

# branch lines



**Forestry**  
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## Investing in the future

**Graduate education and research in the Faculty of Forestry**

**G**RADUATE EDUCATION – the advanced training of tomorrow’s scientists and leaders – is a critical part of our mandate in the Faculty of Forestry, and one in which we are particularly successful. In addition to developing top-notch disciplinary expertise, our graduate students are exposed to issues and ideas across the spectrum of forestry, and so leave with the specialized training and broad understanding needed to develop creative solutions to the complex problems they will face in their careers.

We currently have 260 students enrolled in our graduate program, more than half of whom are doctoral students. Ninety-percent of our Masters students are also engaged in research, in our regular or research-intensive Masters programs. These students are engaged in research that runs the gamut of forestry-related topics which our faculty members investigate. We also offer course-based programs in forestry, forests and society and a sustainability and business specialization MBA in conjunction with the Sauder School of Business. We are also actively working on the development



**Ajith Chandran** and **Monika Singh** met while working in a remote interior tribal area of Western India. Several years later they married, but worked in different parts of the country. It was during these years that they thought about pursuing doctoral programs abroad and individually selected UBC and John Innes' research group for their studies. Interestingly, they are now working together on the project 'common knowledge, values and perceptions of sustainable forest management held by First Nation's communities'. Both plan to continue to work at an international level with the disadvantaged communities after they complete their studies in British Columbia.



Monika Singh (left) Interviewing with a tribal woman in India. peoples' cultural practices in India and Canada that could be transferable to other cultures and countries.

# Monika Singh

## by Ajith Chandran

MONIKA SINGH HAS a Bachelor's degree in geography from Delhi University, India. She studied social work (development studies) for her Master's at Tata Institute of Social Sciences, Mumbai, and was awarded a gold medal for her degree in 1991.

Monika had been working in India on indigenous peoples' issues for 15 years when she felt that it was time to explore indigenous issues in other parts of the world. Graduate studies seemed like a logical step. While attending a World Forestry Congress in Quebec, Monika stopped at the UBC booth and learned of the work of some of the professors in the Faculty of Forestry. She later made contact with Dr. John Innes and met him at different international conferences before beginning a doctoral program under his direction in 2007.

As a part of her doctoral thesis, Monika is looking at people's relationship with forests, specifically indigenous forest management systems in India and Canada. Her research will look at the similarities and differences in the livelihood needs of the forest-dependent communities of India and Canada. Monika explains that it is important to understand the people and forest relationships in order to make policies that are more sensitive to people's needs. Her research will identify the sustainable forest management attributes of indigenous

Monika is also involved with a research project on 'common knowledge, values and perceptions of sustainable forest management held by First Nation's communities'. The aim of this research is to develop a tool for assessing values and perceptions of communities to be incorporated in defining and refining criteria and indicators for assessment of sustainable forest management. In addition, as a member of CIFOR's Poverty and Environment Network, a global network working on a common database on forestry and livelihood, she is involved with research on forest and poverty linkage with a field base in tribal areas of India.

Once her graduate studies are completed, Monika is keen to use her research findings to make a positive difference in lives of disadvantaged and poorer communities. She would like to work towards ensuring that community needs and perceptions of forest management are synchronized with forest management plans and implementation practices. Having joined local networks such as the British Columbia Community Forestry Association and the Socio Economic Extension Working Group of FORREX, as well as global groups such as the IUFRO task force on Traditional Forest Knowledge and The Commonwealth Forestry Association, she hopes to further these goals and contribute to making pro-poor policy and programs.

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# Ajith Chandran

## by Monika Singh

AJITH CHANDRAN IS A doctoral student from India. Interested in doing graduate studies away from home, Ajith explored universities in Britain, Australia and the US before deciding on the Faculty of Forestry at UBC. His first contact with UBC was with John Innes, who has since become his research supervisor. John and Ajith met through the IUFRO conference held in Brisbane in August of 2005. It was at this conference that Ajith first learned about some of the First Nations issues in Canada and was inspired to apply to the Faculty of Forestry for graduate studies in the area of community forestry and forest management. He had already completed his postgraduate studies at the Indian Institute of Forest Management and had earned a certificate in Environment Management as a Chevening Scholar at the University of Bradford, UK.

Ajith's general interest is in the area of development. More specifically, he is concerned with sustainable forest management and its benefits to the community. As part of his doctoral studies, Ajith is working on two research projects, one of which is the identification of management indicators for the Yukon. This project is aimed at developing a hierarchy of indicators for different levels of forest management in the Yukon. These indicators will form the basis of a State of Yukon Forest Report which will help in planning and monitoring on a periodic basis.

Ajith's second project concerns the values and perceptions of sustainable forest management (common knowledge) held by First Nations communities in British Columbia. He is testing a method known as the Q-Method for assessing qualitative methods of monitoring that can be incorporated into local forest management plans. The aim of this project is to help First Nations communities identify criteria and indicators that reflect values and perceptions important to them. Although this research involves First Nations based in Canada, Ajith is quick to point out that the situation here is not dissimilar to India where indigenous knowledge, values and perceptions also need to be given importance in local

planning and in framing policies at the state and national level. Ajith is currently a member of the British Columbia Community Forestry Association and the Socio Economic Extension Working Group of FORREX. Through these groups, he hopes to contribute to issues that he is deeply concerned with and whose aims he strongly endorses.

Ajith's life goal is to be able to make some of the world's disadvantaged people more economically and socially resilient. He hopes to graduate from UBC with a broader perspective on sustainable forest management and its benefits to the community in terms of overall development. With his more than fifteen years of work experience and his newly gained perspectives, Ajith feels that he will be in a good position to work with agencies in developing countries. He is also part of CIFOR's Poverty and Environment Network that is looking at global relationships between environment and poverty. As part of his networking endeavour, Ajith has initiated a newsletter called INFOMEETS to help people connect and participate through various international conferences on this topic.

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Ajith Chandran (right) conducting a Participatory Rural Appraisal with tribal community in India.



## Natalia Vidal and Wellington Spetic

both studied forestry in Brazil before moving to Vancouver for doctoral studies in the Faculty of Forestry. Natalia's research on corporate responsibility in the forest sector involves industries and organizations in Canada, the US and her home country of Brazil. Wellington is investigating BC, New Zealand, Chile and Brazil's forest industries as part of a benchmarking study on competitiveness and sustainability.

# Wellington Spetic

by Natalia Vidal

WELLINGTON SPETIC HAS A Bachelor's degree in forestry from the University of São Paulo, Brazil. Right after graduation, Wellington had the opportunity to have some hands-on experience by working in the forest industry for 4 years. "I consider that learning period in the industry a tremendous contribution to my professional and personal growth," he says. It was during that time that he also felt the need to extend his education and experiences beyond forestry boundaries: he got a diploma in finances concurrently with the job duties of the company. However, that was not enough. With previous international experience from internships in the United States and Germany during his undergraduate years, Wellington was not only looking for multi-disciplinary training, but he also wanted to apply this training to international contexts. It

seemed the right time to leave the industry and Brazil and to venture into graduate school abroad.

The best academic resources and the most welcoming work and living environments were top requirements for Wellington in his

search for a university in North America. After considering other options in Canada and in the United States, UBC's Faculty of Forestry stood out as a perfect fit. Wellington came to UBC in 2000. "Since then, the dream of expanding my knowledge beyond forestry with a multi-disciplinary education as well as using such knowledge to do research on Canada and on international scenarios has definitely come true," he says.

From 2001 to 2003, Wellington worked under the supervision of Professors Rob Kozak and David Cohen obtaining a Master of Science in forest products marketing. Since 2004, Wellington has been working on his doctoral program in sustainable business management with Professors Rob Kozak and Thomas Maness. Wellington is now in the final year of his PhD program. His research project involves long-term factors of competitiveness and sustainability issues of forestry industries operating in different producing regions of the world. As well as looking at how BC can evolve to a more value-focused forest sector, Wellington is investigating New Zealand, Chile, and Brazil's industries as part of a benchmarking study.

Wellington is applying qualitative and quantitative research strategies to study the relationship between the industries' long-term competitiveness and environmental and social sustainability. His work involves personal interviews, case studies and survey research. "Additionally, I will be looking more closely at the competitiveness-sustainability link by studying recent inflows of 'Socially Responsible Investments' into two of Brazil's resource industries, forestry and bioenergy," Wellington explains. This is the last phase of his PhD project and part of a recent Doctoral Research Award from the Government of Canada's International Development Research Centre.

As far as future plans are concerned, Wellington's major objective is to pursue an academic career. "Ultimately, a professorship in a North American university and, for that, I would have to put UBC as my top priority once again." For the immediate future he is considering a postdoctoral or visiting scholar position related to his doctoral research. "Ideally, any opportunity to sharpen grant-writing and teaching skills, as well as to expand my personal research networks would contribute to an even smoother transition into a new career."

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# Natalia Vidal

by Wellington Spetic

NATALIA VIDAL, CHOSE THE UBC Faculty of Forestry for her doctoral studies due to a combination of factors. During her forestry undergraduate program at the São Paulo State University, Brazil, Natalia did international internships in Argentina and in the United States. Considering the added value of those two experiences, Natalia saw graduate studies at UBC as an opportunity to have an excellent education while gaining international experience. In her opinion, the access to knowledge, expert supervision, infrastructure, and the chance to interact with students and professionals from a wide range of cultural and professional backgrounds made the UBC Faculty of Forestry a top choice.

Natalia is part of the Sustainable Business Management Lab. Like most students and researchers in the lab, Natalia's research is interdisciplinary. "In interdisciplinary research, there is rarely a person who is an expert in all areas of what they are studying. We need to be constantly interacting with people working in related areas", she says.

Natalia studies corporate responsibility in the forestry sector under the supervision of Dr. Rob Kozak. Corporate responsibility is often considered as the integration of environmental and social concerns into every-day business practices. Natalia's doctoral program evolved naturally from her Master's research. While studying forest certification, Natalia became aware of a much broader area that encompasses and surpasses the principles of transparency, legality and accountability that are part of certification programs. In some ways, corporate responsibility usually requires a more fundamental change in strategic aspects of businesses. Nonetheless, in her opinion, forest certification, along with responsible procurement policies, is still the main manifestation of responsible behavior in global forestry sectors.

"As a sector that has direct and visible environmental impacts, the forestry sector is an easy target for public



criticism. I believe we need to first understand how a concept like corporate responsibility spreads within this sector before we can effectively promote more responsible behavior among forest companies," Natalia says. Based on this idea, Natalia's research aims at providing a map of how corporate responsibility practices diffuse within and between forest companies, the conditions necessary for diffusion, as well as the drivers leading to the adoption of corporate responsibility practices.

Natalia has developed a three-phase research project. First, she conducted an investigation of how forest companies understand the concept of corporate responsibility and how this concept has been evolving within the sector. She noticed that while environmentally related practices have been the main focus of corporate responsibility, emphasis on socially responsible activities has been increasing. She thinks that this might indicate a shift toward a more holistic approach to corporate responsibility; one with greater balance between social and environmental activities.

For the second and third phases of her research, Natalia has been interviewing 15 forest companies and 10 forestry-related organizations spread across Canada, the United States, and Brazil. Through these interviews she expects to find out how corporate responsibility flows within the sector, how forest companies adopt, communicate, implement, and make decisions around this topic.

When I asked about future plans, she said "hopefully, more research." Natalia foresees a career in academia or as a researcher in private, government, or non-government organizations.

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**Julie Deslippe** and **Jocelyn Campbell** are doctoral students working with the Belowground Ecosystem Group, a research consortium that brings together faculty members and students with an expertise in belowground ecology and biology. Julie spent the summer working in Alaska looking at how microorganisms can affect arctic processes. Jocelyn's research is based in northern British Columbia's inland rainforests where she has been studying the causal factors behind the patterns of tree-dwelling cyanolichen communities.

# Jocelyn Campbell

## by Julie Deslippe

JOCELYN CAMPBELL IS A lichen ecologist. For the past 12 years her work has focused on the lichens of British Columbia's inland rainforest. These forests, on the windward slopes of Canada's spectacular Rocky Mountains, support diverse and abundant communities of rare tree-dwelling lichens. Beginning with her Master of Science degree and continuing during her work as a consultant Jocelyn's research in the tree-tops of the old and antique forests has led to important findings about the distribution and abundance of these rare lichen communities.

Although moisture availability is the primary determinant of regional floristic differences in lichen communities within the inland rainforest, Jocelyn's work led her to understand that site-level patterns in tree-dwelling cyanolichen communities can not be explained by moisture alone. Something more profound is controlling the presence and abundance of these unique components of the ecosystem.



On a hunch that the patterns were, at least in part, driven by site nutrients, Jocelyn sought the help of Dr. Cindy Prescott, a member of the Below-ground Ecosystems Group at UBC, because of her

expertise in forest nutrient cycling. In the fall of 2005, Jocelyn came to UBC to pursue her PhD under Dr. Prescott's supervision. Her focus is on understanding what drives patterns in tree-dwelling cyanolichen communities in the sub-boreal spruce biogeoclimatic zone and on elucidating the causal factors for these patterns.

Jocelyn has shown that cyanolichen communities are dependent not only on the host-tree species, but also on the species of tree under which they are found. Cyanolichen diversity and abundance is significantly higher on conifer saplings beneath poplar canopies than beneath any other tree species in this region. The reasons for the poplar-cyanolichen association are as yet, unknown. Jocelyn is currently measuring a suite of climatic and nutritional factors to help explain this relationship in four cyanolichen species.

When asked about how she sees the role of cyanolichens in forested ecosystems, Jocelyn is quick to point out the unique ability of cyanolichens to fix nitrogen from the air into useable forms for plants. Because many Canadian forests are nitrogen-limited, knowledge of what controls these nitrogen-fixing lichens is important for understanding longer-term ecosystem productivity. Although it has long been thought that cyanolichens may be locally important sources of nutrients to plants and thereby facilitators of vascular plant diversity, Jocelyn's experience and her research at UBC Forestry, has caused her to propose another view. Jocelyn proposes that the strong poplar-cyanolichen association that she observes constitutes a facilitative interaction, whereby the poplar trees ameliorate growth conditions for the cyanolichens. This view highlights the interconnectedness of all components of these complex wet-temperate forests.

Looking forward, Jocelyn notes that forest harvesting in the interior of British Columbia may increasingly target sub-boreal spruce stands in the post mountain pine beetle era. She points to recent research that has revealed extremely high diversity of non-vascular plants – particularly lichens – in these forests. As her career progresses, Jocelyn will continue her research on canopy processes in interior wet-belt forests with an aim to provide avenues through which our scientific knowledge may be applied to ecosystem-based forest management.

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# Julie Deslippe

## by Jocelyn Campbell



JULIE DESLIPPE IS A microbial ecologist with a passion for arctic environments. Her research on low arctic soil microbes takes her to Toolik Lake; a remote field research station located on the north slope of the Brooks

Range in arctic Alaska. There Julie investigates how microorganisms interact with one another and with plants and soil to affect arctic process. Although these microorganisms exist at very small scales, their activities have ramifications at very large scales, potentially affecting the carbon balance of the whole earth.

It was this interest in studying ecology at multiple scales – linking microbial function to ecosystem stability and resilience – that led her to Suzanne Simard’s lab in the Faculty of Forestry at UBC. Julie felt that Suzanne’s work in linking interactions between forest plants and their mycorrhizal fungi could be applicable to studying landscape-level plant-microbe dynamics in the arctic. Julie was also attracted to Suzanne’s lab because it is part of the Belowground Ecosystems Group; a research consortium that brings together a variety of people (4 faculty members and their associated students, post-docs and staff) with expertise in many areas of belowground ecology and biology.

Julie’s interest in arctic microbial ecology goes back to her days as a Master of Science student during which she evaluated the potential impact of climate change induced warming on nitrogen-fixing microbial communities. Julie’s current work continues to look at microbial function in the context of climate change. Using molecular techniques, she examines shifts in bacterial and fungal communities

with experimental soil warming. Julie has found that change in microbial community structures that result from climate warming are far greater than those expected due to normal seasonal variation.



*Russula pascua* mushrooms growing in low-arctic tundra.

Julie’s work goes beyond the response of microbial communities to climate change. Her research aims to evaluate the potentially significant role of microorganisms in carbon cycling and carbon sequestration in Low-Arctic tussock tundra. Julie uses stable isotope analysis to track the belowground pathways for recently fixed carbon. In this method, stable-isotope labeled carbon-dioxide is introduced to photosynthesizing plants in the field. As the labeled carbon dioxide is converted to sugars it circulates from the leaves to the plant roots and into the soil, where it becomes food for soil microorganisms. Julie then tracks the labeled carbon into the biomarkers of the soil microbes. Her results indicate that carbon fixed by plants through photosynthesis is rapidly acquired by mycorrhizal and root-associated soil fungi and certain fast-growing components of the soil bacteria community. This finding highlights the importance of microorganisms in carbon cycling in the Low-Arctic ecosystem.

The implications of Julie’s research are potentially far reaching. Anthropogenic climate change is here. We are already altering the earth’s ecosystems and nowhere is change so rapidly and dramatically felt as in arctic ecosystems. It is increasingly necessary to understand and to mitigate the responses of natural systems to climate forcing. Julie sees her work as part of a growing line of defense for sensitive ecosystems; working to identify keystone species and processes that underpin fundamental biogeochemical processes. Preserving physiological and biological features that sustain such processes may be the key to ensuring ecosystem stability and resilience as the climate continues to change in Low-Arctic environments.

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**Mariano Amoroso** was the key person who inspired **Julia Dordel** to do her doctoral research in his home country of Argentina. On Julia's first trip to Argentina Mariano was worried that she would get lost during the transfer from Buenos Aires to her study site 1500 km away and sent his father to meet her at the bus terminal. Likewise, Mariano's fieldwork may have not been possible without Julia's help. Julia used her connections at the University of Freiburg to help round up volunteers for Mariano's field work in Patagonia.

# Mariano Amoroso

## by Julia Dordel

WHAT MADE AN Argentinean graduate in agricultural engineering from the University of Buenos Aires select UBC Forestry for his doctoral studies? In the case of Mariano Amoroso this involved a long journey on a hard and stony road until he finally came to UBC, thousands of kilometres away from his motherland in the southern Hemisphere.

After finishing his undergraduate degree and working for a while, Mariano decided to leave his position as forest manager in north-eastern Argentina and follow his girlfriend to Seattle where she was attending university. Just getting to Seattle consumed most of his savings. Mariano spoke very little English at this point and decided to improve his opportunities by signing up for a three-month English class that also provided him with a student visa. By finishing top of his class Mariano was given a scholarship to cover an additional three months of instruction. Now, with his newly acquired language skills, Mariano took a job in the campus library to further improve his English. He advanced his skills sufficiently to apply for a Master's program in silviculture at the University of Washington (UW) where he studied growth and productivity of pure and mixed plantations.

Bruce Larson (now head of Forest Resources Management at UBC) was a member of Mariano's Master's committee at UW. When Bruce took up a new appointment at UBC Mariano decided to follow along for his doctoral studies,



Core sampling in Patagonia.

having heard about UBC's reputation as an international university and the Faculty of Forestry's diversity of research interests and experience.

Mariano's doctoral thesis addresses a topic critical to his home country: the decline of cypress (*Austrocedrus chilensis*) forests in Patagonia. His work involves understanding the stand dynamics of these forests with the ultimate goal of advancing forest conservation and management in cypress ecosystems. Limited financial support in developing countries has forced Mariano to plan his field seasons carefully. With help from Freiburg University volunteers, (mediated by his office-mate Julia Dordel), and help from the local people, Mariano has managed to complete his data collection in one long field season.

When asked why he chose UBC for his doctoral studies, Mariano points out that for him a PhD is not only about a research project but is also about the academic experience and scientific exchange. Mariano describes his experience at UBC as a rich one that has greatly increased his knowledge in the field of ecology and stand dynamics. Mariano plans to pursue an academic and research career in Argentina, applying the knowledge that he has gained where it is needed the most. To this end, he will be able to draw on the immense network of contacts that he has developed through scientific exchange, not only in Canada and Latin America but in the United States, Germany and other parts of the world. One of the reasons that Mariano plans to return to Argentina is, as he says, "because it's always good to be back home".

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# Julia Dordel

## by Mariano Amoroso

JULIA DORDEL WAS looking for academic and work experience in North America, something she always wanted to do, when she decided to come to UBC in 2001 as an exchange student from the University of Freiburg, Germany. Arriving in BC, Julia was impressed by the pristine nature of the forests. While on exchange, Julia worked for Dr. Michael Feller (Forest Sciences Department) as a research assistant in various parts of the province and fell in love with the beauty of BC's landscape. She went back to Germany to complete her undergraduate degree and had no hesitation in returning to UBC for her graduate studies.

After finishing her Master degree studying disturbance and ecosystem dynamics (Influences of mountain pine beetle, fire, and ungulate browsing on forest stand structure in the southern Canadian Rocky Mountains), Julia wanted to pursue two new goals: increase her knowledge of different ecosystems in the world, particularly tropical forests, and learn, once again, about a new language and a new culture. Julia wanted to move from the field of ecology to silviculture, an area where she could have more 'hands on' experience in her studies. She thought plantation forestry was a timely topic directly linked to current key issues such as the increasing demand on wood products and raw materials for bio-energy.

As part of our daily conversations in the office and after being asked by her about possibilities for conducting her doctoral research in South America, I told Julia about a Swiss-owned forestry company working in plantation silviculture in north eastern Argentina, close to the area where I used to work. After contacting the company and traveling to Argentina, she started developing her research project working with Suzanne Simard and Cindy Prescott in UBC's Department of Forest Sciences. Julia's doctoral research is focussed on increasing our knowledge about the initial growth of Australian red cedar (*Toona ciliata*) under different overstory species and densities. She is studying the light environment, nutrient

cycling and species interactions with the purpose of building response models to forecast future growth.

Julia has completed four field seasons in Argentina and traveled thousands of kilometres including a six-month scientific exchange back to the University of Freiburg. Julia describes her overall experience as extremely rewarding and emphasizes the help, openness and warmth of the people that she has worked with in Argentina and Germany. Working abroad has resulted in one of her most exciting and rewarding experiences; nevertheless, it has also provided some challenges. Securing funding for research in a new country was probably one of the most difficult tasks for Julia. She had further challenges in the arrangement of logistics for travelling abroad over vast distances. Then there were the challenges of language, cultural differences and the emotional and physical challenges of field work. All of this has taken an enormous amount of effort and commitment, but nothing that could have stopped such a passionate and perseverant person as Julia.

Julia will complete her doctoral thesis next spring. From there she plans to combine the knowledge she has gained from her Master and PhD projects in the fields of ecosystem management and silviculture. She believes that a combined approach will be crucial for successfully addressing issues such as global biomass demand in a sustainable manner, while minimizing environmental risk and externalities.

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Delivering field equipment in Argentina.

**Patrick Waeber** and **Shyam Paudel** spent their summer months in Haines Junction, Yukon, setting up experiments and gathering data for their doctoral theses. The Yukon is a long way from home for both of these international students who worked together as a team by day and shared cultural experiences in the evenings. Patrick describes Shyam as a devoted singer and Nepali flute player who could spice up any meal time with his dhal and curry. Much time was spent absorbing the magnificence of the St. Elias mountain ranges and in friendly debate over the relative splendors of their home country mountains in Nepal and Switzerland.

# Shyam Paudel

by Patrick Waeber

SHYAM PAUDEL GREW UP in the centre of Nepal. Surrounded by nature in the mountains, he was motivated to study forestry in his home country where natural resources are the main source of livelihood for rural people. From Nepal he travelled to the Netherlands for graduate work before deciding to join the UBC Faculty of Forestry in a doctoral program. Shyam was drawn to Canada by the country's massive forested landscapes. He describes the Faculty of Forestry as the right choice for him to work with a multidisciplinary international research team and gain international experience and exposure.

Shyam and Patrick spent this summer in Haines Junction, Yukon collecting data for their doctoral theses. Shyam's research involves sustainable forest management (SFM) in southwest Yukon in the context of recent climate changes, spruce bark beetle impacts and fire hazards. He plans to develop an ecological model for evaluating long-term forest management scenarios with respect to different levels of current and future disturbances and their impacts on socio-economic sustainability. Some of the questions that Shyam will be addressing include:

1. What are ecosystem responses of climate change and increased frequency and severity of disturbance events, i.e. forest fire and spruce beetle outbreak on the properties of soil?
2. In what way have rapid ecological changes affected the socio-economic conditions of the local people? How have local communities responded or would like to respond to the ecological and socio-economic changes?
3. What tools are appropriate for evaluating the effectiveness of forest management practices at achieving the objectives of SFM under rapid change of external conditions? What adaptive management frameworks are appropriate for better achieving the objectives of SFM under rapid ecological and socio-economic changes?

Shyam will use his findings to develop strategic forest management planning scenarios and to test current and alternative management frameworks for managing the forests of the southwest Yukon under predicted climate change. Such scenarios will be used to inform local practitioners of potential changes and the possible consequences of adaptive strategies.



Patrick (left) and Shyam (right) in the Yukon.

Shyam has more than 15 years of experience in the field of forestry and natural resources (especially with bamboo) in Nepal, China and many other countries where he has worked with government, bilateral and international organizations.

After his PhD degree, Shyam plans to combine his new knowledge gained at UBC with his international experience in teaching and research to pursue an academic career at a university in Canada or elsewhere in the world.

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# Patrick Waeber

## by Shyam Paudel

PATRICK WAEBER COMES FROM Switzerland where he graduated with a Master's in zoology from the University of Zurich. His graduate work on lemurs in Madagascar led him to be involved in the Madagascar Wildlife Conservation Organization as a supervisor for ecotourism and environmental education projects in the Alaotra-Mangoro Region. Patrick is also a coordinator for conservation and environmental education with the Jane Goodall Institute Switzerland. Never wondering what to do with his spare time, Patrick also serves as an editor of the peer-reviewed journal Madagascar Conservation & Development. In line with his strong interests in environmental conservation and development, Patrick decided to pursue further graduate studies at UBC Forestry. He was drawn by British Columbia's immense forest resources and by the Faculty of Forestry's broad and diverse scientific programs.

Patrick's research at UBC involves the development of a conceptual model to integrate the two scales (landscape and stand) of forest management planning and intervention in to one approach for forest biodiversity conservation. This project is based on the Yukon Strategic Forest Management Plan's objectives of maintaining or enhancing forest ecosystem function, supporting the ecosystem's natural processes, and promoting a forest industry within the region that is appropriately scaled to resource capacity.



Patrick in the field.

The study area, in the Champagne and Aishihik Traditional Territory region in the southwest Yukon, has been impacted by an increasing level of natural disturbance events, such as major beetle-infestations. Patrick hopes to find out how forest management practices can be adapted to minimize natural disturbances and apply sustainable management objectives (ecological integrity and timber utilization) while conserving biodiversity. His research will integrate bottom-up and top-down effects in a two-scale approach (Integrated Dual Filter). Patrick feels that this approach is needed because such effects are inherent to the results and direct responses of operations and strategies at the two scales considered.

Patrick expresses concern about a future of global challenges, where a rapidly growing human population is confronted with changing availability of natural resources. This interaction of humankind with natural resources is the very area that draws Patrick's interest. To better understand these challenges he is focused on increasing his in-depth experience in the field of natural resources management. In the future, he sees himself active at the interface of academia and applications. He explains that he would like to focus his energies on the development of new tools that could make scientific knowledge and understanding more tangible and easily accessible for policy makers and practitioners in the fields of conservation and sustainable development.

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# Budding Czech geneticist finds his stride at UBC Forestry

TOMAS FUNDA IS A PhD student in the Faculty of Forestry at the University of British Columbia. When asked to describe the type of scientist he is, he humbly replies that he is not a scientist yet, and that he is here, trying to become one. Eventually, he will be a forest geneticist. His current research focuses on fertility variation in conifers seed production populations, an important element in forest regeneration.

Tomas was born in the Czech Republic in the small city of Hradec Králové, which means “Castle” and “Kings”. It is a remarkable centuries-old town that is situated about 120 km east of Prague. Tomas completed the Czech equivalent of a Bachelor’s and Master’s degree in Forest Engineering at the Czech University of Life Sciences in Prague. His research dealt with black spruce (*Picea mariana*) provenance research. He was looking for alternative species that could be used to replace native Norway spruce (*Picea abies*) which had been declining due to air and soil pollution in former Czechoslovakia. Tomas’ research compared traditional randomized complete block design and modern

spatial variation approaches. During this degree, he participated in the Socrates/Erasmus exchange program at the Swedish University of Agricultural Sciences in Umea, Sweden. “That experience was crucial for my future career, especially owing to a great forest geneticist [that I worked with], Dag Lindgren”.

Tomas decided to undertake a PhD at the University of British Columbia following his introduction to Dr. Yousry El-Kassaby, his current supervisor. Tomas recalls: “I met Yousry in Prague, where he gave a presentation about his research and we talked for quite a while [...]. We are very compatible”. When offered a doctoral position he says that he felt “honoured to come and study this subject with Yousry”. He goes on to say that an opportunity to see Canada and to practice his English skills were also big draws.

Tomas is passionate about his research, and enthusiastically describes his project: “Using genetic analysis, I’m trying to simplify the methods used for estimating fertility variation in seed production populations, commonly known as seed orchards”. Fertility



Estimating fertility variation in a seed orchard.

variation affects both the level of genetic gain captured from breeding programs as well as the magnitude of genetic diversity in regeneration seedlots. “Once we know the fertility variation present in any specific year, we can customize the formulation of seedlots that maximize the genetic gain at any desired genetic diversity”.

Currently, Tomas and his

colleagues are attempting to unravel this difficult issue using DNA fingerprinting and pedigree reconstruction. They are using microsatellite DNA analysis to evaluate ten different methods of estimating genetic gain and effective population size based on the strobili/seed production per tree in seed orchards. When the actual parental contributions are finally known, the results will be correlated with the already existing simple and economic methods for assessing fertility variation. "If they produce comparable results, then we will place our 'stamp of approval' on the existing methods, delivering greater savings to the forest industry and Ministry of Forests and Range's seed orchard operators". Tomas sees his work as a piece of a puzzle that aims at maximizing the return on investment of British Columbian forest regeneration programs.

Tomas enthusiastically describes his graduate student experience in the Faculty of Forestry thus far as "great, of course great". His academic expectations have been met. He feels that the committee and supervisor system, common in Canada, was a change but works very well for him. He was also grateful to be able to continue working and corresponding with his colleagues in Prague within the framework of his current research. One of these colleagues, Dr. Milan Lstiburek, is in fact a member of Tomas' PhD committee. He enjoyed his course work as well, citing Val Lemay's multivariate statistics course as his favourite: "She really knows what she's doing! She can bring [the material] to a level the students can understand, and then we can go and apply

those methods". He also expresses how easily he was able to adapt to UBC Forestry, as a first-time international student. "In UBC Forestry, I feel the same and I am treated the same as a Canadian student. UBC has a very good system [...] maybe it's because they have many international students, so they know how to deal with us". Aside from Vancouver's rain, he says he has no complaints.

When asked the question that makes most graduate students cringe, "What's next?", Tomas demonstrates his drive and ambition in his usual endearing, matter-of-fact way: "Back home to Prague. I will go with the job I have waiting for me". He will be the Canadian equivalent of a

research assistant and lecturer in the Department of Dendrology and Forest Tree Breeding at the Czech University of Life Sciences in Prague.

If Tomas could be encapsulated in a few words, they would be tireless, enthusiastic, inquisitive, personable and accurate...everything a good scientist should be. We wish him the best of luck with his PhD and future work.

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*This article was written by forest ecologist Britt Corriveau, a recent Master of Science graduate from the Faculty of Forestry.*

### A global microcosm – Dr. Phil Evans' research group.



Dr. Phil Evans' research group, studying surface properties of wood, includes people of 11 different nationalities.

Pictured from left to right; Vicente Hernandez (Chile); Phil Evans (UK, Australia); Ian Cullis (Canada); Stephan Vollmer (Germany); Arash Jamali (Iran); Kate Semple (Australia); Chunling Liu (China); Jonathan Haase (Guatemala); Marcos Gonzalez (Mexico); Ricky Ratu (Indonesia); missing Jahangir Mohammed Chowdhury (Bangladesh).

# Shedding light on alpine bird ecology

ALAINE CAMFIELD IS A doctoral candidate in the Centre for Applied Conservation Research at UBC's Faculty of Forestry. She is a self-described applied conservation scientist and wildlife biologist. "I like to address interesting theoretical questions, but [questions] that can be applied to real world problems". Her current research deals with the demography, conservation and behaviour of horned larks (*Eremophila alpestris*). I sat down with her to converse about her research and experiences.

Alaine grew up in Halifax, Nova Scotia and has always enjoyed nature and the outdoors. She has always had an eye for wildlife, and so it is no surprise that her career has focussed mainly on its conservation. In 1999, she obtained her undergraduate degree in biology from the University of Michigan at Ann Arbor. She continued her studies there with a Master's degree in resource ecology and management that focussed on hummingbird territorial and foraging behaviour. At the Rocky Mountain Biological Laboratory (RMBL) in Colorado, she

studied broad-tailed (*Selasphorus platycercus*) and rufous (*Selasphorus rufus*) hummingbirds. The RMBL is "a great place to do [ecological] research, and a really great community". Smiling, she adds, "I also enjoyed working with hummingbirds specifically, since so few people get to observe and interact with them".

Alaine decided to continue her bird ecology work. Her experiences at the RMBL stimulated her interest in alpine systems and so, her current supervisor, Dr. Kathy Martin, was the natural choice since Dr. Martin is one of the few researchers in North America who focuses on alpine bird ecology. Vancouver, of course, was also a big draw for Alaine: "I always wanted to live in Vancouver, [and this was my opportunity]".

The subject of Alaine's research is the horned lark, a widely distributed, yet poorly studied, ground-nesting songbird. "Males and females are similar in appearance, though the males tend to be slightly larger and have brighter colouration". Some populations are migratory, and others are not, depending on their location. "Populations that breed at higher latitudes migrate south in winter; alpine populations migrate



Conducting horned lark surveys near Smithers, BC.



to lower elevations". These birds prefer open, sparsely vegetated habitat, such as grasslands, agricultural fields, alpine and arctic tundra, and some dune habitat. They basically prefer "anything that is open and doesn't have huge amounts of consistent vegetation cover; they like patchy vegetation for nesting".

Alaine's research focuses on a migratory alpine population on Hudson Bay Mountain, near Smithers, B.C. She also collaborates with Dr. Scott Pearson, from the Wildlife Science Division of the Washington Department of Fish and Wildlife. Dr. Pearson studies a migratory population of streaked horned larks (an endangered sub-species of horned larks) that inhabit the Puget lowlands in Washington State. Alaine and Dr. Pearson are comparing life history trade-offs between the two populations.

When asked about the applicability of her work, Alaine's face lights up. She truly believes in the importance of her work, and she answers with conviction that there are many reasons why the scientific community, industry and the general public would be interested in her research. Despite the large range of horned larks, these two studies are "the only long-term studies dealing with banded individuals", she explains. "They aren't really studied much, and certainly not in enough detail to do any kind of population modelling". Alpine areas are also relatively poorly studied, and so "we would like to know if the horned larks are well-adapted to those [harsh] alpine conditions, and if



Photo: Matthew Tomlinson

Female horned lark.

so, what are these adaptations? What makes them choose that environment when they could breed in other less harsh habitats"?

She also believes that the public has a general interest and curiosity about alpine environments. With increasing development pressures on alpine ecosystems in B.C., including a proposed ski resort expansion in Alaine's study area, she thinks that "the public wants to know what the impacts of development will be". And so do the developers. Consulting companies and developers need to understand their impacts on ecosystems before they develop. Alaine points out that legislation has been enacted to protect migratory birds, such as the Migratory Bird Treaty Act, an agreement between several countries including Canada and the U.S. to protect shared migratory

bird species. "The Migratory Bird Treaty Act created a legal precedent to be careful about birds when developing, [which is a step in the right direction]".

Alaine will be completing her PhD in September of 2008, and showed no hesitation when asked about her future plans: "Ideally, I'd like to work with the Canadian Wildlife Service as a species at risk biologist". She would like to continue to focus on research, but she retains a healthy interest in policy as she understands how important a role it plays after a species is listed.

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*This article was written by forest ecologist Britt Corriveau, a recent Master of Science graduate from the Faculty of Forestry.*

# Estimation of stand productivity from multi-angular optical remote sensing



I first became first interested in using remote sensing techniques to characterize forest ecosystems when completing a B.Sc. in forestry at the University of Applied Sciences Goettingen in Germany. I went on to study at the University of Applied Sciences Stuttgart for my graduate degree in photogrammetry and geoinformatics. On completion I worked for three years as a GIS and remote sensing specialist in industry before moving to Vancouver in 2005 to start a PhD with Dr. Nicholas Coops in the Faculty of Forestry where he was specializing in remote sensing of carbon fluxes and primary production of terrestrial ecosystems. Dr. Coops' Integrated

Remote Sensing Studio offered a perfect opportunity for me to embark on my doctoral research combining components from the fields of tree physiology, remote sensing and geo-informatics to study carbon cycling of forest ecosystems. I was fortunate enough to obtain a three-year scholarship from the German Academic Exchange Service to support my studies.

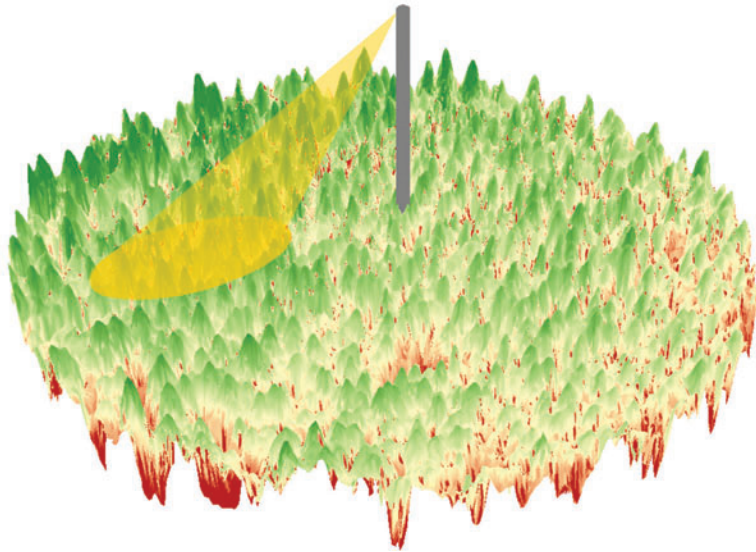
My recently completed doctoral research involved predictions of global CO<sub>2</sub> fluxes related to climate change. Global modeling of gross primary production (GPP) is a critical component of climate change research. On local scales, GPP can be assessed from

measuring CO<sub>2</sub> exchange above the plant canopy using tower-based eddy covariance (EC) systems. The limited footprint inherent to this method however, restricts observations to relatively few discrete areas making continuous predictions of global CO<sub>2</sub> fluxes difficult. Recently, the advent of high resolution optical remote sensing devices has offered new possibilities to address some of the scaling issues related to GPP using remote sensing. Detection of GPP from remote sensing is based on the awareness that photosynthesis is related to the biochemical composition of plant foliage. This biochemical composition is expressed in leaf spectral properties and can be detected from high resolution optical remote sensing instrumentation. One key component for inferring GPP spectrally is the efficiency ( $\epsilon$ ) with which plants can use absorbed photosynthetically active radiation to produce biomass. While there has been progress in measuring  $\epsilon$  using the photochemical reflectance index (PRI), little is known about the temporal and spatial requirements for up-scaling these findings continuously throughout the landscape. Satellite observations of canopy reflectance are subject to view and illumination effects which can confound



Multi-angular spectroradiometer (AMSPEC) at the research site near Campbell River, BC. The instrument is installed on a flux tower of the Canadian Carbon Program.





AMSPEC observes the forest canopy around the flux tower every 15 minutes; one scan is taken every 5 seconds. Data were collected over a one year period.

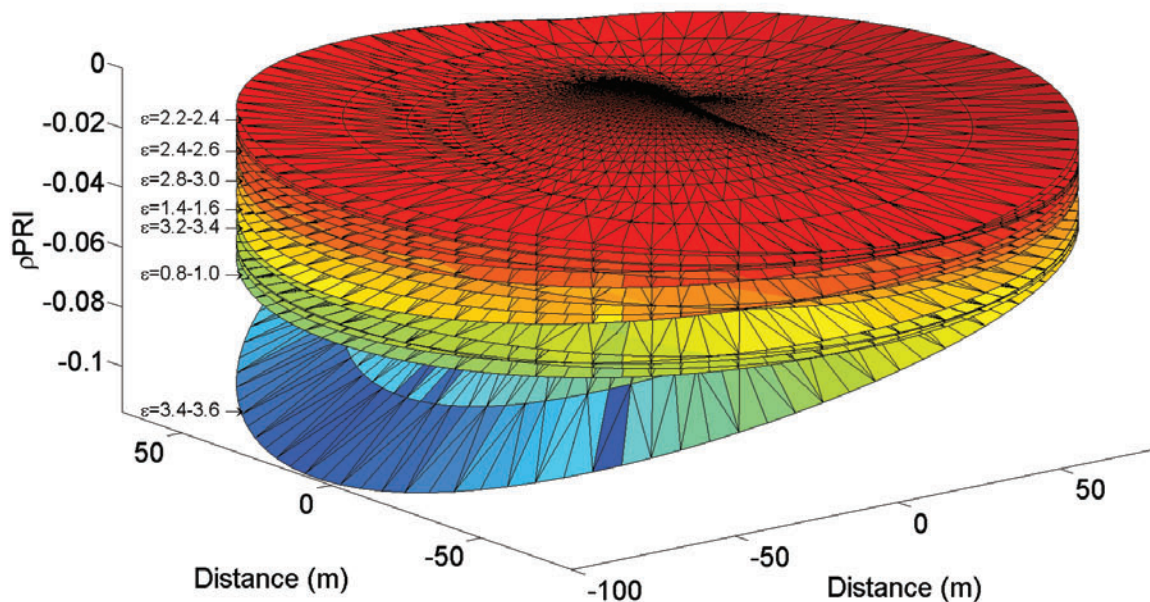
the desired PRI signal. Further uncertainties include dependencies of PRI on canopy structure, understory, species composition and leaf pigment concentration. My research investigated the effects of these factors on PRI to facilitate the modeling of GPP in a continuous fashion. I sampled canopy spectra over a one-year period using an automated tower-based, multi-angular spectroradiometer platform (AMSPEC), designed to sample

high spectral resolution data. The wide range of illumination and viewing geometries seen by the instrument permitted comprehensive modeling of the the bi-directional reflectance distribution, used to isolate physiologically induced changes in PRI reflectance. The model that he developed yielded a high correlation ( $r^2=0.82$ ,  $p<0.05$ ) to EC-measured  $\epsilon$ , thereby demonstrating the capability of PRI

to model  $\epsilon$  throughout the year. I extrapolated my results to the landscape scale using airborne laser-scanning (light detection and ranging, LiDAR) and found high correlations between remotely-sensed and EC-measured GPP ( $r^2>0.79$ ,  $p<0.05$ ). Permanently established tower-based canopy reflectance measurements are helpful for ongoing research aimed at up-scaling  $\epsilon$  to landscape and global scales and facilitate a better understanding of physiological cycles of vegetation and serve as a calibration tool for broader band satellite observations.

Having completed my PhD in April, I am now working with Nicholas Coops as a post-doctoral research fellow studying data blending and data fusion approaches to generate high spatial and temporal resolution satellite imagery for time series analysis.

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Bidirectional reflectance distribution model of multi-angular AMSPEC observations. The PRI reflectance observed is a function of directional and physiological reflectance effects of the canopy.



# Can trees be engineered to increase their levels of cellulose?

I'M A RECENT GRADUATE from UBC's Faculty of Forestry, and am currently continuing my research career in Australia. My decision to do graduate work at UBC was an easy one for me. While working on my forestry undergraduate degree I had ample opportunity to become familiar with the diversity of research going on in the Faculty. Although I graduated from Forest Resources Management, I had no desire to stop working with trees and wanted to take a slightly different approach. An opportunity to work in UBC's globally recognized Wood Science Department, and pursue a biotechnology PhD, presented a perfect opportunity.



The production of cellulose is one of the most important biological processes on earth. Cellulose is a polysaccharide of glucose; and the main component of plants. It is highly utilized for food, fuel and fibre and yet cellulose production in trees is not fully understood. I took on the challenge of furthering the understanding of how trees produce cellulose as the focus of her doctoral studies.

I studied cellulose biosynthesis through increasing the expression of genes that are responsible for the metabolism of sucrose. The idea was that if I could encourage cells to make cellulose more rapidly, then more resources would be sent to those cells. In my research, I overexpressed two genes that are directly involved in the production of UDP-glucose which is the precursor for cellulose. In this way I was able to push the trees to produce up to 6% more cellulose. This was exciting as it provided more information on cellulose production – there is something limiting the production of cellulose other than the availability of sucrose in the cell. It also showed that trees were able to produce cellulose at a higher rate and that it may be possible to

engineer or breed trees that have more cellulose.

In addition to the work on cellulose, I looked at lignin production in trees. Lignin is the substance in trees that holds cellulose fibres together. In combination with hemicellulose, lignin and cellulose are the major constituents of wood. By down-regulating a gene involved in the production of lignin, coumaroyl 3'hydroxylase, the resultant trees had lower lignin. In addition, they had a significantly different lignin monomer composition.

My research at UBC led me to a research fellow position at the Queensland University of Technology where I am currently working in the Syngenta Centre for Sugarcane Biofuels Development. Producing ethanol from cellulose is one of the challenges currently attracting global interest. The availability of cellulose in both forest and agricultural residues has the potential to help reduce our reliance on finite petroleum reserves. My research in Queensland focuses on the development of a cost-effective conversion of sugarcane bagasse to biofuels, including delivery of plant-expressed enzymes through In-Plant Activation Technology (INPACT), which allows the plant to use its own processes to start the breakdown of the cell wall. This research is significant for the use of agricultural residues for ethanol, and for the use of trees as well.

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# The path to graduate studies for Florian Noll

GOING TO UNIVERSITY in the flat countryside of eastern Germany and managing pure pine stands didn't seem too appealing to me when I first started school. At the beginning of my studies I knew that becoming a government forester in Germany was not an option that would satisfy me for the rest of my life and was probably even impossible because of a lifeless labor market for foresters at home.

The only undergrad forestry program that would allow me to study abroad was located in exactly this kind of an environment: An old, former Prussian forestry school with an almost 200-year-long tradition of educating government foresters, but also a program in international forestry. That's what I wanted. Part of the curriculum was an internship abroad; I was sold. Spending my internship at UBC's Malcolm Knapp Research Forest in Maple Ridge, I experienced a whole new world: Big timber, big machinery I had only seen pictures of before and beautiful nature all around.

When I got the chance to work at the research forest after graduation I jumped at the opportunity. Although I did not really know what I was getting myself into, I had a fair idea from my internship experience. In October of last year I arrived at Vancouver airport, three weeks

after finishing school, and with high hopes for my future. In the back of my mind I knew that I wanted to go to graduate school eventually. I was on a quest to expand my knowledge about forestry in general, forest operations in particular and to participate in research at least once. With UBC as my employer I was one step closer to my dream.

After working at the Research Forest for half a year I got the chance to become part of an interesting project involving the use of flange splitter to remotely fall trees. My work on this project (funded by the Workers Compensation Board) will form the basis of my Master's thesis supervised by Dr. Kevin Lyons in the Department of Forest Resources Management. The outcomes of this research have

the potential to help make BC's forests a little safer for workers.

Project in hand, my next big hurdle was getting into graduate school. Original transcripts of records from Germany and letters of reference required many phone calls and e-mails back and forth across the ocean. Language proficiency tests and personal statements had to be written. Visa applications had to be filled out. When I finally had everything together and submitted my mountain of paper, I was relieved. Even more so, when I finally held the letter of admission in my hands and I knew that I really was becoming a graduate student in the Faculty of Forestry at UBC!

So now I am in my first week of graduate school and still I'm a little scared. Never having seen a campus this large before, it is somewhat overwhelming. However, I am also thrilled and excited to be beginning a new phase of my life.

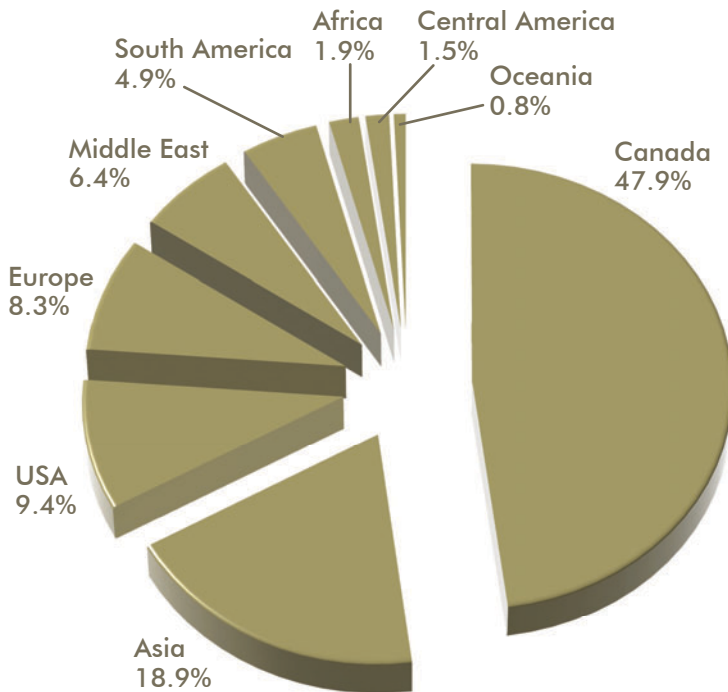
Florian can be reached at: [florian.noll@ubc.ca](mailto:florian.noll@ubc.ca)



Florian and a local resident of the research forest.

of several new course-based Masters programs through the campus-wide SEER (Sustainability and Environment; Education and Research) initiative.

One aspect of The Forestry Graduate Program of which we are particularly proud is our success in attracting graduate students from around the world. Fifty-two percent of our students are from countries other than Canada, and we have students from 38 different countries, making Forestry one of the most culturally diverse graduate programs at UBC (see chart below). We assist incoming international students with the transition to life in Vancouver and at UBC by matching each with a current student from the same country or region. The Forestry Graduate Student Society (FGSA) runs an informal seminar series (“Global Tea House”) in which graduate students discuss forests and forestry in their native country. Given the global nature of modern forestry, the experience our students gain by working with colleagues from around the world is a subtle but effective means of creating the global citizens that UBC aspires to produce. Dr. Phil Evans’ current lab group includes 11 individuals of 11 different nationalities (see page 13), exemplifying the global microcosm that we strive to create.



Origins of Faculty of Forestry graduate students 2007 – 2008.

The Faculty of Forestry offers graduate courses in which students can hone their technical writing and oral presentation skills, and a core course in which students are informed about many aspects of forestry in British Columbia. A broad suite of graduate-level courses are offered by members of the Faculty of Forestry and our colleagues across campus. Graduate students are also encouraged to attend the many research seminars offered in the Faculty and other units on campus. Workshops specifically designed for graduate students are offered each year, including writing scholarships and grant applications, publishing, and teaching. Additional workshops on advanced writing and linking science to policy are planned for this year. The FGSA also organizes monthly social events and sporting activities for graduate students to make sure students enjoy their time at UBC. For more information on The Forestry Graduate Program, visit our website, [www.forestry.ubc.ca/](http://www.forestry.ubc.ca/) and click on “explore our graduate program”.

In 2008, The Faculty of Forestry Graduate Program received the Peter Larkin Award, given to graduate programs that have had a significant positive impact on student life and student development at UBC. This award reflects our commitment to providing outstanding support and service to our graduate students and being a leading centre for graduate education and research in forestry in the world. We take great pride in our graduate program, and in each of the students who choose UBC Forestry as their home for this critical phase of their education. In this issue of Branchlines, we offer a glimpse into the world of a few of our graduate students, so you can meet some of our junior colleagues and share the excitement of their chosen research activities. I’m sure you will agree with me that the future looks bright indeed.

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