable natural resources management calls for recognizing the economic, environmental and social interdependencies of these resources, then exploring integrated and complementary management systems. Recent research has demonstrated that managed polycultures of bioenergy crops can reproduce much of the diversity, resilience, and nutrient use efficiency of natural ecosystems while still achieving reasonable yields.

In fully integrated systems, it is important for wastes and byproducts to move in both directions – agricultural and forest residues as industrial



feedstocks, but also biorefinery residues and byproducts as agricultural inputs.

With the depletion of natural forests in many countries, there is a growing interest in planted forests for multiple objectives including bioenergy uses such as fuelwood and biofuel feedstocks. Public and private investments in forest plantations are growing at a fast rate around the world, but mostly in the tropics and sub-tropics where growing conditions are favorable and management costs are reasonable.

Landscape restoration, including through tree planting, is a nature-based solution. Bioenergy markets can provide additional incentives for positive social and ecological change for the restoration. Agroforestry systems play a significant role in this context as well. However, an important consideration in all these systems is effective management of land use transitions. The challenge is to achieve successful establishment of productive biomass systems while minimizing the carbon footprint associated with land use change.

It is recommended that global policy frameworks should more explicitly address bioenergy production and provide appropriate incentives for sustainable integration with food and wood production. There are many

strategies that can be used to achieve that integration. Central to all strategies are embedded concepts of multifunctional landscapes, integrated landscape design, and resilience in the face of changes yet to come. However, fundamental research on ecological principles, along with systems research on specific mixtures and integration strategies in different socio-ecological contexts, is needed to quantify the costs, advantages, and tradeoffs of integration.

Finally, there is a critical need for social science research into the pre-conditions, processes, and governance required for these integrated systems to grow and thrive. Challenges are often not technical, but relate to educational resources, social and cultural norms, private and public financing, infrastructure, markets, policy and governance.

This article is based on a recent book chapter: Richard TL, El-Lakany H. Agriculture and Forestry Integration. Chapter13 (pages 468-489) in Souza GM, Victoria R, Joly C, Verdade L (eds). 2015. Bioenergy & Sustainability: Bridging the Gaps. Paris: SCOPE 72 ISBN: 978-2-9545557.

For further information, contact Dr Hosny El-Lakany at hosny.ellakany@ubc.ca.

Stronger, lighter composites from wood pulp

Over the past several decades, Canadian forestry companies have implemented a number of responsible forest stewardship practices aimed at improving the sustainability of the forest products industry. These efforts have enabled Canada to develop the largest area of third-party-certified forests in the world. On top of this, Canadian softwood species, such as those found in British Columbia, are world-renowned for having particularly long, strong fibers, which can be used to produce high-value pulps with exceptional properties.

However, despite relatively robust demand for these high-quality pulps, some markets, and in particular those for lower-value mechanical pulps (such as newsprint), have seen a significant decline. This decline in demand has led to significant underutilisation of some mills, often in smaller communities where alternate employment is minimal.

In an effort to counter this falling demand, a concerted research effort into the development of new technologies for producing high-tech materials from wood pulp is in full swing. As one example, innovative new products such as nanocrystalline and nanofibrillated cellulose have been developed. Various groups around the world such as Innventia (Sweden), the US Forest Products Lab and Canada's FPInnovations and Alberta Innovates

Technology Futures, along with various academic and private organizations, have carried out extensive research to develop new 'fibrillated' cellulosic materials. Importantly, this fibrillated cellulose can be produced using some of the very expensive equipment found within underutilised mechanical pulp mills.

Due to the fibrillated structure, this material can be used for a variety of unique applications, including as a reinforcing agent in plastic composites and cement, and as a rheology modifier in paints, cosmetics and industrial fluids. Thus, production of fibrillated cellulose could provide access to entirely new markets while revitalizing some of the idle infrastructure already in place in Canada.

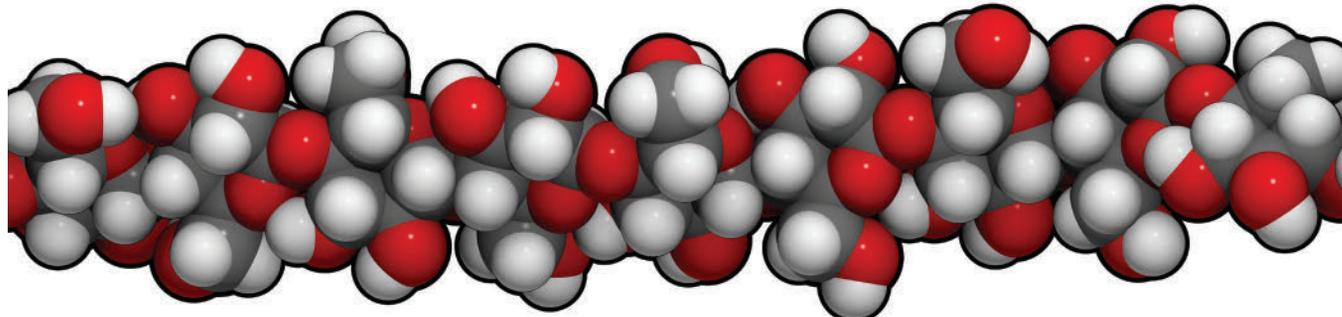
One important area where fibrillated cellulose could be used in non-traditional applications is the automotive sector. The drivers for incorporating cellulosic materials into automotive composites are twofold. First, increasingly stringent fleet fuel efficiency regulations, such as the Corporate Average Fuel Economy standards in the US are "encouraging" automakers to develop ever more fuel-efficient vehicles. One of the simplest ways of doing this is to reduce the weight of the individual automobile components. Many of the plastic components currently used incorporate reinforced glass fibers which are 40% heavier than cel-

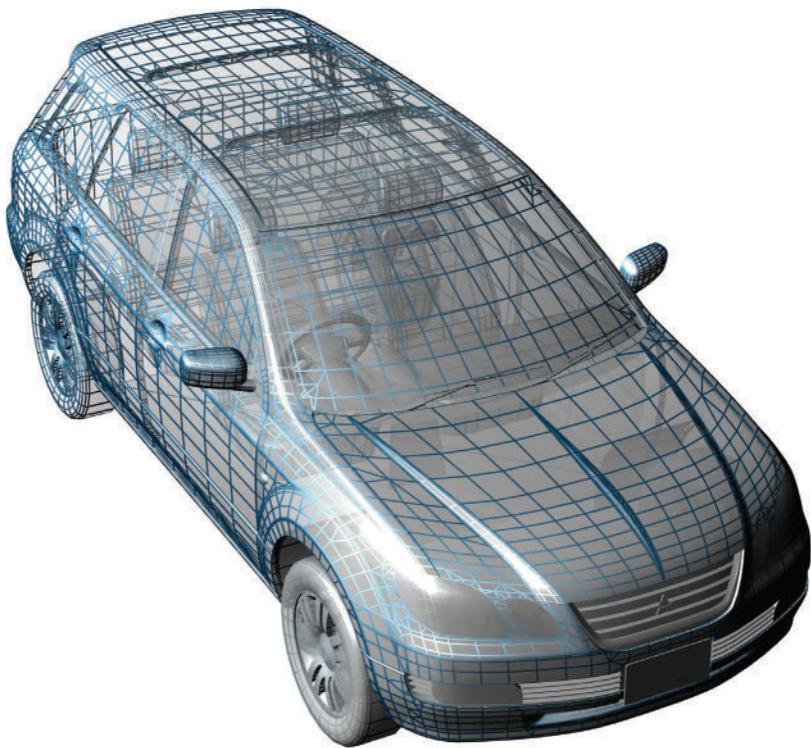
lulosic fibers. If these glass fibers can be replaced with fibrillated cellulose this could reduce the overall vehicle weight and result in improved fuel efficiency.

The second driver is the increasing requirements for the incorporation of materials derived from renewable resources. This is a particular focus in Europe where a number of top-level strategies for increasing the amount of bio-based materials have been initiated. In Canada, a number of policies which could be used to promote the uptake of bio-based fibers into automotive composites are already in place. These include the Forward Regulatory Plan for Energy Efficiency, the Act for Use of Natural Resources and the Act for Oil Substitution and Conservation. Overall, these 2 key drivers (improved fuel efficiency and increased sourcing of renewable materials) provide a large and potentially very profitable landscape for the uptake of pulp-derived biocomposites for use in the automotive sector.

Recent research has demonstrated that composites produced using fibrillated cellulose as a reinforcing material result in many desirable properties compared to those produced using traditional pulp fibers. In particular, the resulting composites exhibit enhanced mechanical and optical properties compared to those produced using whole pulp fibers.

However, before ramping up pro-





duction of these materials it is essential that some insightful market research is carried out. Focusing solely on glass fiber-reinforced composites, the Joint Research Commission of the European Union estimated that 2.6 million tonnes of glass fiber was used for composite reinforcement in 2011. This put the total market value for glass fibers at ~\$6.8 billion CAD. Thus, even a modest penetration of fibrillated cellulose products into this market could provide a significant economic boost for the Canadian forest products industry. Making this market even more attractive is the premium value per tonne currently realized by glass fibers (~\$2600 CAD/tonne) compared to that for even the highest-grade bleached pulp fibers (~\$800-1200 CAD/tonne). This indicates that fibrillated cellulose for composite-reinforcement could command at least double the current price for traditional pulps and perhaps even more if a premium can be achieved due to their reduced weight compared to glass fibers.

In Canada, a number of pulp and paper companies, as well as some tier 1 suppliers to the automotive industry, have recognized this attractive opportunity. Several companies have invested in R&D and scale-up of various processes to produce plastics reinforced with wood-derived materials. For example, Weyerhaeuser has developed its 'Thrive' fiber product, specifically for

incorporation into composite materials. Magna International, a major tier 1 automotive supplier, is also testing composites reinforced with pulp from Canadian mills, with the goal of establishing pulp-fiber reinforced composites within the automotive industry.

To try and capitalise on this potential market, Mercer International and Resolute Forest Products recently formed a joint venture, Performance BioFilaments, where the main focus is to develop non-traditional applications for fibrillated and other specialty cellulose products. This venture is being led by Gurminder Minhas, previously Director of Technology Deployment at Lignol Innovations, a biomass to fuels and chemicals company. Before this, Gurminder was head of R&D for Canfor Pulp Products, where he worked on product development, technology partnerships, technical sales and marketing, providing him with an excellent combination of technical and business skills to apply to the growth and development of Performance BioFilaments.

As well as developing a number of near-term applications for fibrillated cellulose, Performance Biofilaments is also interested in better understanding how fundamental fiber characteristics affect the performance of the fibrillated cellulosic materials in a variety of downstream applications, and how to specifically modify these

characteristics through mechanical, chemical or enzymatic approaches. To achieve these research goals, Performance BioFilaments is making use of the considerable expertise and equipment available at UBC, and has established a significant research presence within both the Wood Science Department and the Pulp and Paper Centre. Of particular relevance, the state-of-the-art infrastructure at UBC, such as the 1500L stirred tank reactors and flow loops within the Pulp and Paper Center, have enabled this research to move beyond the lab bench and on to pilot-scale testing for a number of processes for modifying the fibrillated cellulosic materials.

In order to develop these research projects, funding agencies such as Mitacs and NSERC have been pivotal, providing support for hiring a number of talented researchers from around the world. These include Dr Keith Gourlay, Musavvir Noor Shourav and Dr Young-Hoon Jung, who bring together a variety of expertise in relevant areas while working with the highly qualified personnel at the Pulp and Paper Centre. Together, this research team has been developing chemical and enzymatic cellulose surface modification approaches to improve composite properties as well as assessing the rheological properties of fibrillated cellulosic materials. These Mitacs and NSERC-funded projects provide these recent graduates with valuable industry experience and the opportunity to work on cutting-edge research with near-term industrial applications.

The combination of innovative companies and supportive funding agencies enhances the catalytic interface between academia and industry, while developing a strong fundamental understanding of the key features and processes that are involved in incorporating fibrillated cellulosic materials into new, transformative products for Canada's future Bioeconomy (ie transformed pulp and paper sector).

For further information, contact Dr Keith Gourlay (Postdoctoral Fellow in the Faculty of Forestry) at gourlayk@gmail.com or Dr Jack Saddler at jack.saddler@ubc.ca.



Food web dynamics of streams

The current period of history, or the “Anthropocene”, is characterized by multiple global changes affecting the Earth’s biogeochemical cycles and ecosystems, driven largely by human activities. These include alterations to climate, nutrient cycles and biodiversity, as well as the global intensification of agriculture and associated anthropogenic impacts (eg, deforestation, urbanisation), which disrupt natural ecosystems and the ecological interactions among its components.

Streams, rivers and lakes integrate the effects of multiple stressors across watersheds, and freshwaters are arguably the most heavily degraded of the Earth’s ecosystems. This is of particular concern given that these ecosystems support life, while at a most basic level they supply many ecosystem services for humans such as fresh drinking water, and are frequently central to the cultural and recreational life of local communities.

Anthropogenic impacts on stream ecosystems such as nutrient pollution, urbanisation, and deforestation generate changes in the quality of food available (ie, nutrients and car-

bon), promoting nutrient mismatches between consumers and their food resources, with consequent effects on biodiversity and ecosystem functioning. Furthermore, interannual variability adds an additional dimension to stream dynamics because biological processes vary naturally through time, even if habitat remains constant.

Such ideas are a core component of a project involving Dr Liliana Garcia, a postdoctoral fellow in the department of Forest and Conservation Sciences at UBC (see inset on this page), Dr John Richardson of the same department, Wyatt Cross from the University of Montana, USA, and Isabel Pardo from the University of Vigo, Spain. The project involves examining food web dynamics of streams along a gradient of nutrient enrichment. The team used a landscape approach, taking into account the percentages of land uses and water nutrient analyses within each catchment, to understand how ecological and human processes change stream food webs (complex networks of what-eats-what in a particular ecosystem) and interact to influence biodiversity and ecosystem functioning.

Changes in stream food webs are considered to be useful indicators of the broader effects of stress on stream ecosystems. Over the past few decades, stable isotopes analysis (SIA) has emerged as a powerful tool in ecology because the isotopic signature of an animal reflects its assimilated diet. Naturally occurring carbon and nitrogen stable isotopes are useful to resolve the food web and trophic dynamics. Indeed, the research group are looking at the balance of different elements across organisms, and are using SIA in order to know which stress disrupts food web and energy flow, and what the magnitude of the stress is.

This project was conducted in 10 lowland streams in Vancouver and its suburbs. The selected streams were small-medium in size (2-10 m width), with adjacent riparian zones of variable land uses. The water nutrient content of the selected streams ranged from low to very high. In each stream, several components of the food web - such as water samples, terrestrial leaves that serve as food in streams, macroinvertebrates, and fish - were collected in 2 field sampling seasons: October-



November 2014 and May-June 2015. Currently, these samples are being analyzed at the University of Montana.

Kanaka Creek, located inside a Regional Park, was the least impacted stream within our sampling sites, while Bertrand and Hyland Creeks, located in Langley and Surrey, respectively, were the most impacted ones. Macroinvertebrates and fish are fre-

quently used in biomonitoring programs to assess the ecological status of the streams. Typically, "healthy" streams have a greater diversity of macroinvertebrates (mostly of those denoted as sensitive species such as mayflies, stoneflies and caddisflies), and fish than the highly impacted ones. Many other aquatic insects (such as midges) are tolerant species and

appear in higher relative abundances in the most impacted streams. The dominant fish inhabiting the studied streams were mostly native species such as Coho Salmon (*Oncorhynchus kisutch*), Prickly Sculpin (*Cottus asper*), Rainbow Trout (*Oncorhynchus mykiss*), Three-spined Stickleback (*Gasterosteus aculeatus*), as well as the introduced species Pumpkinseed (*Lepomis gibbosus*).

We hope that these results will offer new perspectives and insights into the understanding of human impacts on stream biodiversity and ecosystem functioning. Hopefully, there will also still be time to preserve the ecosystem services that streams provide.

For further information, contact Dr Liliana Garcia Lago at lilizar@uvigo.es or Dr John Richardson at john.richardson@ubc.ca.



About Liliana

Liliana Garcia Lago is a postdoctoral fellow in John Richardson's lab in UBC's Department of Forest and Conservation Sciences. She is originally from Galicia (Spain) where she has been studying for the past few years. Liliana met John Richardson some years ago while completing her doctoral studies. She came to UBC as a visiting student for 4 months to work with John as part of her degree studies. During that time she conducted experiments at UBC's Malcolm Knapp Research Forest and co-authored 2 papers with John (who also served as an external examiner of her PhD final exam in Spain in 2012).

Now Liliana is a postdoctoral fellow supported by the Galician government in Spain. Her 3-year fellowship involves 2 years researching abroad and 1 year back in Spain. Liliana began working on her postdoctoral research at UBC in July 2014. During the past 1.5 years, she has completed her field sampling (described in this article) and has processed most of the samples. She will spend the remainder of her "2 years abroad" at the University of Montana, where she will analyze her data, interpret her results and confirm or reject her hypotheses.

Sitka spruce forests of coastal Alaska: A time travel odyssey



Sitka spruce (*Picea sitchensis*) grows along the Pacific coast of North America, in a long strip stretching from California to South-Central Alaska. In the Hoh River Valley, Washington, its straight, large and often perfectly columnar stature awes thousands of tourists. On the west coast of Vancouver Island, BC, the tolerance of Sitka spruce to salt spray makes it a beach dweller, providing a scenic backdrop for surfers and sea kayakers seeking coastal waves and wilderness. Its scaly silver to nutty-brown trunk can be found clinging onto rocky cliffs as far along the Pacific coast as Pasagshak Bay on Kodiak Island, where it is the only conifer. This is where the range of this remarkable tree species ends. Beyond it, from a third of the way down Kodiak Island to the Aleutian Islands, grassy landscapes dominate, with occasional cottonwoods and bushy alders punctuating the landscape.

Of spruce and bear

Kodiak Island is mostly known for its brown bear (or grizzly) subspecies. A feature that brown bears and Sitka spruce share on Kodiak is their remarkably low genetic diversity. This is partly because Kodiak bears have been in complete isolation from other Alaskan bear populations for more than 10,000 years. Genetic drift and low population size acted in concert to limit genetic diversity of the Kodiak bear population. Does Sitka spruce follow a similar pattern? Its low genetic diversity has been documented by former members of the Aitken lab in the Faculty of Forestry: Washington Gapare showed that Kodiak spruce trees were generally more inbred than mainland trees, and Jason Holliday and Nina Lobo found that 60% of genes involved in climate adaptation have no genetic diversity on Kodiak. However, this is where the similarity ends. Kodiak spruce and bear histories have followed very different paths. Bears colonized the Kodiak Archipelago during the late Wisconsinan glaciation, probably about the same time as humans.

In the Alutiiq Museum in the town of Kodiak, archaeological items such as petroglyphs, masks and carvings show many representations of bears. But house poles don't seem

to be present in the Kodiak Alutiiq culture. A closer look at the labels for the archaeological items displayed reveals the wood used for carvings: western redcedar and Douglas-fir are more common than spruce. These other tree species do not grow in Alaska. "The local Natives only used driftwood", explains local archaeologist Patrick Saltenstall. The masks of the Alutiiq museum in Kodiak are one of many clues suggesting that conifers on the Kodiak Archipelago are a relatively recent feature. The oldest pictures of the town of Kodiak show human settlements, churches and roads in an almost treeless landscape. Now, the town is surrounded by forests. Explorers in the early 1900s estimated the arrival of Sitka spruce on Kodiak to 500 years before present. If this estimate is accurate, the remarkable longevity of Sitka spruce would suggest some of the early tree colonists are still standing.

Diving into the recent past

For most evolutionary biologists and geneticists, experimentally studying tree species is a curse. They reproduce slowly, grow slowly, and occupy too much space. In short, they are by no means the ideal study organism. However, it is sometimes possible to use these features as an advantage in evolutionary research. Rainforest conifers, with their comparative longevity, could help biologists answer evolutionary questions better than any other organism. This is the challenge that Joane Elleouet decided to take up for her PhD project together with her supervisor Sally Aitken in the Department of Forest and Conservation Sciences. She decided to focus on recent Sitka spruce expansion from the Kenai Peninsula down to Pasagshak Bay on Kodiak Island.

Pockets of old forests with 400 year-old trees and a characteristic uneven forest structure can be found on capes and peninsulas in the Northeastern Kodiak Archipelago. As one travels southwards, the forest appears younger, with evidence of open-grown trees among younger regeneration cohorts. In Pasagshak Bay, the small wind-battered spruce trees grow to form a discontinuous, low canopy and do not exceed 80 years of age. Beyond this point, one would have to look very

The oldest pictures of the town of Kodiak show human settlements, churches and roads in an almost treeless landscape.”

hard to find any coniferous tree, or even any tree exceeding 2 meters in height. Just as photographs and archeological items from this region can

reveal important historical information, walking through these forests of decreasing age tells a history of tree colonization.

Combining dendrochronology and genomics to monitor evolution

Joane would like to determine how much time newly established forests need to accumulate genetic diversity, and how migration and colonization processes affect their ability to adapt to local conditions. As the estimated age of the forest on Kodiak Island is of the same order as the lifespan of Sitka spruce trees (about 500 years), the Sitka spruce northern range limit provides the opportunity to study living trees ranging from 2 year-old seedlings to the 500-year old giants that were some of the first colonizers on the Island.

In June 2015, Joane Elleouet, Sally Aitken and lab members Ian MacLachlan, Vincent Hanlon and Jon Degner spent 6 weeks sampling Sitka spruce trees on the Alaskan coast. They came back with tree cores and DNA samples from 550 spruce trees sampled in several locations on the Kenai Peninsula, Afognak Island, and Kodiak Island, following the direction of forest expansion. The DNA fingerprint and age of sampled trees will be determined. By pooling trees in similar age classes and calculating genetic diversity measures over all classes, Joane can directly monitor the evolution of genetic diversity and differentiation over the entire history of the Kodiak Island Sitka spruce population - without a time machine, thanks to the remarkable longevity of these conifer trees.

What the data will reveal

Lori Daniels' Tree Ring Lab and the CAWP workshop in the Faculty of Forestry helped Joane extract the information in the tree cores she brought back. Tree cores from the whole region of study provide her with an accurate estimate of age distribution within stands and across the region, providing information on the historic rate of spread across the landscape. Patterns of ring width can also give complementary information about time of canopy closure or local disturbances. DNA sequence variation will provide a tremendous amount of information about the history of natural populations, taking advantage



of recent technological advances in genomics and computational methods. This will be analyzed in the Centre for Forest Conservation Genetics at UBC. Age and genetic variation data will together reveal the demographic and evolutionary mechanisms by which forests colonize, grow and adapt to new environments.

With anthropogenic climate change accelerating and contributing to large-scale landscape disturbances and species' range shifts, the pace of migration and adaptation of natural populations is of increasing importance. Tree populations at the northern limit of species' ranges are at the forefront of climate-driven changes. Knowing the processes by which populations recently evolved will improve predictions of range evolution and vulnerability to biotic pressures. For instance, how much damage can potential insect or disease outbreaks do to genetically depleted tree populations? Will expanding forests accelerate their northern expansion with warmer and longer growing seasons? One thing is for sure, tree species will never stop expanding or retracting, interbreeding or splitting, and moving north or south, as they have always done over the geological ages.

For further information contact Joane Elleouet at joane.elleouet@gmail.com or Sally Aitken at sally.aitken@ubc.ca.



research lab profiles

The Forests and Communities in Transition lab



Second in a new series to take you on an inside tour of some of the Faculty of Forestry's research labs

The Forest and Communities in Transition (FACT) lab, housed in the Faculty of Forestry at UBC, is an interdisciplinary research group dedicated to the development of more resilient and liveable forest-dependent communities through research, dialogue, and knowledge exchange. At the foundation of our initiative is the recognition that the natural environment is not boundless, and that it plays an integral role in the economic and social fabric of communities and the health of community members. Thus, the wellbeing of forest-dependent communities begins with the responsible and sustainable management of forest resources.

The FACT lab is managed by **Rob Kozak**, a professor and former head of the Department of Wood Science. While most students know him as the probability and statistics instructor, his research interests revolve around sustainable business management practices in the forest sector and the emerging conservation economy; he has explored many topics including value-added production, forest sector competitiveness and sustainability, forest certification, and corporate social responsibility. In recent years, his research has evolved into more of an interdisciplinary inquiry at the nexus of forestry, business, and communities, with projects focusing on international development, poverty alleviation, and the wellbeing of forest-dependent communities. In 2014, he was awarded the International Union of Forest Research Organization's Scientific Achievement Award in recognition of the work conducted in the FACT lab.

Who works in the FACT lab?

At any given time, the FACT lab is comprised of a mix of graduate students (PhD and MSc students), undergraduate students (co-op placements, internships, work-learn positions), exchange students, visiting scholars, postdoctoral fellows, and research associates. Currently, there are 7 PhD students, 2 MSc students, and 1 exchange student. Many of the students are co-supervised by faculty from across campus, reflecting the interdisciplinary nature of the work conducted in the FACT lab.

Recent postdoctoral fellows and research associates that have worked in the FACT lab include **Joleen Timko** (now a lecturer in the Forest Resources Management Department at UBC), **Reem Hajjar** (now a postdoctoral research fellow at the University of Michigan's International Forestry Resources and Institutions program), and **Dieudonné Alemagi** (now a climate scientist at the World Agroforestry Centre in Cameroon). We have also had a number of students in the

FACT lab graduate in the past year, including: **Erin McGuigan** (thesis: "Social Impact Assessment in Rural and Small-Town British Columbia"), **Mariko Molander** (thesis: "Decolonizing the Mind in Forestry: Centring Settler Colonial Dispossession and Mutually Contested Sovereignties in British Columbia's Forestry Landscape and Narrative"), **Antonia Barreau** (thesis: "Narrating Changing Foodways: Wild Edible Plant Knowledge and Traditional Food Systems in Mapuche Lands of the Andean Temperate Forests, Chile"), **Justin Bull** (thesis: "The Paper to Digital Media Transition: Defining Sustainability in Media Supply Chains"), **Kyle Hilsendager** (thesis: "Tourists' Visual Perception of Forests and Forest Management in Vancouver Island and Tasmania"), and **Molly Moshofsky** (thesis: "Climate Change, Forests, and Communities: Identifying the Range of Acceptable Human Interventions in Forested Ecosystems"). These alumni have gone on to varied and exciting careers in academia, civil society, government, and industry, but this recent attrition has left a hole in the lab – we are currently looking to infuse the FACT lab with new talent.

What does the work entail?

Acknowledging that there is no single panacea for the challenges currently confronting forest-dependent communities, the work that we do in the FACT lab is decidedly interdisciplinary, and strongly rooted in the social sciences. Our methodological strategies typically invoke mixed-methods – both qualitative and quantitative – but we are an action- and solutions-oriented lab. To that end, we work in collaboration with forest-dependent communities, co-creating research questions, co-developing appropriate research methodologies, conducting participatory research, informing policy processes, and mobilizing knowledge back to the communities in meaningful ways. As such, much of our time is spent working with forest-dependent communities, both in Canada and around the world. All lab members are also expected to publish their research results and present international scientific conferences. On average, 10 peer-reviewed papers come out of the FACT lab every year.

What is currently going on in the FACT lab?

Gloria Kendi Borona (co-supervised with Joleen Timko) is investigating people-forest relationships through the lens of indigenous knowledge systems in Kenya's Aberdare Forest Reserve.

D'Arcy Davis-Case (co-supervised with Janette Bulkan) is studying the ecological economics principles embedded in the community forest policies of Bhutan and the ways in which these principles have helped to deal with the rapid

transition of the country since democratization and modernization (see page 5).

Hollie Grant (co-supervised with Philippe LeBillon) is exploring how pervasive forest-related violence, and the evolving socio-political context from which it arises, affect the implementation of community-based forest management and conservation by rural people in Cambodia.

Alice Henry (co-supervised with Shannon Hagerman) is studying ecosystem-based management and its principles as a result of multipartite land use planning and decision-making in the Great Bear Rainforest.

Ngaio Hotte is exploring how trust can be built between federal/provincial and First Nations governments in the context of collaborative natural resource management.

Robyn MacIvor (co-supervised with Rajat Panwar) is examining the legitimacy of sustainable palm oil certification schemes in Ghana and the role that smallholders play in the development of these schemes.

Ana Elia Ramón Hidalgo (co-supervised with Howard Harshaw) is examining the roles that social capital and gender play in empowering residents of 2 ecotourism villages in Ghana.

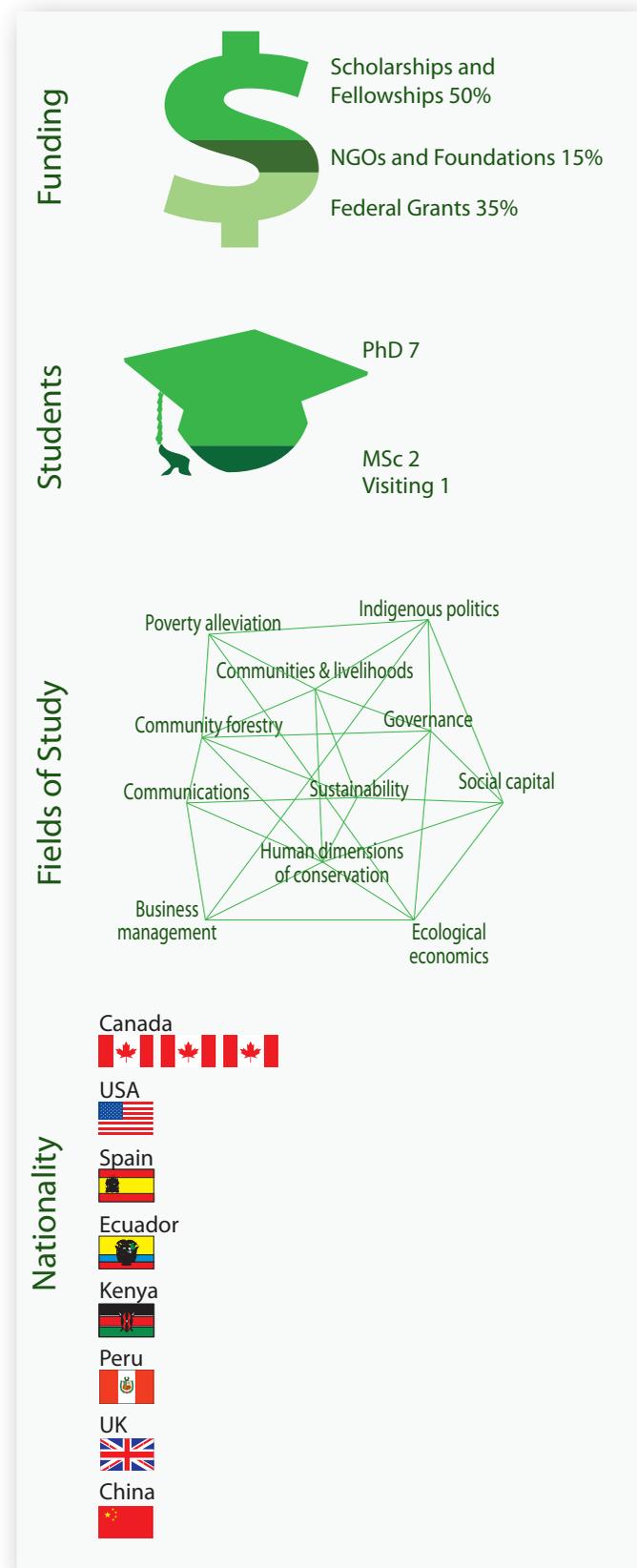
Huiyan Qin is a visiting PhD student from Northeast Forestry University in China studying links between forest conservation and poverty reduction.

Fernanda Tomaselli's research involves exploring public opinion and communications of ecological economics through mental model analyses and message framing experiments.

Andrea Vásquez Fernández (co-supervised with John Innes) is working with 2 indigenous groups from the southeast Peruvian Amazon (the Ashéninka and Yine-Yami peoples) and using indigenous theories to build collaborative methodologies for achieving community goals.

Who funds the work in the FACT lab?

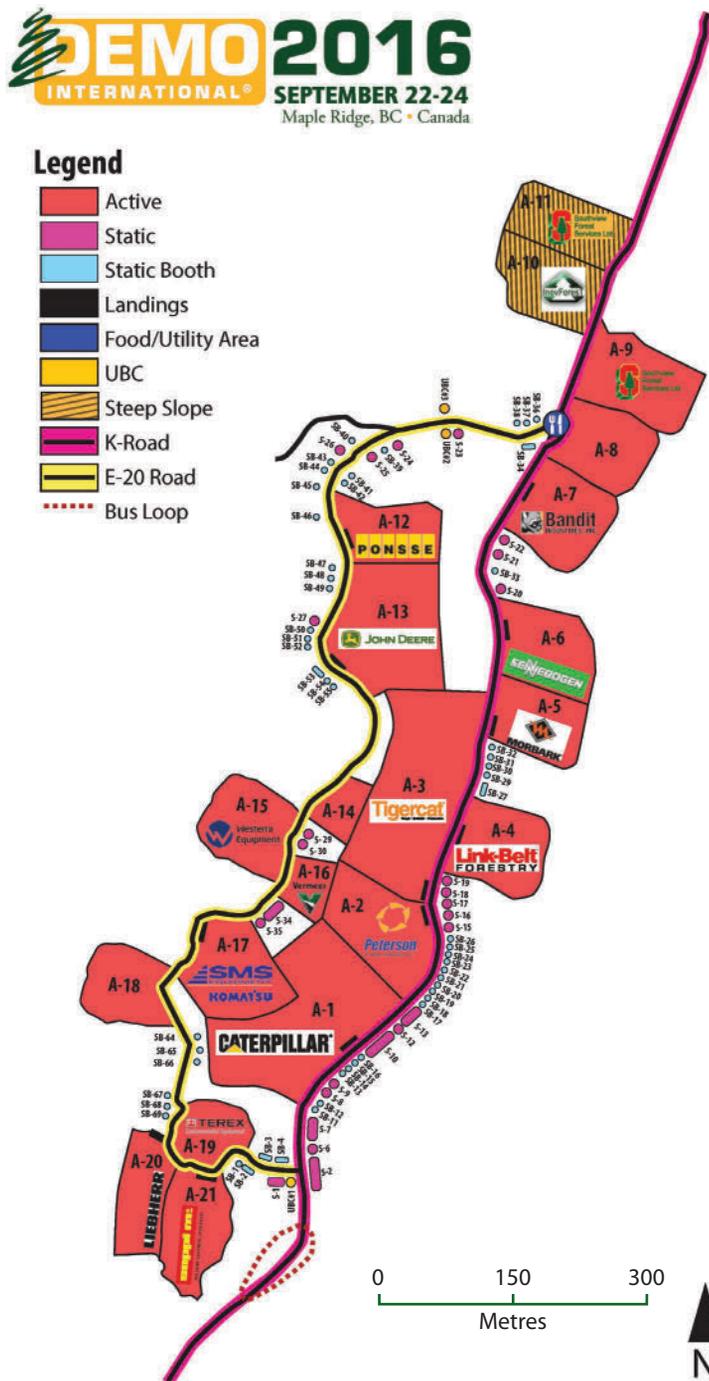
Research in the FACT lab is funded primarily by 3 sources. We have been fortunate to attract significant funding from federal sources to support our research enterprise, including from the Social Sciences and Humanities Research Council, Genome Canada's GE³LS program, and the NSERC Value Chain Optimization Network. We also have worked with a number of nongovernmental organizations, most recently Rights and Resources Initiative, Forest Trends, and the National Geographic Society, who have been very generous in funding some of our fieldwork. Last, but certainly not least, we have an exceptionally bright cadre of students in the FACT lab, many of whose funding comes from internal UBC fellowships (eg Graduate Global Fellowship, Four Year Fellowship, Faculty of Forestry Fellowships, Go Global International Learning Programs Award, Queen Elizabeth II Diamond Jubilee Scholarship, Terrestrial Research on Ecosystems & World-wide Education & Broadcast (TerreWEB) Scholarship) and/or external scholarships (eg Rufford Small Grants, Canadian Rhodes Scholars' Foundation, SSHRC Doctoral Fellowship). Recently, our lab attracted 3 of the 39 highly prestigious Public Scholars Initiative grants given out by the UBC Faculty of Graduate and Postdoctoral Studies which are intended to support PhD studies that, "encourage purposeful social contribution, innovative forms of collaborative scholarship, and broader career readiness."



How can you contact the FACT lab?

The Forests and Communities in Transition lab is comprised of a highly talented group of researchers, providing a positive and fertile space to work collaboratively with forest-dependent communities from around the world or to study broader issues related to business and sustainability. If you would like to learn more about the FACT lab, visit us at fact.forestry.ubc.ca or at our affiliated Africa Forests Research Initiative on Conservation and Development (AFRICAD) site at www.africad.ubc.ca. Rob Kozak can be reached at rob.kozak@ubc.ca.

DEMO International 2016 comes to the Faculty of Forestry



Map of the DEMO 2016 site at the Malcolm Knapp Research Forest

The Paris Air Show, Las Vegas Consumer Electronics Show, Construction EXPO..... these are the events where innovators come together, and where students and practitioners in these field can gather information, contacts and opportunities. DEMO International has been that event for forestry in North America since 1967, but it has never been held on the west coast, until now.

The Canadian Woodlands Forum (CWF) has partnered with UBC Forestry to hold DEMO International at the Malcolm Knapp Research Forest next year. A 40 hectare site is being prepared at the Forest where over 150 companies and organizations will gather in September of 2016 to show the world the latest technologies in forestry equipment and techniques in an active show that will be unparalleled in size and scope.

Peter Robichaud, Executive Director of the CWF is a veteran organizer of 6 DEMO shows, and he is expecting this to be the best one yet. "Even at this early stage, we have attracted more exhibitors than ever before" he says. Over 10,000 guests are expected to attend the 3 day event scheduled for September 22-24th.

UBC's involvement as host of the event will bring students from not only Forestry, but also from fields such as engineering and computer science to view and experience live forestry operations. The opportunity for immersive experiential learning is what excites Dr Kevin Lyons, whose class participants will be attending the entire event. "Our students have few



UBC's involvement as host of the event will bring students from not only Forestry, but also from fields such as engineering and computer science to view and experience live forestry operations."

opportunities like this one, to be out among the latest technologies actually working in the woods."

Dr Lyons is also working with CWF, the Canadian Institute of Forestry, FP Innovations and the Council on Forest Engineering to hold a Technical Conference in conjunction with DEMO titled, "Canada's Forest Sector: Adapting to a New Reality" in downtown Vancouver from September 19th-21st. These 2 events are expected to draw a large professional audience from around the world.

A key element from the student involvement perspective will be judging the exhibitors from the standpoint of sustainability. In fact, the UBC students will be presenting an award to the exhibitors that they judge to have had the displays that best portray sustainable forest practices. Themes of sustainable forestry that the students will be evaluating include:

- Worker safety and ergonomics
- Soil and site productivity protection
- Sensitive site and steep slope operability
- Carbon emissions, fuel economy and energy efficiency
- Adaptability to various silviculture systems and cutting regimes
- Fiber optimization and wood waste/ biomass utilization

To host the DEMO event, the Knapp Forest has constructed a 3.4 kilometer loop road through a portion of the forest that was logged in the 1920s and then burned in 1931. Much of the area has been commercial thinned over the past 20 years and now carries a crop of very high quality coastal forest. Resident Forester Cheryl Power likes to compare the stand to what was there 100 years ago. "The large old-growth stumps that remain from the 1920s logging show us what huge trees these sites can grow", she says. "But the second growth forests that cover this land today are living proof of how well

the BC Coast can grow some beautiful forests in one person's lifetime. The guests and exhibitors at DEMO will have an excellent opportunity to learn what we foresters all know about the history and productivity of our forests".

Cheryl is working on a silviculture prescription for the DEMO site which will detail the ecological characteristics of the land as well as its non-timber forest values. Sensitive sites within the DEMO area will be identified and measures prescribed for their protection. Candidate trees to be retained throughout the site will be identified and marked in the field for retention. Nursery stock of native tree species will be ordered in time for planting in the spring of 2017 so that once DEMO is over, the site will be returned to forest as quickly as possible. Cheryl's involvement in this work will stretch years beyond the actual event, and she and many future forestry interns will be surveying, brushing and monitoring the site annually to achieve the goals that she is setting out for the next forest.

The DEMO site is also home to some of the oldest and most storied research projects among the 900+ projects that have been installed on the Forest since its inception in 1943. The Griffiths Trees – 135 Douglas-fir trees that were first measured by Dr Brahm Griffiths for timing of bud burst and cone flowering in 1948 – are a living laboratory of climate adaptation and forest growth. These trees reside on the north end of the DEMO loop road and will not be impacted by the active events. Also on the north end of the DEMO site are Griffiths Creek – a watershed partial cut in 2004 and being studied by Dr Dan Moore, as well as the Spring Creek experimental watershed that has been under measurement since 1970 by Drs Michael Feller and John Richardson.

To commemorate the Faculty of Forestry's long tradition of field

research, as well as the many accomplishments of its researchers and its Research Forests, UBC Forestry is planning a major presence at the DEMO International Exhibition. Dr Bruce Larson chairs a committee that is organizing the Faculty's participation in DEMO. According to Professor Larson, "DEMO represents an excellent opportunity to put the Faculty of Forestry at the forefront of folks who are both pioneering and practising innovation in forestry equipment and technology. We will have the opportunity to showcase both our history and current activities in the best possible place – out in the forest".

As the date for DEMO 2016 approaches, planning moves to a fever pitch in preparation for the unprecedented activity in the Forest. Logging and safety plans are being prepared, first aid and food service amenities are to be installed and exhibitors' booths constructed throughout the loop. Forestry graduate student Anthony Robinson has been working on site development and planning for over a year. "This is so unlike anything I have ever done", says Anthony "that I have to consider this as a once in a lifetime experience for a forester. Even among the exhibitors who have signed on so far, I have met people on the global stage of innovation in forestry".

For further information visit www.demointernational.com/.



Thanks to the generosity of Andersen Pacific Forest Products, this Wagner log stacker will be sold by Ritchie Bros Auctioneers as a charity auction during DEMO 2016 with the proceeds dedicated to funding the costs of UBC Forestry students attending Field School at the Research Forests.

Master of International Forestry launches



This fall marked the inauguration of our Master of International Forestry (MIF), a course-based, 10-month program in the Faculty of Forestry. This degree is geared towards early and mid-career professionals, providing them with tools to advance to leadership positions. The program concludes with a self-directed internship placement in students' areas of focus and interest, anywhere in the world.

"UBC has pioneered the first, and so far the only, MIF program in North America to prepare graduates for careers as policy analysts, negotiators or advisors to national governments,

inter-governmental and non-governmental organizations, UN agencies, international consulting firms and academic and research institutions. MIF graduates will understand the global context for decision-making in forest management and conservation and are expected to develop into exceptional global citizens who promote the values of sustainable society and environment." – Former UN Food and Agriculture Organization Assistant Director and Forestry Department Head, Dr Hosny El-Lakany.

The MIF program presents a unique bridge between the physical sciences

of forestry and the social and political realities governing the world's forests. This academic bridge is integral to understanding our dynamic dependence on forests and to addressing the environmental, political and social threats forests face.

Fall semester

This year's program is composed of students from around the world and bolstered by lecturers and advisors who are leaders and innovators in their fields. The fall semester began with seminars on conflict resolution, coaching and team building. The first course – forests and society – was taught by Dr Joleen Timko, Managing Director of The Africa Forests Research Initiative on Conservation and Development and connected the science and business of forests to cultures and communities.

Dr Hosny El-Lakany led the second course on international institutions. His lectures brought first-hand experience of forest governance practice and implementation to the classroom and mentored students to hone skills necessary to participate in high-level negotiations.

The semester concluded with a study of governments and governance, led by former BC Deputy Minister, Doug Konkin, who explored the intricacies of good governance and innovative management techniques.

Throughout the semester, students also received career counseling from Dr Gary Bull, UBC Forest Resources Management Department Head and have learned from several notable guest lecturers, including practitioners, scholars, and lawyers in forestry and forest resource management.

Spring semester

In spring, students will be exposed to natural resources economics from Dr Harry Nelson; forest business enterprise and alternatives from Drs Robert Kozak and Rajat Panwar; social, community and indigenous forestry from Dr Janette Balkan; and natural resources planning from Dr Jeanine Rhemtulla.

The students

Jaya (Lucie) Ashley

California, USA

Jaya holds a degree in International Relations from San Francisco State University, and has a lifelong love of forests, having worked 10 years at YMCA of the Redwoods. As Director of Operations at the Center for Critical Interdisciplinary Studies, Jaya conducts research in food security and forest and water conservation. Through the MIF program, she hopes to enhance her technical expertise and leadership skills and build partnerships in resource management.

Nicole Bernardi

Ontario, Canada

Nicole has combined academic study in Geography (Urban Systems) at McGill University with hands-on and applied carpentry skills at Fanshawe College and international field studies in Laos and Barbados. The MIF program complements her holistic approach to learning, and upon graduation, Nicole hopes to work on projects abroad that link multiple-use forests to food security and gender empowerment.

Priscilla Boadi

Ashanti Region, Ghana

Priscilla holds a degree in Natural Resources Management (Silviculture and Forest Management) from the Kwame Nkrumah University of Science and Technology. Priscilla chose the MIF program to expand her knowledge and sharpen her skills in developing frameworks to meet global nutritional challenges. After graduation, she intends to pursue a career linking forestry to global food security and poverty alleviation.

Lin Chen

Fujian, China

Lin holds a Master of Arts in Simultaneous Interpretation (Chinese – English) from Beijing Foreign Studies University and has worked with the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation for 5 years. Lin came to the MIF program to expand her knowledge and refine her analytical skills. Upon graduation, she is interested in conducting research in global forest policy issues.

Robyn Clark

British Columbia, Canada

With a degree in Commerce from the University of Northern British Columbia, Robyn has spent several years working in business development and advisory roles. She was drawn to the MIF program by her enthusiasm for global environmental issues and believes the program will help her transition into a meaningful career in landscape approaches and capacity building for better conservation and sustainability of ecosystems.

Sabrina Gutiérrez

Querétaro, México

Sabrina is a world traveler, having worked in over 30 countries. With a degree in Tourism Administration from the Anahuac University in Mexico, Sabrina came to the MIF program through her experience incorporating conservation values in tourism. Through her MIF, she hopes to draw an even stronger bridge between tourism and forestry to promote sustainable tourism and natural resource use.

Kyungsoo Ha Daejeon

South Korea

Kyungsoo holds a degree in Law from the Korea National Open University and in Agriculture from Seoul National University. Along with his aspirations to learn more about international forestry and to gain key skills in negotiation and diplomacy, Kyungsoo's work as a deputy director at the Korean Forest Service drew him to the MIF program. Upon graduation, Kyungsoo will return to Korea and work for International Affairs in Forestry.

Xiu (Iris) Jin

Beijing, China

Iris graduated from UBC, with a degree in Natural Resources Conservation. Through the MIF program, Iris hopes to broaden her understanding of forest-related issues, while gaining stronger communication and leadership skills. After graduation, Iris would like to work with the government in Hangzhou, China to develop sustainable agroforestry initiatives in partnership with local communities.

Jasmine Lum

British Columbia, Canada

Jasmine holds a degree in International Relations from UBC and worked with Foreign Affairs, Trade and Development Canada. She also undertook field studies in project monitoring and evaluation in Indonesia. Through the MIF degree, Jasmine aspires to work with actors in science, society, and policy to promote knowledge sharing and collaboration for a more just and sustainable future.

Shannon Street

British Columbia, Canada

Shannon holds a degree in Anthropology from UBC, which led her to work in Indonesia and to learn about the complex relationships between resources, forestry practices, local communities and biodiversity. With an MIF degree, she hopes to gain a more robust knowledge of these interconnections. After graduation, Shannon aims to work with NGOs to build sustainable forest management capacities among local peoples in developing countries

Eileen Xu

British Columbia, Canada

Holding a degree in Natural Resources Conservation from UBC, Eileen's awareness of critical environmental and social issues led her to join the MIF program. She aims to enrich her knowledge of international forestry and gain valuable skills relevant to broader fields, including forest governance, policy, and business. Eileen's goal is to become a resource manager and help make impactful decisions that contribute to global sustainable development.

We wish every success to these students as they complete their degrees. The application deadline for the next MIF degree program (beginning in September 2016) is February 29, 2016. For more information visit the Faculty of Forestry website at www.forestry.ubc.ca, or contact Dr Joleen Timko at joleen.timko@ubc.ca or Lucie Ashley at lucieashley@googlemail.com.

Protecting the Lil'wat Nation's botanical resources

The Traditional Territory of the Lil'wat Nation encompasses the Pemberton Valley, located 2.5 hours travel by car north of Vancouver. The forests surrounding the valley feature a rich variety of plants and fungi - 'botanical resources' that are important foods, medicines and materials for the Lil'wat community. In order to ensure the sustainable production of these and other culturally-important materials, the Lil'wat Nation has designated parts of their Territory as A7x7ulm'ecw (Spirited Ground Areas), which represent important spiritual, cultural and food gathering areas.

As part of their management for culturally-important botanical resources, the Lil'wat Nation has engaged in a 'Botanical Resource Strategy'. The objective of this strategy is to identify botanical products, define the ecosystem types and forest conditions that support the production of these products, and identify relevant forest management objectives. This initiative demonstrates the Lil'wat Nation's strategic engagement with private forest companies to restore traditional stewardship activities within their Territory.

Connecting with the UBC Faculty of Forestry and Ecotrust Canada, the Lil'wat Nation received funding through the New Relationship Trust to initiate a year-long research project to catalogue Lil'wat botanical collection practices and identify different strategies that will protect A7x7ulm'ecw as future gathering areas. Respecting the Lil'wat Research Protocol S7itsken, this research project was designed, led and informed jointly by Lil'wat Community Researcher Jordan Gabriel, alongside UBC Faculty of Forestry's graduate student Tonya Smith under the supervision of Dr Janette Bulkan. Jordan and Tonya worked together to facilitate talking circles and expert interviews with respected Lil'wat elders to record over 250 plants that are used by the Lil'wat community.

The research team also facilitated field trips with Lil'wat elders to each of the various A7x7ulm'ecw, identifying important areas for the collection of sensitive plant species, and designing recommendations for forest companies operating within Lil'wat Territory. Through these field trips, the research team learned how to collect plants following Lil'wat cultural protocols,

including thankfulness to the earth and Creator for their offerings, and using non-disruptive harvest techniques that promote the successful regeneration of plants.

Under the BC-Lil'wat Forest Consultation and Revenue Sharing Agreement (2014), forest companies operating on Lil'wat Territory are required to consult with the Lil'wat Nation about their intended management plans. The Nation may grant them a 'go-ahead' to proceed with their activities, or may ask companies to alter their plans. As an output of this research, forest companies operating within A7x7ulm'ecw now receive a copy of the Botanical Resource Strategy. Company representatives are required to demonstrate to the Lil'wat Lands and Resources Office how their management plans will respect the recommendations of the Strategy.

Research for the Botanical Resource Strategy project identified many names for plants in Uclwamictws (the Lil'wat language) that were unknown at the community level. The knowledge of herbalists, hunters, fishers, educators, story tellers and others has been synthesized within a book of cultural plant uses in the Territory. This book will be sold by the Lil'wat Nation at their 2 Lil'wat Cultural Centres to share information with the wider Lil'wat community and visitors to the Territory. This project will also inform the update of a 'Plant Wheel' at the Squamish-Lil'wat Cultural Centre, where visitors may interact with a spinning wheel that depicts the different times of the year that plants are harvested for cultural use. The Lil'wat Nation's own forestry company is using this research to comprehensively map the locations of rare botanicals throughout the entire Territory.

For further information contact Tonya Smith at tonya.smith@ubc.ca or Dr Janette Bulkan at janette.bulkan@ubc.ca.



Xek'tn'alhp (Fireweed) is an important food and medicine plant for the Lil'wat Nation

development & alumni news

Family of forestry engineer Robert Watters establishes student award



The family of the late Robert Watters, who earned undergraduate and graduate degrees at UBC and helped create the Forestry and Construction Technology Program at the College of New Caledonia, has established an undergraduate student award in his name.

The award was given for the first time this year, and Devon Mase is the excited recipient. "I have a very tight budget when it comes to university and while I intend to join the co-op program to help generate some more revenue, this award is helping a lot in keeping me afloat until my first co-op work term," he says.

Fran Watters is Robert's daughter, and the director of the Academic Leadership Development Program at UBC. "My dad grew up in difficult circumstances but he always loved learning, and the forest industry was a big part of his life. My brother, sister and I want to make learning a bit easier for Forestry students," she says.

Robert Watters was born in 1923 in Big Valley, Alberta. His father died when he was just 4 years old, leaving his mother

to raise 3 children during the Depression. "Things were pretty spartan and there was not a lot to go around," Fran says. "Dad got his start in engineering when he joined the Canadian Army during World War II and was sent to McGill University for engineering-related training, then went overseas as part of the Allied occupying force in Europe."

When peace came in 1945, Robert moved to Victoria to live with his older brother and his wife. He fell in love with the forests of the west coast, and had a keen passion for the outdoors. After working on Vancouver Island as a faller, he decided to go back to school and earned a Bachelor of Applied Science in Forest Engineering at UBC. His is a UBC story: he met his wife Rose at UBC and 2 of his children have degrees from UBC.

"As a forestry engineer Dad worked in pulp mills and sawmills across the Province, doing design work and management," Fran says. "We moved around a lot because he could work anywhere there was a mill. We lived in Castlegar, Tahsis, Nanaimo, Williams Lake, and Prince Rupert, but we stayed the longest in Prince George."

In 1972 Robert applied for a teaching position at the College of New Caledonia in Prince George, and was a member of the group that developed the Forestry and Construction Technology Program. He was a faculty member there until 1985. Later, Robert owned Nanaimo Foundry, a machine shop in Nanaimo.

During that period he used a study leave to return to UBC for a Masters degree in Forestry. "Our family was still in Prince George, so Dad lived on campus for the year. He loved that he could talk with students from all over the world about things that really excited them," Fran says.

Like Robert, award recipient Devon Mase has spent most of his life in British Columbia. "I decided to join the Forest Resources Management program at UBC in the hopes of gaining the knowledge I would need for a career that focused on environmentalism and would also allow me to work in the forests and mountains of BC," he says.

"That being said, university is an expensive endeavor and while I've had some support along the way, I still need all the help and money I can get. The Robert C Watters Forestry Award helps me out a lot in that aspect and I am very thankful for that."

To learn more about this scholarship, or to discuss creating a student award of your own, please contact Emma Tully, phone 604.822.8716 or email emma.tully@ubc.ca.

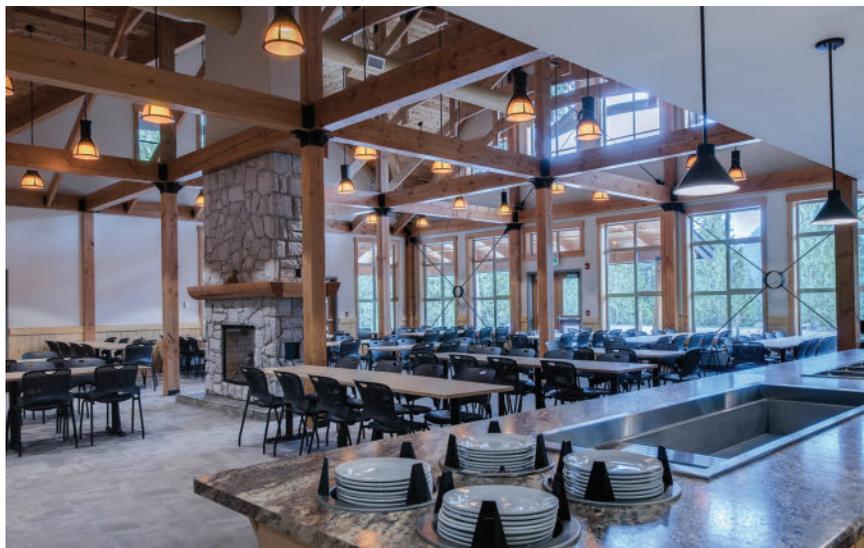
Bentley Family Hall opens its doors

After 12 years of hard work, and thanks to the contributions of alumni, grant-making foundations, companies and organizations the final phase of the Loon Lake Research and Education Centre redevelopment project is nearing completion. On October 1st the new dining hall, named Bentley Family Hall, after lead donor, Peter Bentley and his family, was officially opened.

The new dining hall has almost double the seating capacity of the old facility (6,800 sq ft), enabling the Centre to better cater to the increasing number of guests. The building was designed by local Maple Ridge architect, Wayne Bissky. And, with the majority of wood taken from the Malcolm Knapp Research Forest or donated by local forestry companies, it is an excellent demonstration in sustainable wood design and construction.

The former dining hall is currently being renovated to provide accommodation and a badly needed, meeting space. A very special thank you to all the donors who have collectively brought this project to completion through their tremendous support and generosity!

We look forward to hosting our annual Faculty Alumni and Friends BBQ in the new Bentley Family Hall on April 28th, 2016. In the meantime, if you have questions about this project please contact Emma Tully at emma.tully@ubc.ca or at 604.822.8716.



L to R, Stephen Koerner, John Innes, Peter Bentley

Upcoming and recent alumni events

Mark your calendars for the following events:

UBC Forestry's Alumni Office is already planning events for 2016 and we want to ensure they are in your calendar:

- Alumni Social at the ABCFP Conference in Vancouver - Thursday, February 25th, 2016, 5:30pm – 6:30pm
- Annual Loon Lake Alumni and Friends BBQ and Tour at the Malcolm Knapp Research Forest - Thursday, April 28th, 2016

For more information on these events, contact janna.kellett@ubc.ca or keep an eye on our alumni events page at getinvolved.forestry.ubc.ca/events/.

What is the Future of Forestry – recording and photos

If you weren't able to attend the What is the Future of Forestry event held in Kamloops on October 14th, 2015 and would like to hear the discussions that took place, you can listen online at getinvolved.forestry.ubc.ca/what-is-the-future-of-forestry/.

Class of 1965 50th reunion

The 1965 graduating class had their 50th reunion on August 21st to 23rd at the UBC Research Forest. There were 34 classmates and spouses in attendance. The Koerner Lodge, new cabins, staff and facilities at Loon Lake are excellent and we would highly recommend it for other years planning a reunion. Much better than when we were there some 50 years ago for fall and spring camps. We had an interesting tour of the Forest, and their on-site sawmill. The somewhat isolated location afforded lots of opportunities for re-acquainting and reminiscing with old friends. We intend



to meet again in a couple of years with hopefully a few of the men who were

unable to attend this year.

Submitted by Sandy Gray, BSF'74

Class of 1960 55th reunion

From September 9th to the 11th the UBC Forestry Class of 1960, met in Salmon Arm to celebrate their 55th year reunion.

The Class originated at UBC in September 1956 with 56 students and graduated 35 foresters in 1960. The event at Salmon Arm saw 14 graduates and 13 spouses participate - 40% turn out after 55 years!

Following a welcome evening, the participants enjoyed a full day of activities including a hike, visits to local wineries, and a visit to the Haney Historic Village. This was followed by a banquet where entertaining stories and reminis-



cences, particularly honouring missing classmates, were shared. Breakfast the

following morning saw participants on their homeward way.

Forestry Graduate Student Association early days information search

Calling all former Forestry Graduate Student Association (FGSA) executive members! Do you have information about the FGSA in the early days? We'd love to hear from you. The FGSA's mission is to foster community among Forestry graduate students while supporting them in their academic pursuits. Pre-1970 records are lacking and are much needed to complete our history of the FGSA.

If you can help, please email info.fgsa@gmail.com. Thank you!

HALCO supports students with hands on learning tool for Operations Research

HALCO Software Systems Ltd recently donated the widely recognized SAWSIM® sawmill simulation software to the Faculty of Forestry's Wood Science Department to support student education in the Sawmilling and Drying course. Through their ever-evolving software technology, HALCO Principals Tim Sargeant, Brad Turner and Alex Rapoport have provided consulting services and software sales to the forest products industry all across the globe since 1988.

This very flexible computer program can accurately model the processing of logs for virtually any sawmill layout and log breakdown pattern in order to analyze/predict results before implementing any process modification or conceptual design. This ensures optimal operational parameters are selected for productivity and recovery. Originally developed in 1970 by Howard A Leach, the software continues to be updated to reflect changes in technology and operating practices in the industry. According to Sargeant "students will now have an opportunity to learn in more detail about the log breakdown process and what's possible in terms of analyzing operational parameters in the sawmill or even predicting what could happen to the sawmill's performance if say, the log supply were to change."

Dr Julie Cool, Assistant Professor in the Department of Wood Science, kicked off her Sawmilling and Drying course with a presentation from Tim. Students engaged in the demo which used a modelled sawmill reflective of an operation in the interior of BC.

Dr Cool said "using the SAWSIM® software is a step towards introducing students to the primary manufacturing sector by providing a more practical experience that will contribute to widening their scope of the forest value chain." Dr Cool is pleased that students can now explore the benefits of what sawmilling simulation can do by applying results that reflect reality using this simulation tool. Tests to determine the impact of curve sawing, of using different



breakpoint diameters and/or optimizing for value versus volume help students understand how management decisions influence the performance of sawmills in terms of productivity, product basket, and recovery. Dr Cool added "this tool is a way for students to actually internalize those principles, helping them understand how simulation and optimization works through a hands-on experience."

When asked what advice Tim would give to students, he said "Learn as much as you can of the process by gathering as much data as you can and immerse yourself in it. For a solution to have credibility, paying attention to detail is key." Tim hopes that the software will help nurture student education and possibly support students' future endeavours. Tim added that he is proud to be a UBC alumnus and likes to give back where he can.

To learn more about how you can support the Faculty, please contact Sarah Doran-Coelho, sarah.dorancoelho@ubc.ca or phone 604.822.0898 for more information.

Newsletter production

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