

branchlines

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forestry
university of british columbia

dean's message



It is with the greatest pleasure that we announce here that 3 of our faculty members will receive Scientific Achievement Awards from the International Union of Forest Research Organizations (IUFRO). Sally Aitken, Richard Hamelin and Rob Kozak are all being recognized for the quality of their research. The Awards are difficult to come by – 10 Awards are announced in association with the IUFRO World Congress, which is only held once every 5 years. The Faculty of Forestry at UBC now has more IUFRO Scientific Achievement Award recipients than any other institution in the world, confirming our reputation for academic excellence. I would also like to recognize the award of the Order of Canada to Professor Emeritus Hamish Kimmins for his work on incorporating environmental sustainability in forest management, and Dr Stephen Mitchell, who has been awarded the Percy Stubbs, John Bolton King and Edward Garfitt Prize for Silviculture. Having such distinguished colleagues is one of the bonuses of working in the Faculty of Forestry at UBC.

Our Research Forests represent important demonstration sites for a number of different treatments, but information about exactly what was done and when is often difficult to come by. Some of the experiments are now finished, and others need updating. Work to do this is underway and,

in addition, some new trials have been established so that our future students will have sites to visit during their field-work. Establishing such experiments takes vision – it is unlikely that many of us will ever see the final outcomes. The initial phase of the work has been funded by UBC's Teaching and Learning Enhancement Fund, but after funding was unexpectedly stopped in March this year, the future of the enhancements is in question. We are looking for other funding sources to try and complete this important project that will ensure that the value of our Research Forests is maintained and enhanced.

While much PhD research seems to be increasingly focused on developing a deep understanding of a very small piece of the ecological puzzle, it is interesting to see how quickly successful students can move to new areas of research. This is neatly illustrated by the work of Trevor Jones. His PhD was on the use of remote sensing (specifically LiDAR) to look at the structure and distribution of tree species in and around the Canadian Gulf Islands National Reserve. After completing his PhD, Trevor went on to study the accumulation of carbon in the mangrove forests of Madagascar, showing just how transferable even apparently specialized knowledge can be.

As we move towards more and more budgetary constraints, it is important that we develop new ways to fund our research, especially if that research is not one of the priority areas for funding agencies. Dr Michelle Jackson has successfully engaged the public in her research on the distribution of white-tailed ptarmigan on the mountains of Vancouver Island. Her work illustrates how the public can contribute to the development of better knowledge

about these elusive species.

The transformation of the forest industry has been exciting interest at UBC for some time. On the one hand, research is on-going into methods to provide a full economic valuation of forests and the services that they provide. In some cases, the value of the wood is paramount, but in other cases, it is the services that are more important. We implicitly recognize this in relation to natural hazards such as landslides and avalanches, but other services, such as the maintenance of biodiversity, have been more difficult to quantify. The work of Dr Gary Bull is shedding important insights into this. Forest sector transformation also involves changes in the way that we use the products from forests, especially wood, and Alvaro Madero has been looking at how decision makers in the forest sector are reaching some of their strategic decisions.

In our final section, we feature some important developments in the Faculty related to Aboriginal foresters. We have developed 2 videos which we hope will encourage Aboriginal youth to enter the forestry profession. One of these was premiered in front of the UBC Board of Governors. It featured, amongst others, alumnus Matt Wealick of Ts'elxwéyeqw Tribal Management who this year won the Joint Venture Business of the Year Award. Many congratulations, Matt!

A handwritten signature in blue ink, reading "John L. Innes". The signature is written in a cursive style.

John L Innes
Professor and Dean

Faculty members receive IUFRO Scientific Achievement Awards



Three members of the UBC Faculty of Forestry will be honoured with Scientific Achievement Awards from the International Union of Forest Research Organizations (IUFRO) in recognition of their distinguished achievements in forest science. The awards recognize scientific advances stemming from significant research of a highly original nature or from an extended period of major accomplishment in a particular field.

Dr Sally Aitken (centre) will be recognized for her achievements in the field of forest conservation genetics. Sally leads a broadly-based research program that ranges from investigating basic scientific questions around how forest-tree populations adapt to local climatic conditions and how rapidly they can adapt to new climates, to applied research about how the diversity of native tree species is best managed to ensure planted forests are both productive and resilient to environmental perturbations. As leader of the multi-disciplinary AdapTree project, Dr Aitken is bridging genetics, climate modelling and socio-economic studies to understand and predict the adaptive responses of trees to climate change.

Dr Richard Hamelin (left) will be recognized for his achievements in the field of forest pathology. Richard is a senior research scientist with Natural Resources Canada and a UBC professor. A pioneer in molecular forest pathology, he has integrated molecular biology and genomics into forest pathology to answer questions related to pathogen detection and monitoring, population dynamics and epidemiology. He has developed a platform for molecular diagnostics of forest pests and for monitoring of the impact of transgenic trees on microbial diversity. He is currently leading the TAIGA project to sequence the genomes of forest pathogens and identify unique genetic patterns that can be translated into better diagnostic tools.

Dr Robert Kozak (right) will be recognized for his achievements in the field of forest products. His research in sustainable business management is at the intersection of business practices, forestry, conservation, and community wellbeing, and is grounded in the belief that forestry needs more holistic thinking as society strives to find the right balance between ecological, economic, and social values, underpinned by the salient need to conserve our forests. With his intensive network of international multi-disciplinary research collaborators, Dr Kozak studies how to make sustainable and ethical forestry work for forest-dependent communities around the world.

With these awards, the UBC Faculty of Forestry becomes the first institution in the history of the awards to have 3 recipients in the same year. It also brings to 9 the number of UBC Faculty of Forestry members having received this award, past recipients being: Gene Namkoong (1971), Hamish Kimmins (1986), John Innes (1995), Jack Saddler (1995), Yousry El-Kassaby (2010) and Shawn Mansfield (2010).

Hamish Kimmins appointed to Order of Canada

Professor Emeritus James Peter (Hamish) Kimmins, CM, PhD, DSc (hon) has been appointed to the Order of Canada in recognition of his contributions as an ecologist promoting environmental sustainability in forest management. The announcement was made on December 30th by the Governor General of Canada.

The Order of Canada is one of our country's highest civilian honours. It was established in 1967, during Canada's centennial year, to recognize outstanding achievement, dedication to the community and service to the nation.

Hamish Kimmins served as Professor of Forest Ecology in UBC's Faculty of Forestry from 1969 to 2007. He has been instrumental in the emergence of forest ecology and the shift towards the use of ecological principles as the foundation for sustainable forest management. He played a lead role in the development of the forest growth modeling software FORECAST that has been used across the world to inform forest management. He is also the author of the seminal book *Forest Ecology*, now in its third edition and used worldwide as the essential reference for forest ecology courses. Congratulations Hamish!

Steve Mitchell awarded prestigious silviculture prize



Dr Stephen J Mitchell RPF, Associate Professor in the Department of Forest and Conservation Sciences, has been awarded the 2013 Percy Stubbs, John Bolton King and Edward Garfitt Prize for Silviculture. He receives this prestigious award in recognition of his paper entitled Wind as a natural disturbance agent in forests: a synthesis, published in *Forestry* (2013) 86 (2): 147-157. The paper was considered

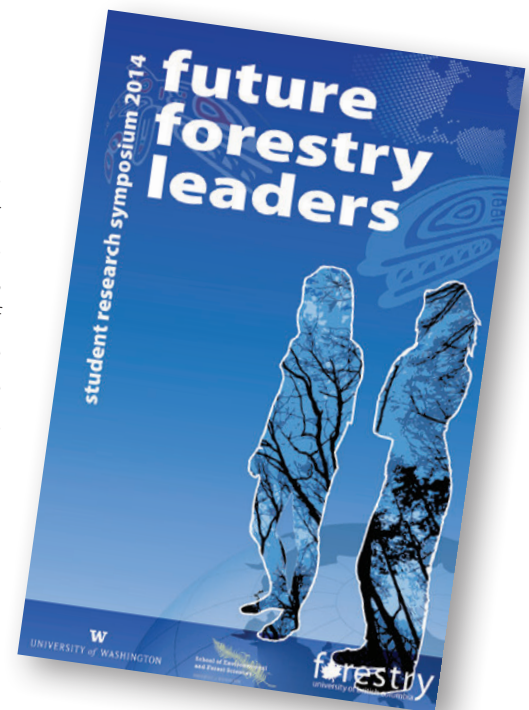
to be an outstanding review of our knowledge of the subject, and proved highly popular with readers of the academic journal.

The Silvicultural Prize will be presented to Dr Mitchell during the forthcoming Trees, People and the Built Environment II conference, which takes place on 2-3 April at the University of Birmingham. Congratulations Steve!

Future forest leaders

In February UBC's Faculty of Forestry hosted its third annual Future Forestry Leaders event that included a networking evening, and a full day conference and poster session. Graduate students from across BC (UBC, UNBC and the University of Victoria), the University of Washington and the University of Eastern Finland participated. The Forestry Graduate Student Association planned, organized and hosted this event (with special recognition to Emily Murphy and Letitia Da Ros). The culmination of the full day conference was the Schaffer Lecture

by Dr Colden Baxter entitled "Fire and Ice: Responses by stream-riparian ecosystems to shifting disturbances regimes and some consequences for forest management". Short papers based on the student presentations will be published in a special issue of the September/October issue of the *Forestry Chronicle*. A more complete report will be in the next *Branchlines* including reports on prize winning presentations and poster.



Open house and co-op presentation evening at CAWP

On January 30th, 2014, UBC's Centre for Advanced Wood Processing (CAWP) hosted their annual Open House and semi-annual Co-op Presentation Evening. It was a full day of informative and engaging seminars highlighting new developments in the industry in addition to software and machinery demonstrations, and presentations. The newly-expanded machine lab space at the Centre for Advanced Wood Processing was open to the public to showcase the new Hundegger Robot Drive timber processor in action - the first of its kind in North America. In the evening co-op students in the Wood Products Processing program delivered presentations on their co-op work

terms in the wood products sector. The networking opportunity attracted more than hundred industry representatives from the sector and enhanced the co-op relationships between students and companies.

UBC's Wood Products Processing Co-op Education Program takes students learning beyond the limitations of the classroom and extends it into the working world by alternating periods of full-time academic study with hands-on industry work experience. Through this educational process students test drive career options in the Primary, Secondary and Tertiary industries in a highly supportive environment, while gaining practical skills and experience.

Hiring UBC Wood Products Processing co-op students has been recognized as key element in companies' long term strategic plans to maximize productivity and nurture creativity and innovation. By leveraging and investing on young minds, co-op employers not only seize opportunities to stay relevant and current with the fast changes in the Wood Products industry but also contribute significantly to the development of well qualified leaders of tomorrow.

If you are interested in learning more about UBC's Wood Products Processing Co-op Program, contact Sudeh Jahan at sudeh.jahan@ubc.ca.

Ecosystem restoration in a dry interior forest



The newly accredited Master of Sustainable Forest Management (MSFM) program at UBC includes a capstone project where students work in small teams to develop a long-term landscape management plan for a forest estate. For 5 graduate students it was an opportunity to explore the unique role of foresters in ecosystem restoration and biodiversity conservation.

Located in the south Okanagan, the White Lake basin is one of the largest remaining intact grassland ecosystems in the region. The Nature Trust of BC began acquiring land in 1996 for the White Lake Basin Biodiversity Ranch with 2 goals in mind: to secure habitats with high biodiversity values that are at greatest risk, and to manage conservation lands integrated with the broader landscape in order to maintain ecosystem resilience and connectivity.

Our economies rely on healthy ecosystems for various resources and services, including medicinal, scientific, economic, and cultural values. Ecosystem services are complex and interrelated natural processes that are not completely understood. As such, the impact of losing any process or ecosystem is unknown. Therefore, it is critical that we proactively manage to maintain the health and vitality of these systems.

The purpose of the biodiversity ranch is to develop a program that integrates livestock management with conservation of habitat for species at risk. Within the biodiversity ranch there are Interior Douglas-fir, Ponderosa Pine, and Bunchgrass BEC zones which present unique management challenges. The property has a complex governance structure from a variety of land uses and owners, which is an opportunity for stakeholder involvement in management planning. Other conservation issues include loss or fragmentation of habitat, protection of provincially and federally listed species at risk, overgrazing, fire hazard, and human disturbance.

Currently the ranch has an ongoing legacy of fire suppression management. Historically, dry interior forests were maintained by a natural and human-caused fire regime which ranged in severity and frequency. However, the removal of this disturbance agent has changed the structure and function of the present ecosystems, resulting in unmitigated forest ingrowth into the adjacent grasslands. The result has been a loss in the number of range and open grassland species, and subsequent deterioration of essential habitats for rare and at-risk species.

Close to 70 at-risk species have been identified in this region, including amphibians, birds, mammals, reptiles, and plants, and thus the preservation of their habitat are of utmost importance for their survival. The infill of trees on the landscape increases the risk of high intensity wildfire in the region as there has been increase in canopy closure and fuel loading on the forest floor.

In January 2014 the student team visited the ranch and met with Nature Trust staff to discuss opportunities and challenges in the management area. The few days spent on site provided an invaluable experience to evaluate the current conditions in comparison with historical photos, which are being used as target conditions for restoration. We are looking forward to learning more about this unique ecosystem and developing a restoration management plan that is in accordance with the objectives of the Nature Trust.

Article written by student Darcie McNeill. For further information, contact Deb DeLong (MSFM program coordinator) at deborah.delong@ubc.ca.



MSFM students collecting data on site.
From left to right: Emily Beavan, Yuanyan Yang, and Yue Shi

Enhancing demonstration and education at UBC's Research Forests



Student interns (Hélène Marcoux, left and Bridget Connors, right) planting the new Douglas-fir spacing trial at Malcolm Knapp

Education and demonstration improvements are underway at UBC's Research Forests. Demonstration sites are indispensable teaching tools in temporally dynamic forest environments that bring forestry concepts taught in the classroom to life. For instance, UBC Forestry alumni will remember touring the Silviculture System Demonstration Area at the Alex Fraser Research Forest, in Williams Lake, or the Dr JHG (Harry) Smith growth and yield plots at the Malcolm Knapp Research Forest, in Maple Ridge. However, several demonstration sites at each Forest have exceeded their lifespan and now need replacing or updating. Also, with increasing enrollment in UBC's forestry courses, demonstration and teaching sites will be more useful if arranged in a layout

that facilitates visits by large numbers of people.

Initiated by a Teaching and Learning Enhancement Fund grant under the guidance of both Dr Bruce Larson and Research Forest staff, a demonstration enhancement project will improve the educational capacity of the Research Forests for decades to come. Two student interns (Hélène Marcoux and Bridget Connors) were hired in 2013 to develop a 50-yr plan optimizing the spatial configuration and accessibility of demonstration developments to large groups. Strengths and deficiencies of existing sites were evaluated by answering the question what makes an effective demonstration area? Consultation with UBC Forestry Faculty members also yielded valuable insight into

future demonstration and educational needs for field schools and courses.

At the Malcolm Knapp Research Forest, planning and operations are currently underway for the creation of a new 3 hectare demonstration area in 2014. This area will include 3 components: a Douglas-fir spacing trial with incremental silviculture treatments, a red alder management demonstration, and a Douglas-fir/western redcedar Nelder plot. The "Nelder wheel" is a unique teaching tool with a circular configuration that allows students to observe multiple tree densities along each spoke of the wheel. Funding from a Trees Ontario / Forest Recovery Canada grant will help offset reforestation costs associated with these new installations. Lastly, 2 new docks will be built this summer

to improve access and safety during field schools exercises on Placid and Shirley Lakes.

Alex Fraser Research Forest is in the early stages of developing 4 new demonstration sites (approx 13 hectares in total) to concentrate examples of phases involved with planning for partial cutting (group selection, group shelterwood, single-tree selection, thinning from below). Visitors will be able to compare and contrast adjacent examples of pre- and post-harvest stands that were cut to achieve various silviculture objectives. Walking trails will be established through each site

to enhance opportunities for experiential learning. Spatial planning for the annual Fall Field School using GIS analysis has also been used to identify new locations for field exercises. In the coming year, added facilities such as new interpretive signs and outhouses will be developed for both Forests, improving the overall quality and presentation of new and currently used demonstration sites.

Hands-on and boots-on-the-ground training is an essential part of a forestry education. Demonstration sites at the Research Forest are an integral part of student training. However,

investments in periodic replacement and frequent maintenance are critical to ensure sites remain safe, accessible and relevant for field exercises. Both UBC's Alex Fraser and Malcolm Knapp Research Forests provide opportunities for learning beyond the confines of ordinary classroom environments. By creating a forest-wide demonstration plan, both Research Forests will ensure the viability of demonstration sites for future students, and mitigate challenges due to growing class sizes.

For further information, contact Paul Lawson, Director of the University Research Forest, at paul.lawson@ubc.ca.

Student volunteers clean up legacy of past research



Volunteers shoveling mulch and laying it down on trails throughout the MKRF forest

Armed with gloves, gum boots, and much enthusiasm, a dozen Natural Resources Conservation students spent 3 days volunteering at the Malcolm Knapp Research Forest last November. These work days helped fulfill volunteer hours required by CONS 451 Field School.

Led by Research Forest staff, volunteers wasted no time tackling the large list of tasks ahead of them. The itinerary featured a range of activities.

Some tried their hand at pruning and brush-sawing. Others were charged with trail maintenance and removing debris from the Forest. At Loon Lake, students battled invasive ivy and one lucky student got to operate an off-road utility vehicle for the day.

Much of the work involved cleaning up and removing derelict materials once used for research in the Forest. This unwanted legacy of past research per-

sists in many parts of the Forest. Research installations are often left behind as a result of expired funding, or a longer-than-anticipated project timeframe.

Volunteering over several days not only offered students valuable course credits, but also gave them the opportunity to build lasting connections with peers while giving back to UBC Research Forests.



Mangrove forest clear-cut for charcoal production in Ambanja Bay

From BC's Gulf Islands to Madagascar's mangroves

Dr Trevor Jones received his PhD in Forest Resources Management under the supervision of Dr Nicholas Coops in UBC's Integrated Remote Sensing Studio (IRSS). Trevor's research involved using data collected by advanced airborne hyperspectral and light detection and ranging (LiDAR) sensors to map the structure and distribution of tree species in and around the Canadian Gulf Islands National Park Reserve. This work directly built on his undergraduate and master's-level experience at Clark University, which had involved using field observations and Landsat satellite imagery to map past and present forest distribution in the commonwealth of Massachusetts and the New York State Adirondack Park.

Leading up to his graduation from UBC in May, 2011, Trevor was increasingly exposed to forest conservation issues in Madagascar through his role as a contributing editor to the journal *Madagascar Conservation & Development*. Having already worked extensively in temperate forests and with a desire to apply what he had learned towards capacity build-

ing, soon after receiving his PhD Trevor moved to Toliara, Madagascar to help establish a "blue" (ie, marine) forests science program for the marine conservation NGO Blue Ventures (www.blueventures.org).

While blue forests collectively refer to all marine vegetation, including sea-grasses, marshes, sea-weeds and mangroves, Trevor's work in Madagascar focussed on mangroves. Mangroves are inter-tidal ecosystems found in over 120 countries between 30° N and S latitude. These ecosystems provide a staggering range of goods (eg, construction and fuel materials; food and medicine) and services (eg, protection from storms and erosion; filtering water; breeding, nesting and nursing grounds) for coastal communities. These ecosystems are also globally significant as they support high biodiversity for both plants and animals and sequester significant amounts of CO₂.

Madagascar contains about 2% of the world's mangroves, which is Africa's fourth largest extent. In keeping with the global trend, in much of the country, these ecosystems are

being rapidly degraded and in some places completely deforested. In response to this rapid and ongoing deforestation, the Blue Ventures Blue Forests program was established to work with coastal Malagasy communities to conserve and restore mangrove forest, which in turn helps secure critical goods and services, safeguard biodiversity, and contribute to climate change mitigation through preventing greenhouse gas emissions that can result from mangrove deforestation. To get the project up and running, the first steps were to establish how the distribution has changed over time. For this task, Trevor analyzed national-level mangrove maps made from Landsat satellite imagery (courtesy of Chandra Giri (United States Geological Survey) and colleagues). This analysis not only aided in quantifying how much mangrove loss had occurred nation-wide from 1990-2010, but also facilitated carving up the national distribution into distinct ecological units. Through the lens of individual ecological units, he could then objectively determine which parts of the country were exhibiting the most rapid and widespread deforestation.

With several loss “hot-spots” identified, experience Trevor had acquired during his time at UBC was further drawn upon to partition mangroves based on their distinct ecological characteristics, as observed in Landsat satellite imagery. To refine and confirm these different mangrove types (ie, strata), all areas of interest were visited on the ground. Thanks to prior field experience, organizing and overseeing numerous field campaigns was not a new process; however, the jungle gym arrays of buttress roots, the at-times waist deep mud and 40°C heat were vastly different conditions than those encountered in the Gulf Islands National Park Reserve.

With the ecological variability of mangrove types as represented by distinct strata observable in satellite imagery confirmed based on ground observations, areas of interest were revisited to systematically establish field plots. Within these field plots, measurements of tree height and diameter and soil samples allowed estimating how much carbon these forests actually store.

From July 2011 to June 2013, the Blue Forests team grew from a 3 person team to 16 full-time conservationists, ecologists, geospatial analysts, socio-economists and community liaisons, most of whom are Malagasy. This team is augmented through collaboration with a diverse group of both foreign and Malagasy graduate students, interns and volunteers, and supported by key partnerships with a range of Malagasy research institutions, including the Department of Forestry in the University of Antananarivo, and the National Oceanographic Research Facility in Nosy Be.

The Blue Forests project is now active in 5 very different locations across Madagascar’s west coast. Within each of these locations, ongoing activities are variable, but all revolve around community-centred approaches to improved mangrove and fisheries resource management. While there are many possible ways to work towards improved resource management, project members are currently examining the full range of possibilities associated with improved management through funding from carbon financing mechanisms, other payments for ecosystem services, and alternative or enhanced livelihoods. There is of course no silver bullet strategy, which is why a wide range of options are being considered and explored simultaneously.

With the Blue Forests science team up and running, Trevor left Madagascar in the summer of 2013 and has now returned to UBC as a visiting post-doctoral research scientist in the IRSS. With several years’ worth of data collected, UBC’s facilities and infrastructure are supporting the preparation of several manuscripts for submission to peer reviewed journals, the first of which was recently published in the journal *Forests*, presenting the first-ever above- and below-ground carbon stocks for Madagascar’s mangroves and the first-ever map of mangrove types in northwestern Madagascar. Another key aspect of returning to Vancouver is to build on existing relationships with the UBC Fisheries Centre and help forge new collaborations, including with the UBC Faculty of Forestry.

For more information about this research, please contact Dr Trevor Jones at trevor@blueventures.org.



Mahajamba Bay, Madagascar’s largest mangrove ecosystem

Is that tree looking at me?



Whether advocating for environmental usage, or fundraising for its protection, a deep level of understanding for what lies at the heart of people's relationships with natural habitats, and their contents, makes for judicious and thoughtful decision-making that is better able to satisfy core requirements over the long term. In the past, decisions were frequently made that prioritized financial and management objectives. Little thought was given to

the emotional component that may have existed between the people, and the animals, and the environment in which they resided. Thankfully forest conservation policies have evolved radically over the past few decades, and the complexities of human attitudes to forest wildlife and resources have never been better appreciated.

Understanding more of the psychological aspects, that feed into human attitudes to nature, allows us

to successfully develop both forest management and planning strategies, as well as marketing and information campaigns in these areas. Anthropomorphism, the attribution of human qualities to non-human objects and animals, may seem a topic distant from forest management concerns at first glance, but in fact it has already proven itself to be directly linked to people's attitudes towards a variety of issues relating to environmental management. Take the case of Julia Hill. In the late 90s she spent 2 years living in a 200 ft Californian redwood tree she called Luna, in an attempt to save the tree from being logged. Julia, a generally sensibly minded individual, stated in her accounts of the period that Luna became to her not only a living being, but also one in possession of a human-like mind that was capable of suffering pain – all of which provided a huge motivation for Julia's subsequent conservation activism.

Over the past decade, research into the impacts of anthropomorphism across a variety of disciplines, from consumer behavior to environmental conservation, has suggested that we not only have more positive attitudes towards anthropomorphized items in general, but are frequently more reluctant to part with them. However its not all plain sailing – past research has also revealed that we often allocate agency to objects that are anthropomorphized, and may even go as far as to punish them when they 'misbehave'. In Mexico City, for example, a valued bell at the Catedral Metropolitana struck and killed a bell ringer in 1947. According to anthropomorphism researchers, Adam Waytz, Nicholas Epley and John Cacioppo, the bell was sentenced by the local people to be tied down for

50 years and stripped of its clanger for the 'crime.'

The circumstances in which we anthropomorphize, and more specifically how it may impact on subsequent attitudes to nature and conservation marketing, is the research area of PhD student Cluny South whose research supervisory committee includes Dr Michael Meitner from the Department of Forest Resources Management. Previous research, by others working in the field, has confirmed that the reasons why animals, machines and natural phenomena are anthropomorphized are often varied and complex. One circumstance in which we often anthropomorphize is when trying to satisfy a need to make things more understandable to us, especially when events seem confusing or arbitrary. This can be the case when violent weather strikes, or natural events, such as landslides, or forest fires, occur. We name hurricanes, and describe natural forces in human terms, perhaps in an attempt to provide a level of uncertainty reduction for something that appears essentially unpredictable and confusing. A second major motivation for anthropomorphization has been found to be loneliness and a perceived need for social connection. When people are lonely they anthropomorphize all sorts of non-human items more, be they trees, animals, or even objects they own. This type of anthropomorphism may account for some types of excessive hoarding behavior, as well as an often very strong attachment to non-human animals and natural environments, the latter of which may result in extreme protective responses, as discussed.

Cluny's research has so far been focused on this second category of anthropomorphism motivation, specifically looking at how people who feel lonely relate to non-human items, and whether this can make them feel more closely connected to them in a variety of ways. In order to investigate causal links her current research is being conducted through a series of experimental studies with laboratory participants, looking in detail at the ways in which loneliness affects attitudes to different animals and plants, and how this impacts subsequent monetary dona-

tions to campaigns featuring these items. Data collection is still ongoing, but already results suggest notable gender, cultural and demographic differences. It is predicted that lonely individuals will rate items more highly, especially if they anticipate that these items may offer potential for social connection. Furthermore the prediction is also that lonely individuals will anthropomorphize more strongly in general, and that lonely individuals will be more willing to support campaigns for any anthropomorphized items.

The implications of the above on issues relating to public attitudes to natural resource management of forest reserves and the wildlife that lives within them, as well as to conservation marketing, has the potential to be wide-ranging. Cluny's intention is

to investigate the applications in fine detail with the hope of putting forward a set of best practice guidelines. Be it trees, animals, rocks, machines, or weather that people are relating to, it is important to understand the relationships and the rules that govern them, in order to respond successfully to public expectations and manage the natural resources to every ones satisfaction. "If there are times when we think of natural environments, and the animals that live within them, in distinctly human terms then this needs to feed into how we plan our forest resource use and structure publicity and conservation campaigns in these areas", says Cluny.

For further information on this research project, contact Cluny South at cluny@clunysouth.com.



Citizen science helps an alpine bird specialist



Well camouflaged ptarmigan

In recent years, public participation in science (aka “citizen science”) has gained widespread support and recognition. Members of the public with a keen eye for observation have throughout history contributed to scientific inquiry by recording natural phenomena. Many of these records, preserved in specimen collections and field journals, are used to answer important ecological questions, such as how species shift their range in response to climate change. To capitalize on the knowledge and abilities of citizen scientists, several programs have been developed worldwide that involve the public in scientific data collection. These range from organized, systematic surveys (eg, Christmas Bird Count and Breeding Bird Survey) to web-based platforms for entering opportunistic observations (eg, eBird, FrogWatch, Project BudBurst).

The potential inherent in keeping track of naturalists’ observations is exemplified in a partnership between the University of British Columbia’s Centre for Alpine Studies and the Strathcona Wilderness Institute (SWI), a small non-profit organization dedicated to protection of Vancouver Island wilderness. In 1995, Dr Kathy Martin (Department of Forest and Conservation Sciences) began studying White-tailed Ptarmigan on Vancouver Island. The smallest of the grouse, White-tailed Ptarmigan are permanent residents of mountaintops ranging from Alaska to New Mexico. Numerous adaptations allow these birds to survive severe conditions. For example, feathered legs and feet provide warmth and the ability to walk on deep snow, cryptic plumage renders them nearly invisible, and flexible breeding schedules allow birds to

re-nest following nest failure. Based on unique morphological and behavioral characteristics, White-tailed Ptarmigan on Vancouver Island were listed as a separate subspecies in 1938.

Because alpine ecosystems on Vancouver Island exist in small, isolated patches at relatively low elevation, Vancouver Island ptarmigan have less suitable habitat available to them than their mainland counterparts. Vancouver Island mountains have few access points or trails and are comprised of steep, rocky terrain, rendering alpine wildlife there extremely difficult to study. From 1995-1999, Kathy Martin and her field crews conducted ptarmigan surveys on Vancouver Island during the breeding season. Birds were located using playback calls, then captured and outfitted with a radio collar. Each year, colored birds were located using radio-telemetry. Such fieldwork involved multi-day hikes simply to access the alpine, followed by several days camping and searching for the birds’ radio signals over rugged terrain. Following the birds to their winter habitat, however, required extensive time in a helicopter, sometimes dealing with bad weather conditions that hindered the detection of radio signals.

As is often the case with elusive species restricted to difficult-to-access locations, combining the efforts of many interested non-scientists over time can result in more data than could be collected by any one field team alone. Hundreds of hikers visit Strathcona Provincial Park annually, many with a bent toward natural history. In order to supplement the small but hard-won field dataset on habitat use by Vancouver Island ptarmigan and to capture the observations of park visitors, SWI



Strathcona Provincial Park, Vancouver Island

posted notices at trailheads describing White-tailed Ptarmigan and asking hikers to report their sightings by mailing a card to UBC's Centre for Alpine Studies. Many hikers responded, often including photographs and map coordinates with their reports. In later years, more sightings began to arrive via e-mail and often contained more accurate GPS coordinates. All sightings were confirmed as White-tailed Ptarmigan (versus Dusky Grouse, sometimes mistaken as ptarmigan) through photos, habitat descriptions, and/or follow-up communications with observers. To date, over 300 confirmed ptarmigan sightings have been compiled, covering more than 90 Vancouver Island mountains. This represents a dramatic increase from the 35 mountains covered in the original field surveys, proof that opportunistic recordings of a rare species can cover a much larger percentage of the species range than could be gathered without public contributions.

Along with providing critical information on the habitat requirements and population status of a species, public participation in the gathering of scientific information has also been shown to promote environmental awareness and support among participants. Recruiting participants in citizen science programs can, however, require major effort, especially for organized surveys. On the other hand, recording platforms set up to receive opportunistic data such as eBird (<http://eBird.org>) simply capitalize on the tendency of birders to keep track of their sightings, focusing on the inherent interests of the target audience. The ptarmigan observation program developed through SWI

and UBC, although regional in scope, offers some of these same advantages. Still, on-going efforts are needed to promote public involvement; the SWI recently issued a "Ptarmigan Challenge" (<http://strathconapark.org>) to recruit more submissions in 2014.

Of course, opportunistic data collected by citizen scientists comes with unavoidable biases. Perhaps most noteworthy is the fact that no records are obtained from areas where species are not detected, resulting in observations of presence only. Species distributions can be challenging to model with such data because baseline measures of survey effort are lacking. Opportunistic observations also tend to be spatially biased, occurring most frequently along roads or trails (ie, areas most likely to be traversed by an observer). Vancouver Island alpine consists of fairly open terrain, so hikers tend to spread out rather than concentrating along trails. Still, certain mountains are more accessible by humans and thus more frequently climbed than others, resulting in spatial clustering of ptarmigan sightings around those peaks.

Despite the sampling biases and associated challenges, the data collected through the Strathcona ptarmigan observation cards have helped Kathy and colleagues to better understand White-tailed Ptarmigan range sizes on Vancouver Island. As a post-doc with Drs Kathy Martin and Sarah Gergel, Dr Michelle Jackson is now using the data to understand how climate change may affect ptarmigan habitat in the future. For instance, in British Columbia's coastal alpine, climate change is causing substantially warmer winter temperatures

“Despite many hours scanning rocks, ridgelines, and snowfields, she has realized that the best way to find a ptarmigan is to keep your eye on the ground in front of you.”

and more extreme weather events during the spring breeding season that could increase breeding failures. Furthermore, tree and shrub encroachment into alpine tundra will result in even smaller and patchier habitat for alpine wildlife in the region. Using both the field survey observations and public submissions from SWI, Michelle is developing distribution models for ptarmigan that will predict changes in area of suitable habitat under climate change scenarios. Preliminary analyses show that the majority of current suitable habitat for ptarmigan may be lost by 2080, and that most of the predicted future habitat supply will be located in Strathcona Provincial Park. These model results strongly justify on-going partnerships with SWI to help protect and better understand the habitat requirements of ptarmigan, along with other endemic alpine specialists such as the Vancouver Island Marmot.

The partnership between the Centre for Alpine Studies and the SWI has proved to be fruitful and beneficial for both parties, along with the hundreds of participants who have had the chance to share what was perhaps one of the highlights of their backcountry experience. According to Michelle, catching a glimpse of such an elusive bird has certainly been the highlight of several of her own hikes into the alpine. Despite many hours scanning rocks, ridgelines, and snowfields, she has realized that the best way to find a ptarmigan is to keep your eye on the ground in front of you. Eventually you will stumble upon one. Have your camera ready; a bird that relies on motionless invisibility for survival will prove quite amenable to a photo shoot!

For further information contact Dr Michelle Jackson at michellegooch@gmail.com or Dr Kathy Martin at kathy.martin@ubc.ca.

Market demands for certification of forest ecosystem services



Forest ecosystem services are the benefits that people receive from forest ecosystems. These vital benefits include social benefits such as recreation, ecological benefits such as carbon storage and goods such as timber and byproducts. Forests store carbon and help mitigate climate change. Many forest watersheds regulate water quality for drinking water and irrigation purposes. Tropical forests are habitats for many unidentified plant species with potential medicinal properties. For such reasons, many countries have environmental policies and regulations to protect their forest ecosystems. Despite such regulatory enforcement, many countries still suffer from rapid forest degradation and deforestation. This is particularly true in developing countries but is also a real threat to the entire globe. As the world population escalates, there is increasing pressure to find effective approaches to maintaining and conserving forest ecosystems globally.

Market-based instruments are considered one part of these approaches. Economists and policy makers consider market-based instruments more effective and cost efficient than conventional regulations and policies. A popular example is a scheme of payment for ecosystem services (PES), where buyers pay sellers for the provision of ecosystem services. In Lombok Island, Indonesia, for instance, the residents in Mataram City depend on water from the watersheds of Rinjani Mountain. The residents of upstream communities living in the watershed

areas pay 1,000 – 2,000 Indonesian Rupiah (8 to 16 cents) per month for management of the upstream watersheds. The World Wildlife Fund (WWF) in Indonesia supports this PES scheme, and it intends to provide a monetary incentive for the upstream communities to protect the watersheds rather than legally enforcing the protection without an incentive. Other examples of market-based instruments are the water quality trading programs in the US and Australia. Under these mandatory programs, water users can either reduce water effluents (such as nitrogen or phosphorous) or emit the effluents by purchasing water quality credits from other users who are efficient in reducing emissions. These choices allow water users to be more cost efficient.

However, market-based instruments are by no means a solution to all the problems associated with ecosystem degradation and deforestation. As with any regular market, these instruments are vulnerable to market failures. A particular example is asymmetric information (imbalance of information) between buyers and sellers in the markets of ecosystem services. Because ecosystem services are intangible and hard to measure, buyers often have limited information on the quantity and quality of ecosystem services. In forest carbon markets, for example, it is hard for carbon credit buyers to measure the actual amounts of carbon in forests. Quantifying the provision of ecosystem services requires rigorous scientific methods, and

these methods are often too complex for non-experts. It is also hard for buyers to verify whether or not carbon credits have been issued by sacrificing the rights of local forest-dependent communities. Consequently, this limited information on the quantity and quality of forest carbon credits increases risks for credit buyers. Their credit liability is at stake if the credits overestimate the amount of carbon in a given forest, or if the credits come from contentious forests lacking social, economic and environmental safeguards. Such limited information affects the efficiency of the carbon markets by increasing the risks of trading carbon credits which, in turn, discourages buyers from participating in the markets.

Certification is a market-based instrument designed to mitigate the problems of asymmetric information. It is prevalent in conventional markets. For instance, car buyers learn about a vehicle's fuel efficiency by recognizing an energy efficiency certificate. Purchasers of organic product access information about the product's quality by recognizing a label of organic certification. However, would certification work for the markets of forest ecosystem services? The answer is not straight forward. Successfully implementing certification depends on several factors. An imperative is the existence of "market demands" for certification. In other words, it would be challenging to apply certification for the markets of ecosystem services if buyers did not want –or did not discern – certified forest ecosystem services, or if sellers could not benefit from certification (eg, no price premium for certified forest ecosystem services). Clearly, a market study is a preliminary step in examining the feasibility of implementing certification for the markets of forest ecosystem services.

Wanggi Jaung is a doctoral candidate under the supervision of Dr Gary Bull in the Department of Forest Resources Management. Wanggi's research involves analyzing market demands for certification of forest ecosystem services in collaboration with the Center for International Forestry Research (CIFOR). This research is the

market study component of CIFOR's project, entitled "Forest Certification for Ecosystem Services (ForCES)". The project is led by the Forest Stewardship Council and funded by the UNEP-GEF.

This market research study aims to analyze both "sellers" of ecosystem services (to estimate demands for certification) and "buyers" of ecosystem services (to estimate demands for certified ecosystem services). The project involves both global and regional demand studies. The global demand study analyzes certification demands of sellers of ecosystem services who are project developers of forest ecosystem services and forest owners. The global study focuses on 3 forest ecosystem services: (1) protecting forest watersheds, (2) storing forest carbon, and (3) conserving wildlife habitats for forest biodiversity.

The regional demand study will include an analysis of certification demands of buyers of a watershed protection service as a case study by examining the buyers of a scheme of PES in Lombok Island, Indonesia. WWF-Indonesia will collaborate on these regional studies as a project partner. The research results are expected to be available in early 2015. Certification becomes a feasible instrument to mitigate asymmetric information between buyers and sellers of ecosystem services, only when both buyers and sellers demand certification. The results of this research will contribute to a better understanding of the feasibility of certification implementation in the markets of forest ecosystem services.

For further information, please contact Wanggi Jaung at w.jaung@cgjar.org or Dr Gary Bull at gary.bull@ubc.ca.



Orangutan in an Indonesian rainforest



Carbon in wood-framed houses

The forestry sector plays an important role in climate change due to its ability to act as a carbon source or a carbon sink. The major carbon pools within the sector are forests, harvested wood products (HWP) in use and HWP in landfills.

Forests absorb carbon dioxide from the atmosphere through photosynthesis and can create a carbon pool by storing large amounts of carbon. The production of wood and paper products after harvesting incorporates much of this carbon into the final products. HWP are defined by the United Nations Framework Convention on Climate Change as “wood-based materials that, following harvest, are transformed into commodities such as furniture, plywood, paper and paper-like products, or used for energy”. This “delay” of carbon release creates the HWP in use pool. Retired harvested wood products are either recycled for alternative uses or sent to landfills. Carbon in the products sent to landfills does not degrade immediately and contributes to the HWP in landfills pool.

Carbon accounting is important for reporting purposes such as national and provincial level reporting for intergovernmental matters, mitigation strategy development and policy making. Carbon accounting is also important for studying quantitative analysis of the mitigation options and providing the scientific basis to support carbon policies, programs and projects.

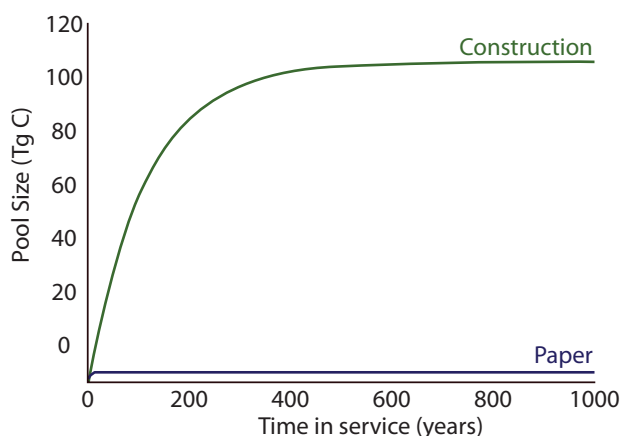
Although the pools of HWP in use and in landfills are smaller than those associated with forests, they are still substantial. According to the US National Inventory Report, the aboveground biomass of forests in 2011 was 14.6 Gt C. The HWP in use pool was estimated at 1.5 Gt C or 10% of the forest pool and the HWP in landfills was estimated at 1 Gt C or 7% of the forest pool. Recent research suggests that the pool sizes of HWP in use have, historically, been underestimated. However, uncertainties remain as the estimation processes used by these studies were not always transparent.

Forests constitute the largest carbon stock in most

countries and this is where most of the forest sector carbon accounting research has been focused. However, data show that over the long run, a given forest area is considered to be carbon neutral. During shorter periods, and due to disturbances such as severe wildfires or pest and disease outbreaks, forests may act as carbon sources. During other periods of recovery or growth, they will provide carbon sinks.

Harvested wood products play an important, but largely unrecognized role, in climate mitigation. Enhancing carbon sinks and reducing carbon emissions are the 2 major climate mitigation strategies. Fossil fuels are a non-renewable resource and can only provide a one-way carbon flow to the atmosphere. In addition to providing the carbon pools, HWP are less energy intensive and can be used as substitutes for fossil intensive products and fuels. Increasing the use of HWP addresses both mitigation strategies and quantifying harvested wood product pools more accurately could prove to be very beneficial.

For many nations, about half of the harvested wood products end up in long-lived uses, such as construction, with the remainder being converted to products with shorter lives, such as paper and packaging. In North America, wood-framed construction dominates the housing market, with about 90% of residential houses built from wood. Harvested wood products in wood-framed houses are one of the longest-lived products in use with a service life (in the US) estimated to be about 80 years by the US Forest Service. In contrast, the service life of short-lived HWP, such as paper, has been estimated by the Intergovernmental Panel on Climate Change to be 2 years. A longer service life indicates a longer “delay” in the release of carbon to the atmosphere and therefore a larger carbon pool is created for that product. It also results in the carbon pool taking more time to saturate, which means that the HWP pool acts as a carbon sink for a longer period. Estimating the size of a real-life HWP pool and modelling its behaviour over time



Comparison of HWP pools for paper and construction using a same carbon input scenario.

is rather complex. A same input scenario can simplify these concepts by assuming a fixed and equal annual input of 1 Tg C for a construction product (with a service life of 80 years) and paper (with a service life of 2 years). The graph (above) shows that, in this scenario, construction wood products provide a much larger equilibrium carbon pool size than paper (116 Tg C vs 3.4 Tg C) and a much longer sink period (approx 650 years vs 15 years).

Because a larger proportion of HWP ends up in wood-framed houses with a comparatively long service life, this pool is worth quantifying first. The basic approach used to quantify the carbon stocks of HWP in wood-framed houses is illustrated by the figure (below).

Dr Paul McFarlane (Department of Wood Science) and his research team are using US housing data, which is considered to be the best publicly available information, to quantify the

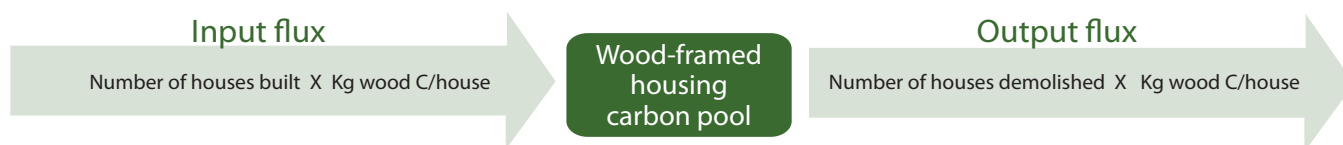
HWP in use pool. They have estimated the average mass of wood consumed per house in the US from 1950 to present. The housing starts by year are reported by the US Census from pre-1920 to present and the American Housing Survey reports housing units remaining from 1985 to present. The annual number of houses demolished is not published and the decay kinetics of wood-framed houses must be modelled to estimate these values.

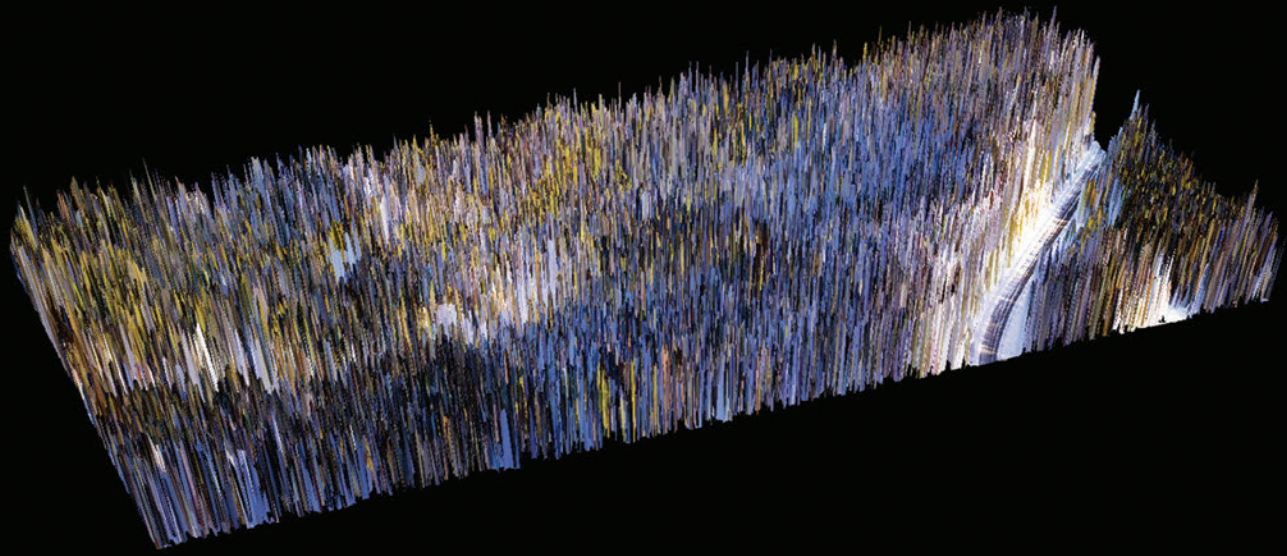
The contribution of wood-framed houses to the total housing stock and their service life varies among nations. Several models have been proposed to describe their decay pattern and this project (funded by the Pacific Institute for Climate Change) will determine the best model for the decay pattern of North American wood-framed houses.

The research team, including masters student Sheng Xie is tackling this project in 4 stages:

- 1 the current state of the knowledge will be established by reviewing the literature on HWP accounting approaches, decay models of HWP in use and estimations of the parametric values of the models;
- 2 the decay pattern of wood-framed houses in the US will be modelled in a transparent manner and a standard methodology for developing these models will be proposed;
- 3 the decay patterns of wood-framed houses in Canada and selected countries that have adequate and accessible data will be modelled;
- 4 the carbon stocks of wood-framed houses in the US, Canada and selected countries will be estimated and a sensitivity analysis of different decay models will be undertaken.

For further information, contact Sheng Xie at sheng.xie@alumni.ubc.ca or Dr Paul McFarlane at paul.mcfarlane@ubc.ca.





3-Dimensional representation of a forest as obtained from LiDAR and high-resolution aerial photography

Remote sensing and hydrology

Insights into the beetle infestation

More than a decade after the massive mountain pine beetle (MPB) infestation erupted in the lodgepole pine forests of British Columbia (BC)com, controversies about its environmental and social impacts still remain along with the 18 million hectares of dead stands currently dominating the interior landscapes of the province. With most of the affected area lying within the Fraser River basin, stakeholders are particularly concerned that such a large-scale recession of forest cover could substantially affect streamflow regimes and lead to flooding events potentially able to reach as far as Vancouver's lower mainland. However, while unusually high streamflow episodes have been observed in diverse watersheds within

the MPB-infested region in the past decade, researchers have not been able to accurately and systematically quantify the role of MPB in those increases. The reason is simple: it is not feasible to run observational experiments in extensive areas under the influence of multiple and complex — often counterbalancing — meteorological, biological and hydrological processes.

What is the alternative? Computer models previously validated with real data are, currently, the only means to obtain answers. Hydrology has a long history of using mathematical models to evaluate the effects of land-use changes on individual or aggregate components of the hydrologic cycle. Unfortunately, the unprecedented

extension of BC's MPB infestation and the gradual effect of the insect on forest structure have emphasized the current limitations of hydrologic modeling more than ever before. Most models are only adapted to evaluate the complete removal of vegetation and cannot adequately represent the spatial variability of a canopy layer subject to a slow and heterogeneous degradation. This is principally because up to a few years ago we did not have the technology to estimate the variables representing forest structure over continuous, large areas. Nowadays, the combined strengths of airborne and satellite remote sensing data are increasingly contributing to overcome many of these limitations.

Andrés Varhola's recently completed PhD project from the Integrated Remote Sensing Studio (IRSS) at UBC's Faculty of Forestry was focused on the characterization of forest structure specifically for hydrologic modeling applications in the context of MPB-induced tree mortality in BC. Andrés initially focused his research first on reviewing existing hydrologic models suitable for the local hydroclimate regime and identifying the forest structure variables linked within the models to the key physical processes driving the hydrologic regime (e.g. radiation attenuation, snow interception, wind speed reduction). He found that most of the available models use 4 specific variables to represent vegetation: leaf area index, tree height, canopy cover, and sky-view factor.

Secondly, Andrés developed methods to obtain variables from Light Detection and Ranging (LiDAR) data collected over ground-truth plots in Baker Creek, close to Quesnel (BC). LiDAR is a remote sensing technology that uses infrared pulses to estimate the distance to a target object. Downward-looking LiDAR sensors mounted on aircraft now constitute a popular method to characterize vegetation by taking advantage of millions of pulses that result in 3-dimensional point-cloud representations of the canopies, from where a number of metrics can be extracted. Through diverse methodologies, Andrés was able to obtain accurate estimates of all 4 metrics currently required by physically-based hydro-

logic models. However, since LiDAR does not necessarily provide wall-to-wall coverage of entire watersheds and the cost of acquisition remains relatively high, further methods were required for extrapolations to the wider landscape.

Landsat Thematic Mapper satellite data, covering the entire globe every 16 days with a spatial resolution of 30 m, can also provide rich information about vegetation characteristics. The third phase of Andrés' project consisted of correlating the 4 structural variables obtained from LiDAR with dozens of vegetation spectral indices calculated from Landsat cloud-free data. The extensive LiDAR coverage enabled him to develop a very large sample for this purpose, including more than 12,000 synthetic hemispherical photos (from which leaf area index and sky-view factor could be directly estimated) strategically distributed to cover the full range of stand types in the study area. As a result, for the first time in hydrologic modeling (to our knowledge), he was able to produce maps showing the actual pixel-by-pixel distribution of the 4 relevant forest structure metrics. The improvement of hydrologic predictions based on these fully-distributed metrics is yet to be tested and is part of ongoing research at the IRSS.

The final part of Andrés' project involved re-evaluating the relationship between snow indicators and plot-level forest structure metrics obtained from remote sensing. By using numerous low-cost ultrasonic snow depth sensors located in open areas and under the

canopies of stands with different MPB infestation stages, Andrés was able to obtain better estimates of peak snow water equivalent and snow ablation rate. His results confirm that in the interior plateau of British Columbia, a loss of forest cover will result in an increase in snow accumulation in winter and faster melting rates during spring. More importantly, the results of this study suggest that combining the enhanced accuracy of both LiDAR and ultrasonic sensors to estimate forest structure and snow indicators, respectively, is fundamental to identifying statistically-significant relationships between the variables. This finding has the potential to substantially improve simple, plot-level empirical models predicting snow accumulation and ablation from forest structure — one of its major drivers.

Andrés Varhola completed his PhD thesis under the supervision of Nicholas Coops in August 2013 and has since been awarded the Best Doctoral Thesis for 2013 from the Faculty of Forestry. His research has resulted in 6 peer-reviewed publications (co-authored by Markus Weiler, Dan Moore, Sarah Boon, Christopher Bater, Pat Teti, Younes Alila, Dan Bewley, Gordon Frazer and Jens Wawerla). Funding was provided by the Forest Sciences Program and the Natural Sciences and Engineering Research Council of Canada. For more information please contact Dr Andrés Varhola (avarhola@alumni.ubc.ca) or Dr Nicholas Coops (nicholas.coops@ubc.ca).



Low-cost prototype ultrasonic snow depth sensors developed for the project



Forest industry transformation

Forest businesses across Canada face the issue of remaining competitive in today's business environments and moving towards the adoption of more sustainable business models. Several stakeholders including industry professionals, research institutions and provincial and federal governments are exploring new "transformative" initiatives for dealing with this twofold challenge.

At the core of this challenge is a question that captured the interest of Alvaro Madero, an MSc student in the Faculty of Forestry. Alvaro has been looking at how different forest businesses explore transformative initiatives inside their organizations. The goal of his research is to advance an understanding of the drivers of forest business transformation, and in so doing provide additional insight towards improving the competitiveness of the Canadian forest products sector.

The outlook for the forest sector takes on a different dimension when looking at the current global trends shaping the forest products industry. These emerging trends have started to transform the way in which forest businesses deliver value. A good example, on the solid wood side, can be seen with the large pieces of wood (such as radiata pine) coming from tropical and lower latitudes. Such wood flows are now used in many high-demand, low-value applications such as concrete forming (in China for instance). Likewise, many other emerging demand-supply dynamics have alerted North Americans, particularly softwood producers, to look for higher quality niches within mid-to-long term horizons. On the other hand, the pulp and paper business is becoming very high-tech. Recent shifts, such as new fibre flows from fast-growing plantations (eucalyptus)

and the movement towards digital newspapers and magazines (due to iPads/electronic devices), have deeply impacted the global dynamics of some types of market pulp. But perhaps the biggest transformation that is looming comes from the realm of the bio-economy. This first started when pulp producers included 'renewable power generation' as a new revenue stream. Now, we see the beginnings of a bio-chemicals, bio-fuels stage adopted by some pulp producers in Scandinavia. In the same way, nanocrystalline cellulose or microfibril commercial developments could soon be a reality. The prospects look both exciting and challenging for our forest sector.

The transformation of the Canadian forest sector can be better understood by looking at the different forest businesses and firms as the industry's building blocks. When these building blocks are aggregated they constitute the entire sector. Changes within each firm can produce an increased transformation for the whole forest industry. Ultimately, the major changes that occur within each company (or firm-level transformations) are what will determine the scope of the transformation of the whole sector.

This nested idea of transformation is by no means new. Alvaro's research integrates this into an exploratory framework for analyzing firm-level transformations in the forest products industry. The data collection component of this study is being carried out in phases. In phase 1 (current one), the information is gathered at a regional scale (British Columbia). Once this model is tested and adjusted, phases 2 and 3 can be conducted with larger populations at national and international scales respectively.



Old-fashioned beehive burner

Phase 1 consists of interviewing a sample of high-level industry executives from primary and secondary forest businesses in British Columbia. The data from these transcribed interviews will be analyzed with NVivo 10 software, using a mix of pre-defined and emergent coding schemes. The research participants in this exploratory phase are industry executives directly involved in leading business transformations. The executives were selected from both public and private forest businesses that have been in the marketplace for a minimum of 20 years.

The interviews were conducted between November 2013 and January 2014, and data is currently being analyzed. Participants in the study included individuals in positions such as Chief Executive Officer (CEO), Principal, Chief Financial Officer, Senior Vice Presidents and Vice President and other senior positions. Sixty percent of these executives either sit on the Board of Directors of their companies, or lead the formulation of strategic initiatives. The remaining 40% of the executives have either proposed new strategic initiatives to the Board/CEO in the past, or were actively engaged in this when the interview was held.

Early results reveal information about what industry executives consider as key enablers (drivers) of business transformations in the forest industry. The list of transformation enablers identified through this research includes a range of factors directly linked with the type of culture and governance structure of businesses; as well as a second set of factors which facilitate the startup process of transformative initiatives. Among the transformation enablers associated with the embedded culture (core values) and governance style of companies (CEO-driven, Board-driven, etc), preliminary results highlight the importance of having an entrepreneurial mindset at the senior management level, tolerating mistakes after choosing unsuccessful alterna-

tives, promoting a long-term view, obtaining active support from the Board and communicating the vision and values across the entire organization. With respect to a second set of enablers that are linked to better execution of transformative initiatives, early results underscore the role of providing the optimal access to capital, finding the right partners early in the process of transformation, having the skills and people needed, providing the proper policy and legislation support, executing the transformation at incremental steps, performing systematic benchmarking and technology screening, among others.

The qualitative nature of this research facilitates an in-depth view of the cultural and technical aspects considered crucial by key decision makers leading firm-level transformations. Regardless of how forest businesses have transformed in the past, whether it was by means of expanding their product portfolio; or by becoming highly efficient in what they do; or even diversifying their markets and geographic operations; this study illustrates the importance of the institutional culture as an essential driver in facilitating major changes across firms. Creativity and openness to new proposals should continue to be encouraged as a way of finding new avenues for creating value. As mentioned by one of the participants referring to the discipline and the mindset required to succeed when transforming: "I think it's [business transformation] an entrepreneurial initiative and we need to see it that way... We need to recognize that there is no silver bullet, no easy answer... It's an entrepreneurial initiative, as simple as that." (Senior Executive 2013).

Alvaro Madero has been supervised in developing this exploratory model by a multidisciplinary team including Drs David Cohen, Shannon Hagerman and John Innes (research supervisor). For further information, contact Alvaro Madero Marquez at alvaro.madero@alumni.ubc.ca.



Modern bio-refinery facility

development & alumni news

Donor support strengthens student recruitment

"I tell the students that it's more than trees," laughs Andrea Lyall, the Faculty's Aboriginal Initiatives Coordinator. Thanks to a generous gift from Sue Johnson, Andrea's ability to open Aboriginal high school students' eyes to the possibilities of a UBC Forestry education have improved dramatically.

"It's very satisfying to see students, parents and high school teachers understand the value in having more Aboriginal students involved in land management and making decisions about natural resources," Andrea says. "UBC is helping create leaders for our communities."

In 2013, Andrea visited 12 BC communities to share her story as a UBC alumna and RPF with 15 years of experience in operational forestry, aiming to inspire Aboriginal youth. In the Lower Mainland, Sandra Ramsden and Ashley Dobko, both Aboriginal students in their fourth year of undergraduate studies, accompanied Andrea on high school visits.

"Sandra and Ashley said, 'Let's wear plaid and be approachable!' and that made a huge difference in our visits," Andrea says. "It was easier for them to relate to each other as learners; it was less intimidating."

In addition, 2 new videos show Aboriginal students what it's like to study forestry at UBC and the types of job opportunities waiting after graduation. To view these short videos and to find out more about the Faculty's Aboriginal initiatives please visit <http://aboriginal.forestry.ubc.ca/>.

Sue Johnson is a longtime friend of the Faculty, having previously made gifts that created the Charlie and Sue Johnson Cabins at Loon Lake, established an entrance scholarship, and supported Dr Yousry El-Kassaby's research.

Sue was motivated to support this Aboriginal recruitment initiative by her belief that everyone should have the opportunity to achieve their potential. "I wanted to



try to remove some of the barriers to Aboriginal students attending UBC, including feeling like a university education is beyond them, or not knowing what opportunities are out there."

Andrea shares this belief. "There's a lot of potential for Aboriginal students who come to UBC Forestry. Our alumni are succeeding in a wide range of land management, conservation, and forestry jobs, and they are making positive change in their communities," she says.

In addition to the Faculty's direct recruitment activities, this initiative includes a plan to bring in experts in the field to the UBC Vancouver campus, to foster mutual learning and stronger relationships. Funding will also be available to student groups who want to work directly with First Nations on a project to benefit their community.

Sue is characteristically modest about her gift. "Money is there to help the next person.

You pass it on to help someone else if you are lucky enough to have more than you need," she says.

To learn more about how you can support the Faculty's Aboriginal initiatives, or any other aspect of our strategic plan, please contact Emma Tully, emma.tully@ubc.ca or 604-822-8716.

“Money is there to help the next person. You pass it on to help someone else if you are lucky enough to have more than you need”

Alumni in action

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

Matt Wealick, BSF 2001

Forestry alumnus finds success in Chilliwack Valley



A Forestry alumnus who grew up in a small village on Vancouver Island has received the Joint Venture Business of the Year Award on behalf of Ts'elxwéyeqw Tribal Management, a Chilliwack-based management services provider owned by seven First Nations communities.

Matt Wealick, BSF'01 and RPF, accepted the award at the BC Aboriginal Business Awards on December 5, 2013, in Vancouver. As the Chief Operating Officer of Ts'elxwéyeqw Tribal Management, Matt oversees 6 businesses with the support of 9 core and up to 10 part-time staff. The company manages 5 forest licenses: two of its own and 3 belonging to other First Nations.

Matt's interest in forestry started young, growing up in the small community of Sayward on central Vancouver Island. "My dad, my stepdad, and many of my mom's siblings worked at MacMillan Bloedel," he says. "When I was a kid, I thought logging trucks and machinery were pretty cool. So when I was old enough to work in

the summer, I started at a shake block company."

Matt's path to UBC wasn't a direct one, however. "I went to the University of Saskatchewan for a year, studying physiotherapy" he says. "But I realized I didn't have the connections in the field that would allow me to have a good career. And after I spent a summer doing forest engineering work, I knew I had to go to UBC."

After graduation, working with Lennard Joe, BSc NRC '97 and a fellow BC Aboriginal Business Award recipient, gave Matt a more solid grounding in Aboriginal forest management. With 2 years of varied consulting work under his belt, Matt struck out on his own and worked with major forestry companies as a consultant for several years.

In 2005, just after Matt received his RPF, he was asked to apply for the newly-created forest manager position with the Ts'elxwéyeqw Tribe in Chilliwack, his tribal home. "I had been sending the chief a letter once a year for many years, suggesting that the tribe get into forestry," he says. "For a long time, the

“My time at UBC as a student was great, and I appreciate the opportunity to give back”

answer was always ‘no thanks’. But that year the answer was ‘yes’.

Matt embraced the opportunity to build a forest company from the ground up. He became involved in every aspect of forestry, as well as areas that aren't in the typical RPF scope of practice, like Aboriginal rights and title, traditional and cultural use, and capacity building. An example of this is the Qwō:qwel website, which gives members of Ts'elxwéyeqw Tribe communities a way to voice their opinions about Kinder Morgan's proposed pipeline expansion.

Matt sits on the Faculty of Forestry First Nations Council of Advisors where, he says, "our main objective is to encourage more Aboriginal students to become interested in forestry. We give input on the needs of industry -- there are lots of great opportunities out there -- and suggest ways to add Aboriginal content to the curriculum," he says. "When you graduate from UBC and get a job working for a First Nation, you can be managing a forest license right out of the gate. It's an amazing experience."

He adds, "My time at UBC as a student was great, and I appreciate the opportunity to give back."

Matt is also a Director and the Aboriginal Committee Chair of the Truck Loggers Association, where he develops relationships between small licensees and contract loggers, and First Nations. "I see my role as making connections between First Nations and the forestry industry," he says.

UBC Forestry Alumni Reception at the ABCFP Forestry Conference – Kelowna

On February 13th, 2014, Dean John Innes hosted an evening reception for UBC Forestry alumni and guests. The reception was held during the ABCFP annual Conference and AGM in Kelowna, British Columbia, at the Delta Grand Okanagan Resort. The evening marked the fourth consecutive year that our Faculty has partnered with the ABCFP for an alumni event during their annual Conference and AGM. The Dean engaged the crowd by recognizing each graduating class starting from the 1940s up to the graduates of 2013 – over 70 years of forestry knowledge in one room.

With our alumni spread across the Province this type of event provides a wonderful opportunity to bring alumni together to catch up with old friends and make new connections. Thank you to the ABCFP for their partnership around this event, which has grown year over year. And thank you to all of the alumni for joining us!



Mark your calendars for the following events:

- Sunday, April 27, 2014 – **UBC Forestry Alumni and Friends BBQ & Tour** at the Malcolm Knapp Research Forest at Loon Lake. Keep an eye out for your invitation by email or in the mail. All alumni, family and friends are welcome to this weekend event. We hope to see you there!
- Saturday, May 24, 2014 – **Alumni Weekend**, UBC Point Grey Campus, Vancouver, BC. Join us for a day full of fun and activity for the whole family. Stay tuned for more information at www.alumni.ubc.ca/events/alumniweekend/.
- Friday, July 4, 2014 – **UBC Alumni Event at the Calgary Stampede**. Dust off your best western duds and come experience the Calgary Stampede in style at the 3rd annual alumni UBC Stampede event! New this year, join us for a wine tasting (3 wines), wine presentation and buffet lunch at the Wine Garden in the Western Oasis followed by action at the World's Richest Rodeo. That's right – Wine AND rodeo!

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

Newsletter production

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