

Centre for Environment UNIVERSITY OF TORONTO

2011 ANNUAL REPORT



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Adjunct Professors

Jane Ambachtsheer, Partner, Mercer Investment Consulting Brad Bass, Researcher, Environment Canada

Satyendar Bhavsar, Research Scientist, Ont. Min. of Environment Sonia Labatt, Member, CFE Environmental Finance Advisory Committee Susan McGeachie, Manager, Deloitte Paul Muldoon, Vice Chair, Environmental Review Tribunal

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Message from the Director

BY DONALD JACKSON, Interim Director, Centre for Environment, 2010-2012.

I am pleased to have the opportunity to continue serving in the Centre. The year has passed quickly and provided me with both many opportunities and challenges, many of which have been shared as we have worked together during the past year. For me, it also has been a time of learning about many aspects of the Centre which were previously unfamiliar and gaining a deeper understanding about the myriad of connections that the Centre includes. It has been wonderful working with the faculty, staff, students, and those with less formal connections to the Centre, in order that we might pursue our goals in teaching, research and university outreach – I look forward to our ongoing work in these areas.

I would like to thank **Professor Tony Davis** (Geography) for serving as Undergraduate Coordinator and **Professor Rick DiFrancesco** (also Geography) for serving as Graduate Coordinator during this past year. We have benefitted from their efforts and I am pleased to have been able to work with them. I am also pleased that **Karen Ing** (Senior Lecturer at the Centre) has agreed to serve as our Undergraduate Coordinator this year. Karen held this position for several years previously and her experience will be a great asset this year.

Students have shown extremely positive response to the programs and courses offered within the Centre, especially with the new courses and programs that we began offering last year. Last year students had the new opportunity to take a Centre course in their first year with our ENV100 Introduction to Environmental Studies course being taught by Professor Stephen Sharper (*see page 11 for a brief article on this new course*). Given both the students' response to this course and having our new Environmental Studies major available, the courses and programs offered by the Centre for Environment are in great demand.

In order to meet this enthusiastic response by our undergraduates, we face challenges in being able to expand our offerings and work to further enhance our quality. We, along with several other cognate departments in the environment and natural resource fields, have been part of a working group in the Faculty of Arts and Sciences that has been meeting this summer to determine how to enhance student opportunities in these fields. Our goal is to be able to provide the highest quality programs to our students and we have been working hard to see how to better achieve this goal. Following the great success of Centre's new programs and courses, we now have the opportunity to further broaden our offerings and help translate our success to additional programs.

We have been actively involved in various initiatives during the year. The Centre for Environment hosted a meeting of the **Transborder Research University Networks (TRUN)**, a consortium of universities in southern Ontario, New York and Michigan, at Hart House to develop a research and graduate student initiative focused on water-related issues, specifically the Great Lakes. The TRUN group has continued developing these ideas



with the goal of formalizing their major project in the coming year, including active participation by the Centre. International interest in the Centre remains very strong. We have had various groups interested in the potential to partner in teaching undergraduate students which would offer new opportunities to our students and those from other countries. Visits from international delegations, including two large Chinese delegations during the summer, attest to the strong international interest in the environment and the role that the Centre plays at the U of T. Unfortunately, due to changes being implemented by the Government of Canada, our collaboration with Environment Canada has come to an end *(see page 6)*. We are disappointed to lose the contributions provided by **Dr. Brad Bass** as he has contributed many opportunities for U of T students.

Funding support by Centre members, alumni, and friends has been appreciated greatly. This spring we were able to award the first recipient of our new Jane Goodall Scholarship, which was developed in partnership between the Centre and the Jane Goodall Institute (see page 15). The inaugural Alexander B. Leman **Memorial Award** was also presented in April. This award was established by the Leman family (including his daughter and former CFE Director, Professor Ingrid Leman Stefanovic), friends and colleagues of Alexander Leman (see page 18). We are very grateful to the members of the University of Toronto Women's Association (UTWA) for establishing the Jane Joy Memorial Scholarship: Excellence in Environmental Sustainability, thereby recognizing a valued former member of their organization. All funds used to create this scholarship were raised by UTWA members selling roses during the University's convocation ceremonies, so supporting their sales provides ongoing support to many of our U of T students.

A valued member of the Centre's Environmental Finance Committee, **Errick "Skip" Willis**, passed away this past winter. Skip had been a long-time member of this committee and strong contributor to the Centre's Professional Development program. In honour of his memory, his family and colleagues have established a memorial fund that will begin by funding a Centre scholarship/ bursary related to climate change. We are grateful for the various diverse contributions these individuals have made, as well as those that have been made by others to formally recognize them.

Another valued member of the Environmental Finance committee, **Dr. Sonia Labatt** and her husband **Arthur Labatt**, were conferred honorary Doctor of Laws U of T degrees this June *(see page 22)*. Since their establishment of Graduate Fellowships in 1998, over 80 of our graduate students have benefitted from their generosity.

I look forward to another interesting eventful year with you. Please join us for our seminars and other events within the Centre and feel free to contact us if you are interested in becoming more involved.

Assessing metal dynamics and ecotoxicity in Ross Lake, Flin Flon, Manitoba, in collaboration with Hudson Bay mining company

Professor Miriam Diamond (Department of Geography) and her lab in the Department of Geography, in collaboration with Hudson Bay Mining and Smelting Co. Ltd. (HBMS), are working on a model to assess metal dynamics and metal ecotoxicity in Ross Lake, located in Flin Flon, Manitoba in this three year Centre for Environment (CFE) project (2009-12).

Ross Lake has received zinc enriched mine tailing effluents for over 50 years. Due to resuspension of sediments, Ross Lake is a source of zinc to downstream waterbodies. In this project, a model is being developed for HBMS that would help them assess metal dynamics and metal ecotoxicity (toxicity to fish and other species in the lake) in Ross Lake as part of the mine's closure plan. (Although the mine is not closing, government regulations demand that they develop a closure plan.) The coupled metal fate/transport, metal speciation and toxicity model is an updated version of a previously completed TRANSPEC model developed by Dr. Satyendra Bhavsar as part of his doctorate. (Dr. Bhavsar is a Research Scientist, Ontario Ministry of Environment and CFE Adjunct Professor; see his research project on page 3.) The updated model would be used to evaluate the different scenarios laid out in HBMS's mine closure plan, and to estimate the amount of zinc that could be added to the lake without causing any adverse effects to fish and other aquatic species.

So far, field work at Ross Lake was completed in October 2010 and in July 2011, with data gathered used to evaluate the model.



M.A.Sc. student Sumara Yacoob and Professor Miriam Diamond doing field work on Ross Lake, Manitoba. Data collected will be used to develop a model of metal dynamics and metal ecotoxicity for Hudson Bay Mining and Smelting Co. Ltd.

For more information, please contact Miriam Diamond at miriam.diamond@utoronto.ca or Sumera Yacoob (M.A.Sc. candidate, Department of Chemical Engineering and Applied Chemistry) at sumera.vacoob@utoronto.ca.

From exhaust pipe to plants: tracking the fate of trace metal emissions in roadside gardens in Toronto

A research study led by Professor Clare Wiseman of the Centre for Environment (see page 37) is assessing the fate of traffic-related trace metal emissions and their uptake by plants grown in Toronto. Originally initiated in cooperation with Foodshare and with a seed grant from the Centre for Urban Health Initiatives of U of T, the goal of this study is to elucidate how soil trace metal behavior and bioaccessibility are influenced by stabilization processes, as determined by primary physico-chemical soil parameters and changing field conditions over time. A wide range of trace metals will be examined, ranging from lead, copper and nickel to the lesser known elements strontium and cerium. The ultimate aim is to assess the hazard potential of gardening in close proximity to traffic and provide a better knowledge basis for more informed decisionmaking in the establishment of community gardens in Toronto.

Since 2010, common garden plants such as oregano and eggplant were cultivated at four locations with predicted variable traffic metal inputs: two locations on U of T's St. George campus (on the Galbraith Building's rooftop and at the corner of St. George Street and Hoskin Avenue) and two in the west end of Toronto.

Preliminary results from the first phase of this study using the application of a microwave-assisted acid digestion procedure and ICP-MS for both plant tissue and soil samples suggest several important trends. First, the location of the gardens matters. Plants grown on soils close to higher volumes of traffic generally contain higher levels of trace metals. Oregano grown close to the Gardiner Expressway, for instance, had significantly higher concentrations of lead compared plants grown in a residential location with a low volume of traffic (an average of 4.67 mg/kg vs. 0.84 mg/kg).



Professor Clare Wiseman working at one of her roadside gardens located at U of T's St. George campus (St. George Street and Hoskin Ave.). Her study assesses the metal uptake in garden plants in close proximity to traffic.

Secondly, metal uptake by plants appears to be strongly influenced by soil age. Specifically, oregano grown in a new organic triple mix soil along a road with medium volumes of traffic took up a greater proportion of many trace elements such as cadmium compared to plants grown in older aged soils at a heavy traffic Continued on page 3...

Development of B*focussed productivity system

Dr. Beth Savan (CFE Senior Lecturer; see page 36) recently received one year of funding from the Federal Economic Development Agency's Applied Research and Commercialization Initiative for a project done in partnership with Kangaroo Design and Innovation Firm. The study builds on some of the best-practices developed by the U of T Sustainability Office's successful Rewire project which aims to empower students to reduce their own energy consumption through small behaviourial changes (see page 26). It aims to develop a time management product called B*focused in order to optimize the working potential of individuals in a shared office setting. Under the leadership of Dr. Savan and Post-Doctoral Fellow Dr. Ellie Farahani, the pilot phase will determine the social conditions needed for effective adoption and will rely on research bestpractices developed by Rewire and includes psychology-based insights from the Theory of Planned Behaviour and Community Based Social Marketing.

For more information, please contact Dr. Beth Savan at b.savan@utoronto.ca.

Continued from page 2.

location. Initial results using a physiologically-based extraction procedure to determine the solubility of metals in the gastrointestinal tract of children also suggest that the proportion of bioavailable lead in the newer, remediated soil is greater compared to that in the older, unremediated soil (approximately 50% vs. 30% lead solubility). This demonstrates that trace elements are more likely to be tightly bound to soil constituents over time, making them less soluble and available for uptake.

Thirdly, elevated concentrations of certain elements measured in plant tissues compared to soils suggest metal uptake through atmospheric deposition in addition to soil-plant transfers.

Fourthly, metal uptake by plants is strongly species dependent. Eggplant grown at the roadside St. George campus location had higher levels of cadmium on average (0.22 mg/kg) compared to oregano grown in the same bed (0.10 mg/kg).

The next phase of this research will continue to explore current trends, as well as examine the role of mineralogical controls in governing the fate of metals from soil to plants.

For more information, please contact Dr. Clare Wiseman at clare.wiseman@ utoronto.ca.

Study assesses human exposure to PFCs in Ontario fish and finds PFCs in creeks near release of fire-fighting foam

In this one-year project funded by Public Works and Government Services Canada, **Dr. Satyendra Bhavsar** (Research Scientist, Ontario Ministry of Environment, OMOE; and Adjunct Professor, CFE) and colleagues from U of T, OMOE, and Health Canada are researching human exposure to perfluorinated compounds in Ontario fish caught near point sources and the effects of cooking on exposure.

Perfluorinated compounds (PFCs) are a family of fluorine-containing chemicals with unique properties to make materials stain and stick resistant. They have been used in a wide array of consumer products (including Teflon and Scotchguard) as grease and water repellents and are incredibly resistant to breakdown. Studies have shown that Canadians are exposed to PFCs which accumulate in the body. One of the major routes of exposure is via contaminated food, such as fish, but the relative importance of domestically-caught fish is not known. The research team has collected fish samples from a number of locations near major industrial facilities, a former PFC spill site, and selected major sewage treatment plants in Ontario and is currently analyzing them for PFC content. The effect of three different cooking methods (baking, broiling and frying) on fish PFC levels is also being studied.

Study finds PFCs in nearby creeks one decade after use of fire-fighting foam at Pearson International Airport

In a project as part of the above study, the researchers also detected concentrations of PFCs in creeks one decade after the discharge of fire-fighting foam at Toronto Pearson International Airport and have recently published results in *Environmental Science and Technology*¹. PFCs were detected in an Etobicoke creek one decade after the discharge of fire-fighting foam at the airport in 2000 due to a fire alarm malfunction and in 2005, used to extinguish the fire caused by Air France flight 358 overrunning the runway.

The researchers examined spatial and long-term (9-year) temporal trends of PFCs in water, sediment, fish and fish liver collected in 2003, 2006 and 2009 from 10 locations stretching approximately 20 km in Etobicoke and Spring Creeks, into which Moore Creek flows. Fire-fighting foam is of concern because it is a major



CFE Adjunct Professor Dr. Satyendar Bhavsar and OMOE staff collect fish samples to assess human exposure to perfluorinated compounds in Ontario fish caught near industrial facilities and other point sources.

source of PFCs in the form of perfluorooctane sulfonate (PFOS).

Even a decade after the spill, sediment PFOS concentrations are still elevated in Spring Creek Pond which received the foam discharge from Moore Creek, however, the major impact is relatively localized likely due to the storm water detention nature of the creek. Fish and fish liver PFOS concentrations at a Spring Creek location declined by about 70 and 85%, respectively, between 2003 and 2009. Compared to PFOS measurements for fish liver collected from airport property 21 days after the spill, PFOS levels in Spring Creek Pond were 92-99% lower in 2009. Spring Creek flows into larger Etobicoke Creek where fish and water PFOS concentrations dropped further. PFOS in water at locations further downstream have declined by more than 99.99% since the spill; however, the 2009 water and fish levels were approximately 2-10 times higher than upstream locations likely due to the long-term impact of the spill as well as urbanization.

^{1.} E. Awad et al. Long-term environmental fate of perfluorinated compounds after accidental release at Toronto Airport. *Environmental Science and Technology* (Forthcoming; online published July 20, 2011).

For more information, please email Dr. Bhavsar at s.bhavsar@utoronto.ca.

Projects focussing on Canadian environmental policy relating to climate change, transportation, and the oil and gas industry

The following current projects on environmental policy are led by Dr. Douglas Macdonald, Senior Lecturer at the Centre for Environment (see page 34). For more information, please contact him at douglas.macdonald@utoronto.ca.

Allocating Canadian GHG Emission Reductions Amongst Sources and Provinces

This three-year project (2009-12) is funded by SSHRC and studies the allocation of Canadian greenhouse gas emission reductions amongst sources and provinces, learning from the European Union (EU) and Germany. The project is a collaboration with researchers at the Technische Universität Darmstadt in Germany and Wageningen Universiteit in The Netherlands and addresses the inability of Canadian federal and provincial governments to reach agreement on one national climate-change program, including allocation of cost amongst sources and provinces, in comparison to success in developing such programs in Germany and the EU.

Because it is a true collective-action problem, effective climate policy requires agreement amongst participating jurisdictions, globally and in federated systems, respecting the share of the total cost to be assumed by each. In Canada, this is complicated because provinces like Alberta and Saskatchewan, with fossil-fuel dependent economies, are being asked to pay a much higher price for effective action than others. The project addresses this challenge which is one of the most significant barriers to effective national policy.

To date a number of reviews of relevant bodies of secondary literature have been done of secondary literature related to social coordination. Case study research using primary documents and approximately 50 interviews with government officials in six Canadian provinces and the Government of Canada, Germany and the EU have also been completed. A survey of Canadian climate professionals is being conducted and work has begun on analysis of the project findings. That analysis was expressed in a preliminary report discussed at workshops in Edmonton, Ottawa and Halifax in September 2011. The final project report will be released and presented to Canadian governments in late spring 2012. A number of academic conference papers have also been presented at Carleton University, Dalhousie University, and Wilfrid Laurier University, and other academic publications are planned.

Policy Instrument Choices Influencing Sustainable Transportation in Toronto

This one-year project (2010-11) is part of a SSHRC-funded project led by **Professor Jean Mercier** with co-investigator **Professor Mario Carrier** (both from Université Laval) to look at factors influencing urban transportation policy. At U of T, Dr. Macdonald has been working with **Amir Ganjavie** (Ph.D. candidate, Geography and CFE) and **Scott Sams** (Ph.D. candidate, Political Science) to examine policy instrument decisions made by the City of Toronto and the Governments of Ontario and Canada which have been intended to shift transportation toward sustainability.

The purpose is to identify the most important policy instrument decisions which explain, along with other factors, the current transportation mix and to then gain understanding of how and why those decisions were made. During the 2010-11 academic year, secondary literature on transportation policy was reviewed and an examination was made of basic factors such as geography and city

demographics which influence the modal split. Preliminary primary research was also done on government organization and its relation to transportation policy, particularly the creation of Metropolitan Toronto in 1954 and the concomitant push to provide transit in the suburbs; as well as subway construction since the 1950s and Ontario government funding reductions in the 1990s. The project moved to the interview phase in the summer of 2011. The Laval team will then amalgamate the Toronto case findings with those of Seattle, Boston and Montréal to provide a generalized understanding of transportation policy decision-making.

The Oil and Gas Industry and Canada's Climate Change Policy

This is a two-year SSHRC-funded project (2009-11) examining the recent lobbying history of the oil and gas industry and the varying degree of influence it has had on Canadian federal government climate change policy decisions.

The oil and gas industry's close engagement with the evolution of Canadian environmental policy has resulted in both wins and losses for the sector. The 1995 decision to rely solely on voluntary action was a boon to an industry in which policy mandating the regulation of greenhouse gas emissions is directly relevant to sector profitability. On the other hand, lobbyists for the oil and gas industries were powerless to prevent the 2002 ratification of the Kyoto Protocol.

In the project's first year, CFE undergraduate student **Gurushabd Khalsa** conducted research on relevant primary documents and news media articles. A conference paper by Dr. Macdonald on this project was delivered at the annual meeting of the Canadian Environmental Studies Association at Concordia University, Montréal in 2010. Since then, Ms. Khalsa has done more primary research and research. Dr. Macdonald hopes to publish a peer-reviewed article on sources of the agency and structural power of the industry by the end of 2011.

Governance Innovation and the Transition to a Low-Carbon Economy

Dr. Macdonald also received two years of funding in 2010 from Carbon Management Canada for a project to study innovation in governance practices to address climate change and accelerate the transition towards a low carbon Canada. It is being done jointly with **Professors James Meadowcroft** and **Glen Toner** (School of Policy Studies, Carleton University) and graduate students from both universities.

The research led by Dr. Macdonald examines distributional potentially associated with climate change policies, such as inequitable effects imposed upon the poor by a carbon tax. The focus is on regional/intergovernmental, industrial, and social dimensions of climate-related political conflict in Canada. The analysis will be supplemented by historical case studies of political conflict associated with other major policy initiatives in Canada and a secondary literature review of experiences managing low carbon transition conflicts outside Canada. The Carleton portion of the project is examining institutional innovations for climate governance (such as the United Kingdom carbon budgets established by six jurisdictions with particularly active climate policy: UK, Netherlands, Germany, Denmark, Sweden and the EU) in order to understand lessons which might be applied in Canada.

Research Day

Annual event showcases research of the Centre's faculty and students

The following research presentations were made at the Centre for Environment's (CFE) Research Day, held on April 20 2011, during Earth Week. The annual event showcases research done by some of the Centre's faculty and students. Condensed abstracts are included below.

ALANA BOLAND, Associate Professor, Dept. of Geography; Full member, Centre for Environment graduate faculty. *Public Participation in China's Green Communities: Mobilizing Memories and Structuring Incentives.* In recent years, there has been heightened interest in creating more environmentally sustainable forms of urban development in China, including promotion of public participation in community-based environmental activities. This talk featured a study which examines the production and effects of participation in a state-led program which considers how incentives are structured

by political and economic imperatives. The study hypothesizes that the participatory processes associated with such an urban initiative cannot be adequately understood without reference to earlier participatory practices and broader policy priorities.

SATYENDRA BHAVSAR, Research Scientist, Ontario Ministry of the Environment; Adjunct Professor, Centre for Environment. *Toxic Perfluorinated Compounds (PFCs) in Our Waterways and Our Fish: The Impact of Fire-Fighting Foam.* This presentation covered a research study examining the spatial and long-term concentrations of PFCs (perfluorinated compounds) found in nearby creeks one decade after two incidents caused the discharge of fire-fighting foam at Toronto Pearson International Airport. *(Please see page 3 for details and findings.)*

GREG EVANS, Professor, Dept. of Chemical Engineering and Applied Chemistry; Full member, Centre for Environment graduate faculty. Every Breath You Take: The Impacts of Aerosol on Air Quality and Health.

People inhale millions of aerosol particles with every breathe they take. Though microscopic, they may have large impacts on our environment and health. Only recently have novel instruments and interdisciplinary collaboration offered the opportunity to make progress in this field. This talk provided an overview of current knowledge and issues, and some of the methods being used to study atmospheric aerosol, including a presentation of recent field measurements from urban and rural sites in Ontario.



Professor Kundan Kumar speaks about his study of forest governance in India at the Centre's Research Day held in April 2011.

KUNDAN KUMAR, Assistant Professor, Dept. of Geography and Centre for Environment (see page 34). Democratic Forest Governance in India. Forest dwellers and populations living adjacent to forests are amongst the poorest in India. They are subsistence cultivators and forest product gatherers, dependent on land and forest resources for their livelihoods. Their rights and usage of forests have been expropriated through exclusionary colonial forest laws, resulting in widespread environmental and social injustice, exclusion and marginalisation of the poor. This presentation examined a recent Indian law enacted in response to a nationwide mobilization of marginalized forest dwellers and their advocates.

SCOTT PRUDHAM, Associate Professor, Dept. of Geography and Centre for Environment (see page 35). Pimping Climate Change: Richard Branson, Global Warming, and the Performance of Green Capitalism . In 2006, Virgin Group Chairman Richard Branson pledged approximately 1.6 billion pounds to fighting climate change and then made investments in technologies for sequestering carbon dioxide from the atmosphere. This presentation examined Branson's announcements and the problems associated with "green capitalism", arguing that the problems are not only quantitative but also qualitative. The question is not only about reducing material and energy throughput, but also taking into consideration the relationship between how innovation and decision-making are socially organized and the resulting environmental policy solutions.

FOR MORE INFORMATION:

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MOHINI SAIN, Professor, Faculty of Forestry; Full member, Centre for Environment graduate faculty. The Role of Renewable Bio-Products in Greener Automobiles. The automotive industry has relied heavily on petroleum based chemicals and plastics for numerous applications and is also seen as one of the major contributors of greenhouse gas emissions. This talk discussed the recent launch by North American and European car manufacturers, in collaboration with research institutes, of initiatives incorporating state-ofart manufacturing technologies into the synthesis of bio-products based on soybean foam/plastics, polylactic acid, polyhydroxybutyrate, and natural fibres derived from

hemp, flax, jute, bamboo, kanaf etc.

BENITA TAM, Ph.D. candidate, Dept. of Geography and Centre for Environment (Environment and Health program). The Effects of Climate Change on the Well-Being of Aboriginal Populations in Ontario. This presentation was on a doctoral study which examines the relationship between climate change and health, focusing on vulnerable Aboriginal populations in Toronto and Fort Albany, Ontario. There is an injustice for vulnerable populations to cope with climate change, as they are already afflicted with limited resources, financial issues and greater health disparities. First Nations may be more vulnerable to climate change because their health, culture and land use practices are so closely intertwined with the environment.

JENNIFER WEAVER, Ph.D. candidate, Dept. of Geography and Centre for Environment (Environmental Studies program). Invasive Mute Swans in Ontario: Where Are They Located and Why Are They There? This talk featured a doctoral study examining the relationship between the invasive mute swan and landscape structure in southern Ontario, specifically the role that urban land cover plays in influencing mute swan distribution. Unsurprisingly, percentage water is significantly correlated with the presence of mute swan. Distance to urban land cover and longitude are negatively correlated with mute swan presence. They are likely attracted to urban areas due to plentiful food resources, moderated temperatures and lack of competition with native species.

Adaptation & Impacts Research Section

Partnership with Environment Canada researchers at the University of Toronto

The Centre for Environment and its predecessor, the Institute for Environmental Studies, has had an enriching research partnership with the Adaptation and Impacts Research Section (AIRS) since 1995. Regretfully, this partnership will be wrapping up this year and AIRS researchers at the Centre will be winding up their activities by the end of 2011.

Part of the Science and Technology Branch of Environment Canada, AIRS research efforts are directed towards understanding the impacts of a changing climate and developing impact models and tools on the risks and opportunities related to human and ecosystem health, human safety and Canada's long-term economic competitiveness. A key element of the research agenda has been carried out through partnerships and collaborations, such as those with specific universities: British Columbia, Waterloo, and Toronto.

AIRS' collaborative research at the Centre for Environment (CFE) focussed on simulating adaptation and developing educational curriculum using COBWEB (Complexity and Organized Behaviour Within Environmental Bounds), urban heat island visualization, infrastructure technologies such as green roofs and breathing walls and sectoral adaptation studies on energy at the community scale. The Ontario node of the Canadian Climate Change Scenarios Network was also housed here.

At U of T Scarborough, AIRS research focusses on regional climate reports, development of new tools that facilitate climate impact studies (Canadian Climate Change Scenarios Network, CCCSN), Rapid Assessment of the Impacts of Climate Change (RAICC), applying existing tools for climate change adaptation studies (Cost-Effective Adaptation Options, CAO) and sectoral climate change impact and adaptation studies (energy, tourism, protected areas, engineering).

Both locations have engaged graduate and undergraduate students in ongoing research and educational initiatives. High school students were also able to participate in research at CFE through the Faculty of Arts and Science's Mentorship Program. In 2010-11, **Dr. Brad Bass** (see below) completed secondary school curriculum on climate change adaptation that utilizes COBWEB and which will be disseminated by the Toronto District School Board. High school students **Sandra Dusolt**, **Mikaela Preston** and **Naima Raza**, mentored by Dr. Bass, each won gold medals at the Canada-Wide Science Fair for their work on biofuels and water quality. CFE and AIRS were also pleased to host Fulbright Specialist and green roof expert **Dr. Jeff Licht** (*see page 27*).

AIRS Researchers and Projects at U of T BRAD BASS

Office: Centre for Environment, Room 1048B (5 Bancroft Ave. entrance); mailing address: 33 Willcocks St., Toronto M5S 3E8; tel: 416-978-6285; fax: 416-978-3884; brad.bass@ec.gc.ca. **Research Interests:** Simulating adaptation with anticipatory/emergent computing, ecological engineering adaptations to atmospheric change (green walls, green roofs), community energy systems planning and adaptations to climate change, adaptation accounting, organizational structure and adaptation capacity, climate change visualization. **Projects:** adaptation studies using simulation platforms and models to study vector-borne disease and energy consumption, and the effectiveness of green roofs/walls in reducing energy consumption; to





AIRS researcher Dr. Brad Bass (far left) shows U of T and high school students how a green roof drainage layer works. Students from left to right: Pallavi Hariharan (B.Sc. graduate June 2011, Environmental Geosciences), Stephanie Gaglione (St. Roberts Academy), Helen Huang (B.A. student, Urban Studies), Abigail Feniza (B.A. student, Humanities), Tanner Regan (B.Sc. student, Environment and Science).

develop innovative views of the urban heat island and adaptations; and to design and evaluate different types of green infrastructure to maintain water quality and food supplies after severe weather events.

ADAM FENECH

Office: Dept. of Physical and Environmental Sciences, Room S-653, U of T Scarborough, 1265 Military Trail, Scarborough M1C 1A4; tel: 416-208-4873; fax: 416-287-7279; adam.fenech@utoronto.ca. **Research Interests:** Rapid assessment of the impacts of climate change, projections of future climate change, climate extremes and protected areas, applying global climate models to local impact studies, climate change impacts on tourism, climate change in the Greater Toronto Region and Niagara Region.

Projects: include studies of rapid assessment techniques and costeffective adaptations options for Ontario municipalities; the impacts of a changing climate on Canadian protected areas; the influence of climate change projections on tourism and wine sectors of the Niagara Region; and the rationale for, and value of, developing an indigenous/community-based climate observation program in the global UNESCO system.

MONIRUL MIRZA

Office: Dept. of Physical and Environmental Sciences, Room S-653, U of T Scarborough, 1265 Military Trail, Scarborough M1C 1A4; tel: 416-208-4874; fax: 416-287-7279; monirul.mirza@utoronto.ca. Research Interests: Hydro-meteorological analyses, extremes and natural hazards, climate change and sea-level rise vulnerability, impacts and adaptation for water and energy sectors, climate change scenarios, environmental security and sustainable development, hydro-politics and transboundary water resources management, water resources modelling and assessment, application tools and GIS. **Projects:** include studying adaptation baseline for extreme floods in Red River Basin, Manitoba and Bangladesh, urban and per-urban agriculture and potential impact to climate change in cities of Africa and Asia, as well as a report titled Climate Change in the Greater Vancouver Area (forthcoming late 2011), and a book titled Climate Change and the Canadian Energy Sector co-authored with Brad Bass and Heather Auld of AIRS (forthcoming late 2011, Springer New York).

Graduate Students' Research

The Centre for Environment (CFE) is pleased to have graduate students enrolled in its collaborative graduate programs in Environmental Studies and Environment & Health who are conducting interesting and important research. The following four pages contain condensed abstracts of theses or research papers of 2010-11 graduate alumni and listings of research topics of 2010-11 new and continuing students.

Environmental Studies Program 2010-11 Alumni

The following alumni convocated in 2010-11 from the Centre for Environment's graduate program in Environmental Studies (CFE ES). Please see page 16 for more information.

MATTHEW AIKEN, M.B.A., June 2011, Management/CFE ES: supervisor: Ignatius Horstmann, Management. Green Supply Chain Management. Over the last the decade, several supply chain management initiatives have been launched with the purpose of "saving the environment," by way of reducing carbon emissions, increasing the amount of material that is to be recycled, etc. This paper identifies some of the major practices that are being put into practice by major corporations or are being prominently mentioned in supply chain management literature. It also discusses whether these practices can be considered "green" or if they are simply sound business fundamentals that should be pursued, regardless of motive.

JULIA BARNES, M.A., Nov 2010, Geography/CFE ES; supervisor: Ken MacDonald, Social Sciences, U of T Scarborough. The Fiction of Globally Important Biodiversity: The Production of Scale through the Global Environment Facility's Biodiversity Policy and Programming. The gap observed between the rhetoric and reality of biodiversity conservation draws critical attention to the discourse of conservation and to claims that local and global interests can be balanced. This paper argues that the spatial framing of organized biodiversity conservation inhibits attempts to produce such "balance". It examines the processes by which biodiversity conservation projects are developed within the institutional framework of the Global Environment Facility and argues that the mechanisms that structure these projects around global goals systematically undermine the claims of situated resource users and prevent questions of justice from being raised.

ANNA CHASE, Ph.D., June 2011, Dept. of Curriculum, Learning and Teaching (OISE/UT)/ CFE ES; Dr. Gary Knowles, OISE/UT. Enveloped by Ocean Life: Experiences of SCUBA Diving. This inquiry focuses on what it means to immerse deeply into experiences within the natural world through personal experiences and shared stories. It brings the notion of connectedness with nature to the forefront as humans' alienation from the natural world is recognized as a significant contributor to the present ecological crisis. The exploration of ocean experiences in this study was also a search for ways to encourage and sustain a lifelong inquiry into the relations with the nonhuman world as a way to continually build and reinforce a bond with the natural world for psychological, social and ecological wellbeing.

NYSSA GRACE CLUBINE. M.Sc. Nov 2010. Geography/CFE ES; Joe Desloges, Geography. Seasonal Suspended Sediment Response to Floods in the Ausable River, Ontario. Studies on the effect of suspended sediment transport on the ecological health of the fluvial environment indicate that high levels of concentration of suspended sediment (CSS) reduce the health and spawning activity of many varieties of fish. Using data from a 24 year period (1970 to 1993), the objectives of thise study were to determine temporal patterns in the relationship between CSS and stream discharge from the agriculturally dominated Ausable River; to identify seasonal hysteresis patterns in sediment delivery and consider possible geomorphic controls; and to assess the possible roles of climate variations and land use in determining suspended sediment availability.

HIBA EL-CHEIKH ALI, M.F.C., June 2011, Forestry/CFE ES; supervisor: Neera Singh, Forestry. Urban Forest Awareness by Different Ethnic Communities in Ottawa/Gatineau. Ottawa/Gatineau has many different ethnic communities, with Lebanese and Somali communities among the most common visible ethnic minorities. This study assessed the level of awareness and attitudes of these two communities on urban forestry, in comparison to French Canadians. Results indicate that communities perceive the urban forest according to their background and country of origin. Somalis have less forest cover in Somalia and interviews indicate that they are less aware of forestry issues than the other communities studied. The Lebanese were more aware of forestry issues in Lebanon and French Canadians interviewed showed more interest in forestry issues than the others.

CATHERINE M. FEBRIA, Ph.D. Nov 2010, Ecology & Evolutionary Biology/CFE ES; Dudley Williams, Physical and Environmental Sciences, U of T Scarborough. *The Molecular Ecology of*



Recent Ph.D. alumnus Sedric Pankras Mettlemary gives a seminar on his research looking at different approaches to optimize ACQ wood preservative in order to minimize copper leaching into the environment.

Hyporheic Zones: Characterization of Dissolved Organic Matter and Bacterial Communities in Contrasting Stream Ecosystems. Bacteria and dissolved organic matter (DOM) form the basis of all stream food webs. The smallest headwater streams remain the most poorly known of all stream food webs and are undergoing environmental change. In this thesis, a permanent stream and an intermittent stream were studied over a three-year period to characterize the seasonal and spatial patterns in DOM and bacterial community composition. This study provides new knowledge on both organic matter dynamics and bacterial communities in a dynamic aquatic ecotone, and also confirmed the hypothesis that bacterial communities correlated significantly with ecosystem processes within a watershed.

LISA JOHANNESEN, M.Sc. Nov 2010, Anthropology/CFE ES; supervisor: Gary Coupland, Anthropology. Analysis of Coastal Marine Travel and Transport by Ancient Northwest Coast First Nations Through an Archaeological and **Environmental Survey and Site Analysis Project** in Salmon Inlet, British Columbia. The coastal setting and a marine-focused outlook of the ancient Northwest Coast First Nations of the North American Pacific coast focussed on seasonal harvesting and processing of salmon and has been described as the primary reason why social and economic complexity arose without agriculture. This study assessed how travel and transport by boat allowed for movement of people and goods quicker than over mountains, how it impacted the choice of settlement patterns and resource site use. Soil samples from archaeological sites were used to assess composition and potential use of sites.

Continued on page 8...

Continued from page 7.

MUNYA KABBA, Ph.D., June 2011, Sociology & Equity Studies in Education (OISE/UT)/CFE ES; supervisor: George Dei, OISE/UT. *Critical Investigation of the Sierra Leone Conflict: A Moral Practical Reconstruction of Crisis and Colonization in the Evolution of Society.* This research investigates the persistence of crisis tendencies in Sierra Leone as it fails to institutionalize the requisite organizing principle – post-conventional morality (rational discourse) in coordinating and resolving conflicts. The thesis argues that through their social interaction, citizens can realize a reflexive (evolutionary) learning potential. The thesis aims to promote the problem-solving capacity appropriate to regulate conflicts and to ensure stable social co-ordination. It argues that the political economy of Sierra Leone must find its limits in the socio-cultural domain of communication to enable the society break free of its crisis-ridden logic.

BRANDON OTT, M.A., Nov 2010, Political Science/CFE ES; supervisor: Grace Skogstad, Political Science. *Ontario's Feed-In-Tariff: The Good, the Bad and the Ugly.* In order to respond to our growing need for energy, innovation must be present not only in the development of new technology, but in policy instruments as well. One of the most innovative policies of the last two decades has been the feed-in-tariff. The concept of rewarding renewable energy generators with above-market value for their electricity has been implemented all over the world. This study analyzed Ontario's feed-in-tariff which has led the way in North America. After some disappointing conservation efforts, results indicate that the tariff offers solutions to ongoing problems such as the problem of supply and demand as peak energy needs increase.

SEDRIC PANKRAS METTLEMARY, Ph.D., June 2011, Forestry/CFE ES; supervisor: Paul Cooper, Forestry. *Influence of Alkaline Copper Quat (ACQ) Solution Parameters on Copper Complex Distribution and Leaching.* Ingredients of many wood preservatives have been found to be carcinogenic which has led to a new generation of preservatives, such as alkaline copper quat (ACQ), which use copper as an active ingredient. Although less toxic, copper is leached to the environment from ACQ treated wood, which can harm organisms. This research studied different approaches to optimize ACQ in order to minimize copper leaching. It evaluated solution parameters such as copper to quat ratio in the formulation, pH of the solution, ligand type and copper to ligand ratio that influence the amount of leach resistant fixation.

SARAH SHUJAH, M.I., June 2011, Information/CFE ES; supervisor: Matt Ratto, Information. *Bringing Food Democracy to the Patron's Dinner Table: How do Social Inclusion and Food Democracy Interrelate and Should Libraries Care?* Many people around the world are going hungry due to poor income and the lack of access to healthy food. It is argued that our current food system is unsustainable and further impoverishes people. Moreover, the global food system governs the access and distribution of healthy food. This paper argues that the public library has a social responsibility that is embedded in the foundational principles of librarianship – to promote food democracy as a component of social inclusiveness. Recommendations are provided.

SMITH SUNDAR, Ph.D., June 2011, Forestry/CFE ES; supervisor: Mohini Sain, Forestry. *Chemical Modification of Cellulose Fibers and Their Orientation in Magnetic Field.* There has been demand in the automotive industry and in manufacturing of furniture for the use of plant cellulose (or bio-based composites) in place of inorganic reinforcers or fillers in polymer based composites. Their mechanical properties are not only governed by factors such as fiber length and dispersion of fiber but also the orientation of fiber in the polymer matrix, which is usually uncontrolled. The objective of this research was to achieve optimal orientation and dispersion of cellulose fibers in the polymer matrix, by subjecting the modified cellulose to an electro-magnetic field.

LAURA TOZER, M.A., Nov 2010, Geography/CFE ES; supervisor: Virginia Maclaren, Geography. *Community Energy Plans in Canadian Cities: Success and Barriers in Implementation.* Some municipalities in Canada have developed community energy plans, which focus on energy needs at the local level for the development of efficient and environmental energy systems. Five Canadian cities (Calgary, Halifax, Vancouver, Guelph, and Pickering) that were early adopters of community energy planning principles were studied in this paper to assess whether community energy plans are being implemented in practice and what barriers have been experienced. Cities were compared in terms of the implementation of energy management, renewable energy and land use planning, and reductions in greenhouse gas emissions.

DEBBIE W. WAUNG, M.A.Sc., Nov 2010, Chemical Engineering/CFE ES; supervisors: Emma Master and Ramin Farnood, Chemical Engineering. *Optimizing Enzymatic Preparations of Mechanical Pulp Through the Characterization of New Laccases and Non-Productive Interactions Between Enzymes and Lignin.* The objective of this research was to identify and optimize enzymatic applications that have the potential to degrade lignin of middle lamella (first layer formed during cell division). The elucidation of non-productive binding behavior between hydrolytic enzymes and lignocellulosic substrates could improve the efficiency of corresponding industrial bioprocesses. This study characterizes non-catalytic interactions between enzymes and fibre and the biochemical and mutational studies of a novel bacterial enzyme.

JENAYA WEBB, M.I., June 2011, Information/CFE ES; supervisor: Matt Ratto, Information. *Information Practices/Environmental practices: Leveraging Approaches from Information Studies to Understand Household Environmental Practices.* This paper positions the *household* as an important site for the study of the interconnections between environmental conservation practices and digitally mediated information practices. It explores how the examination of everyday household information practices can be an important component of understanding household consumption and conservation practices. It also examines Google's PowerMeter initiative as a potential "field site" for exploring the articulation of information practices and environmental issues, particularly energy conservation.

Environmental Studies Program 2010-11 New & Continuing

The following students were enrolled in the Centre's graduate program in Environmental Studies (CFE ES) in 2010-11 and may continue or convocate in 2011-12. Research topics are included.

Maryam Adrangi, M.Ed., OISE/UT (Adult Ed. & Counselling Psych.)/CFE ES; supervisor: Angela Miles, OISE/UT. *Environmental and social justice*. Ramsey Rasheed Affifi, Ph.D., OISE/UT (Adult Education and Counselling Psychology)/CFE ES; supervisor: Gary Knowles, OISE/UT. *Living environmental education; interspecies curricula.*

Simon Appolloni, Ph.D., Religion/CFE ES; supervisor: Stephen Scharper, Anthropology UTM/CFE. Intersection of religion & the environmental crisis. Madina Bakhtovarshoeva, M.Ed., OISE/UT (Sociology & Equity Studies in Education)/CFE ES; supervisor: Paul Sawchuk, OISE/UT. Organizing communities around environmental issues.

Tajinder Singh Bhatia, Ph.D., Forestry/CFE ES; supervisor: Shashi Kant, Forestry. *Economic modeling of world carbon markets.*

Rachel Bryant, Ph.D., Philosophy/CFE ES; supervisors: Wayne Sumner, Dennis Walsh, Philosophy. *Normative foundations and ethical implications of conservation biology.*

Justin Chan, M.Ed., OISE/UT (Sociology & Equity Studies in Education)/ CFE ES; supervisor: Paul Olson, OISE/UT. Study of how to engage students and community members.

Aurel Cristian Ches, Ph.D., Geography UT Scarborough/CFE ES; supervisor: William Gough, Physical & Environmental Sciences, UT Scarborough. *Top-down and bottom-up climate change policy in Canada.*

Douglas Creighton, M.F.C., Forestry/CFE ES; supervisor: Andy Kenney, Forestry. Assessing forestry and environmental management decisions from various perspectives.

Tingsong Dai, M.Eng., Chemical Engineering/CFE ES; supervisor: Ramin Farnood, Chemical Eng. *Environmental analysis of gasification of biomass and syn-gas formation technology.* **Nicole Desaulnier**, M.I.St., Information/CFE ES; supervisor: Matt Ratto, Information. *Assessment* of environmental alternatives.

Troy Dixon, M.A., Political Science/CFE ES; supervisor: Victor Falkenheim, Political Science. *How domestic institutions impact the implementation of preventative environmental policy in Canada, the U.S. and European Union.*

Kristina Djokic, M.Ed., OISE/UT (Adult Ed. and Counselling Psychology)/CFE ES; supervisor: Gary Knowles, OISE/UT. *Environmental* sustainability planning strategies and programs.

Doug Duckworth, M.Sc.Pl., Geography (Planning)/CFE ES. *Greenbelts and their effects* upon sprawl.

Gabriel Eidelman, Ph.D., Political Science/CFE ES; supervisor: Richard Stren, Political Sci. *The politics of waterfront redevelopment in Toronto.* **Raluca Ellis**, Ph.D., Chemistry/CFE ES; supervisor: Jennifer Murphy, Chemistry. *Using high resolution measurements and models to investigate changes in atmospheric ammonia.*

Beth Jean Evans, Ph.D., Political Science/CFE ES. Sustainable development aspect of the Clean Development Mechanism and carbon market legitimacy.

Maryn Forde, M.A., Geography/CFE ES; supervisor: Danny Harvey, Geography. *Renewable* energy for the tourism sector of small island developing states.

Charlotte Friel, M.Sc., Geography/CFE ES; supervisor: Sarah Finkelstein, Geography. *Exploration of previous climate change episodes and their possible causes in the High Arctic.*

Jonathan Fung, M.Sc., Geography/CFE ES; supervisor: Jing Chen, Geography. *Inverse* modelling of observed CO2 to estimate regional and global carbon fluxes.

Nilima Gandhi, Ph.D., Chemical Engineering/CFE ES; supervisor: Miriam Diamond, Geography. Development of a new method to assess hazard of metals: improvements in assessment of metal fate, speciation and ecotoxicity.

Amir Ganjavie, Ph.D., Planning (Geography)/CFE ES; supervisor: Paul Hess, Geography. *Impact of neighbourhood design on car usage.*

Columba Gonzalez, Ph.D., Anthropology/CFE ES; supervisor: Hilary Cunningham, Anthropology. *Conservation areas in Northern Mexico: political ecology and biophysical perspectives.*

Robyn Hall, M.I., Information/CFE ES; sup: Matt Ratto, Information. *Communication and management of environmental information*.

Brian Harding, M.I., Information/CFE ES; supervisor: Sara Grimes, Information. *Knowledge* practices in the use of quantifactory technologies and techniques.

Mark Hathaway, Ph.D., OISE/UT (Adult Ed. and Coun. Psych.)/CFE ES; supervisor: A. Miles, OISE/UT. Transformative learning in movements; organisations working to change worldviews. Matt James Hodgson, M.A., History & Phil. of Science & Tech./CFE ES. How scientific theoryconstruction and modelling impact social values; disconnect between life-value and economic value. Shaik Hossain, Ph.D., Forestry/CFE ES; supervisor: John Caspersen, Forestry. Branch and crown dynamics in tolerant hardwood forests. David Houle, Ph.D., Political Science/CFE ES; supervisor: Grace Skogstad, Political Science. Climate change policy in Canadian provinces in the context of multi-level & regional governances. Ashleigh Ingle, M.Sc., Physics/CFE ES; sup: Paul Kushner, Physics. Effects of different ecosystems and growth patterns on climate models.



At the Centre's Research Day, doctoral student Jennifer Weaver presents her research on effects of landscape structure on the distribution and range expansion of the invasive Mute Swan in Ontario (see page 5).

Charissa Lindsey Jattan, M.Sc.Pl., Planning (Geography)/CFE ES. Sustainable transportation and environmental effects.

Andrew Kett, Ph.D., OISE/UT (Adult Education and Counselling Psychology)/CFE ES; supervisor: J. Gary Knowles, OISE/UT. *Environmental education and the workplace.*

Smita Kothari, Ph.D., Religion/CFE ES; supervisors: C. Emmrich, Religion; S. Scharper, Anthro. UTM/CFE. Dana and Dhyana in Jaina yoga: Preksha meditation and the Terapantha. William Kurth, M.Ed., OISE/UT (Adult

Education and Counselling Psych.)/CFE ES; supervisors: JP. Restoule, J.Quarter, OISE/UT. Impact of environmentally progressive policies on community networks.

Jessica Lemieux, M.A., Political Science/CFE ES; supervisor: Victor Falkenheim, Political Science. *The Transition Towns Movement: flash in the pan or here to stay*?

Angela Loder, Ph.D., Geography/CFE ES; supervisors: T. Relph, Social Science, UTSC;
S. Wakefield, Geography. *Exploring office worker perceptions of green roofs, health, and well-being.*Yi Luo, M.Sc.Pl., Geography/Planning/CFE ES;

supervisor: Matti Siemiatycki, Geography. *Green* infrastructure in municipalities. John Maiorano, M.Ed., OISE/UT (Sociology and

Equity Studies in Education)/CFE ES. Environmental finance and sustainable investment.

Zen Mariani, Ph.D., Physics/CFE ES; supervisor: Kimberley Strong, Physics. *Infrared emissions* measurements in the Arctic.

Justin Mok, Ph.D., East Asian Studies/CFE ES; supervisor: Richard Guisso, East Asian Studies. *Relationship between humans and environment in the cultural and environmental history of China.* Kate Moss, Ph.D., OISE/UT (Curriculum,

Teaching & Learning)/CFE ES; supervisor: Dennis Thiessen, OISE/UT. Comparative international education for sustainability: Canada, Lithuania and Sweden.

Amy Bliss Mui, Ph.D., Geography/CFE ES; supervisor: Yuhong He, Geography. *Estimation of* wetland and vegetation biochemical content using hyperspectral remote sensing.

Beverly Neapetung, M.A., OISE/UT (Adult Ed. and Counselling Psychology)/CFE ES; supervisor: JP. Restoule, OISE/UT. *Use of indigenous knowledge to examine fresh water sustainability and rights to this renewable resource.* Livio Nichilo, M.Eng., Mechanical and Industrial Engineering/CFE ES; supervisor: Kim Pressnail, Civil Engineering. *International development of Building Integrated Photovoltaic and its potential application in Toronto.*

Kaoruko Nitohbe, M.A., Political Science/CFE ES; supervisor: Ryan Balot, Political Science. *Global environmental governance in lessdeveloped and developing nations.*

Peter Ralevic, Ph.D., Forestry/CFE ES; supervisor: Tat Smith, Forestry. *Greenhouse gas mitigation potential and cost-competitiveness of forest bioenergy systems in Ontario.*

Renata Ramasra, Ph.D., Geography/CFE ES; supervisor: Thembela Kepe, Geography. *Governance challenges associated with forestry based carbon finance projects.*

Keven Roy, Ph.D., Physics/CFE ES; supervisor: Richard Peltier, Physics. *Impact of continental ice sheet on the rotational state of the earth: simulations & melting rates under climate change.* Vishma Lisa Singh, M.Eng., Chemical Engineering/CFE ES; supervisor: Tim Bender,

Chemical Eng. *Physical and chemical processes* affecting air quality, in both natural environments and engineered processes of treatment. Jessica Spina, M.A., Political Science/CFE ES;

supervisor: Ryan Balot, Political Science/Political popularity of ethanol and interconnections between agriculture & energy policies in America. Suzanne Spyron, M.F.C., Forestry/CFE ES; supervisor: John Caspersen, Forestry. Predicting tree crown or tree height based on tree age or

diameter in maple trees in Oakville, Ontario. Daniel Suarez, M.A., Geography/CFE ES; supervisor: Scott Prudham, Geography. *Political*

Supervisor fecosystem services in British Columbia. Solaiman Talut, M.I., Information/CFE ES; supervisor: Matt Ratto, Information. Impacts of digitization program policy on sustainability and service effectiveness in developing countries. Anne Vallentin, M.Ed., OISE/UT (Adult Ed. and Counselling Psych.)/CFE ES; sup: Jennifer Sumner, OISE/UT. Evaluation of the Everdale Organic Farm Certificate Program.

Daniel Vandervoort, M.A., OISE/UT (Adult Ed. and Counselling Psych.)/CFE ES; supervisor: Roxanna Ng, OISE/UT. *The social organization* of ecological agriculture knowledge.

Jason VanSlack, M.Ed., OISE/UT (Adult Ed. and Counselling Psych.)/CFE ES. Public outreach and environ-mental education at Lake Superior National Marine Conservation Area.

Stephanie Vanthof, M.Sc., Geography/CFE ES; supervisor: Danny Harvey, Geography. *Energy* management.

Jennifer Weaver, Ph.D., Geography UTM/CFE ES; supervisors: T. Conway, Geography, UTM; M-J. Fortin, Ecology and Evolutionary Biology. The effects of landscape structure on the distribution and range expansion of the invasive Mute Swan in Ontario. (See page 5 for abstract.) Cynthia Whaley, Ph.D., Physics/CFE ES; supervisor: Kimberley Strong, Physics. Understanding tropospheric trace gases at the University of Toronto Atmospheric Observatory. Gary Siu Leon Yip, M.B.A., Management/CFE ES. Effects of businesses on marine ecosystem. Thomas Paul York, Ph.D., Religion/CFE ES; supervisor: S. Scharper, Anthropology UTM/CFE. A Kantan interpretation of climate change issues. Xianming Zhang, Ph.D., Chemistry/CFE ES; supervisor: F. Wania, Physical & Environmental Sci., UTSC. Organic contaminants in the environment: passive air sampling and modeling.

Environment & Health Program 2010-11 Alumni

The following alumni convocated in 2010-11 from the Centre's collaborative graduate program in Environment and Health (CFE EH). Condensed abstracts of research papers or theses are included. Please see page 16 for information on this program.

Coursework Programs:

PRIYANKA RAJ, M.P.H., June 2011, Public Health/CFE EH. Coursework program in Occupational and Environmental Health. TARA ZUPANCIC, M.H.Sc., June 2011, Public Health/CFE EH. Course work program in Health Promotion. KAVITA SINGH, M.P.H., Nov 2010, Public Health/CFE EH. Course work program in Epidemiology.

Research Programs:

HAJERA AMATULLAH, M.P.H., June 2011, Public Health/CFE EH; supervisor: Jeremy Scott, Public Health. In-Vitro and In-Vivo Studies Investigating the Cardiopulmonary Effects of Particulate Air Pollution. Epidemiological studies have consistently associated air pollution with adverse effects on cardiovascular health. Studies have found enhanced arterial vasoconstriction after exposures to particulate matter, which may lead to cardiac events. This research investigated the differential health effects of various sized particulate matter (PM) concentrated from ambient air off the streets of downtown Toronto. Mice were exposed to coarse, fine or ultrafine particulate matter and compared to mice exposed to HEPA filtered air. Findings indicate that coarse and fine PM influence lung function and airways responsiveness, while ultrafine PM can perturb cardiovascular function. This supports the hypothesis that coarse and fine PM, likely deposited in the lungs, can exert their effects there while ultrafine PM may cross the alveolar epithelial barrier into the systemic circulation to affect cardiovascular function. The biochemical and molecular mechanisms responsible for the differential effects observed in the initial study were also investigated.

MICHELLE NORTH, Ph.D., June 2011, Medical Science/CFE ES; supervisors: Jeremy Scott, Public Health; Frances Silverman, Medical Science. L-Arginine Metabolism Regulates Airways Responsiveness in Asthma and *Exacerbation by Air Pollution.* Asthma is a chronic respiratory disease with high prevalence in Western countries and increased exacerbations associated with ambient air pollution. The maintenance of airways tone is critically dependent on the endogenous bronchodilator, nitric oxide (NO). The nitric oxide synthase isoenzymes produce NO from the amino acid L-arginine and competition for substrate with the arginase isoenzymes can limit NO production. Results of this research indicate that arginase isoenzymes and downstream polyamine metabolites contribute to airways hyperresponsiveness in asthma. Also, allergic mice exposed to air pollution exhibited increased arginase activity and expression, compared to filtered air-exposed controls. Results indicate that arginase inhibition may be a therapeutic for asthma and may also protect susceptible populations against health effects of air pollution.

KATE PARIZEAU, Ph.D., June 2011, Geography/CFE EH; supervisor: Virginia Maclaren, Geography. Urban Dirty Work: Labour Strategies, Environmental Health, and Coping Among Informal Recyclers in Buenos Aires, Argentina. This dissertation investigates informal waste recycling practices in the modern urban centre of Buenos Aires, Argentina. The research sets a baseline for the living and working conditions of the approximately 9,000 informal recyclers (*cartoneros*) in the city, focusing on their health, socio-economic status, and access to social and material resources. Findings indicate that the cartoneros are of a relatively low socio-economic status with poor health outcomes compared to others in the region. They are often stigmatized and discriminated against and experience social, political, and physical exclusions. The thesis argues that municipal agendas of neoliberal urban development are implicated in both the symbolic and physical marginalization of these workers. The cartoneros draw upon many resources and occasionally engage in collective action, and are therefore agents in their own destinies and



Doctoral student Benita Tam presents her research on effects of climate change on the well-being of Aboriginal populations in Ontario at the Centre for Environment's Research Day (see page 5).

potential actors for social change. An assessment of the municipal government's recent plans for some of these workers is included, as well as recommendations for other policy-based interventions.

BRUCE URCH, Ph.D., Nov 2010, Medical Science/CFE EH; supervisors: Paul Corey, Public Health; Frances Silverman, Medical Science. Controlled Human Exposures to Concentrated Ambient Fine Particles and Ozone: Individual and Combined Effects on Cardiorespiratory Outcomes. Epidemiological studies have shown strong associations between exposure to air pollution and increases in morbidity and mortality. Key air pollutants identified include fine particulate matter (PM) and ozone (O3), both major contributors to smog. In this research, a controlled human exposure facility was used to study acute cardiovascular responses to concentrated ambient fine particles (CAP), O3, CAP+O3 and filtered air exposures. Results showed that for CAP and CAP+O3 exposures, there were small but significant transient increases in diastolic blood pressure during exposures. Also, markers of systemic inflammation increased 1-3 hours after exposures and brachial artery reactivity decreased 20 hours after exposures. Responses to O3 were smaller, comparable to filtered air. Further results point to autonomic irritant responses and inflammatory mechanisms. Findings support the epidemiological evidence of adverse fine PM health effects.

New & Continuing

The following students were enrolled in the Centre's collaborative program in Environment and Health (CFE EH) in 2010-11 and may continue or convocate in 2011-12.

Dolon Chakravartty, Ph.D., Public Health/CFE EH; supervisors: Blake Poland and Donald Cole, Public Health. Environmental contaminants and effects on women's health.

Emily Groot, M.P.H., Public Health/CFE EH. Coursework program in Social and Behavioural Health Sciences.

Morris Komakech, M.P.H., Public Health/CFE EH. Coursework program in Social and Behavioural Health Sciences

Iffath Syed, M.H.Sc., Public Health/CFE EH. Coursework program in Occupational and Environmental Health.

Benita Tam, Ph.D., Geography/CFE EH; supervisor: William Gough, Physical and Environmental Sciences, UT Scarborough. The effects of climate change on the well-being of Aboriginal populations in Ontario. (See page 5 for abstract of research presentation.)

Andrew Thomas, M.P.H., Public Health/CFE EH; supervisor: Frances Silverman, Medicine. Cardio-respiratory health effects from volatile organic compounds in controlled human exposure studies.

Michael Weisbrot, M.P.H., Public Health/CFE EH. Coursework program in Occupational and Environmental Health.

Message from the Undergraduate Coordinator

BY KAREN ING

FOR MORE INFORMATION:

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From the undergraduate perspective, the 2010-11 academic year has been one of transition and growth. A long awaited first year environmental studies course was launched, full year courses were converted to half year offerings, and a new **Environmental Studies B.A. program** amalgamated two previous B.A. programs. The latter amalgamation was designed to allow students greater flexibility while maintaining their ability to specialize and stream in certain areas of interest. The popularity and success of this amalgamation is evidenced by the 175 students who enrolled in the major and another 64 who enrolled in the minor in its first year of offering.

This surge of interest in the environment was also reflected by the fact that four of the new or reconfigured first and second year courses saw enrolments of more than 300 students. This surge was led by Professor Stephen Scharper's inaugural offering of ENV100 Introduction to Environmental Studies, a first year course which was designed to explore major social, cultural, economic, regulatory, ethical and ecological aspects of environmental issues (see article below). We are delighted at this opportunity to reach more students, but anticipate some growing pains as this may translate to greater demand for our upper year courses.

To better address the needs and interests of our students, curriculum planning in environmental programs is ongoing. At the time this Annual Report is going to press, working groups on both the Environmental Science and Environmental Studies are meeting to look at ways to make more effective use of existing teaching capacity towards environmental teaching across the



units in the Faculty of Arts and Science. The reports will likely be released for consultation by early Fall 2011.

And finally, the Centre would not be able to offer and maintain both the diversity and quality of undergraduate courses and programs if not for the valued contributions of our faculty, administrative staff, sessional lecturers, teaching assistants, and collaborating units across the university. To all these individuals and units, we extend a sincere thank you for your contributions this past year and look forward to working with you in the coming years.

Karen Ing is also a Senior Lecturer at the Centre for Environment. (See page 33.)

New Introduction to Environment course

Inaugural offering of first year course draws high enrollment

BY STEPHEN SCHARPER AND DAVID POWELL

The Centre for Environment (CFE) was very pleased with the response to its first year course **ENV100H Introduction to Environmental Studies** first offered in the fall term of 2010. Enrolment reached the maximum of 390 students, with more than 35 on the waiting list. Course instructor **Professor Stephen Scharper** (of Anthropology UT Mississauga and CFE; *see page 35*) was pleased by the level of interest and enthusiasm in the material shown by the students.

With guest presentations by U of T alumnus **Dr. Bob Willard** on green business, visiting Fullbright Specialist **Dr. Jeff Licht** on green roofs *(see page 27)*, Anthropology **Professor Hilary Cunningham** on notions of wilderness, as well as **Kevin Frank** of Second City Comedy Group, the course has been graced by lively perspectives from a variety of disciplines. Dr. Scharper was also very fortunate to be working with an excellent team of graduate teaching assistants, headed by Ph.D. candidate **James Nugent** of Geography and including Ph.D. candidates **Simon Appolloni** (Religion and CFE) and **Mark Hathaway** (OISE/UT and CFE), and M.A. student **David Photiadis** of Geography.

Because of the high level of interest, Fall 2011 maximum enrollment has been increased to 500.



Visiting Fullbright Specialist and green roof expert Dr. Jeff Licht (standing centre) speaks to full auditorium of students in the new course ENV100 Introduction to Environmental Studies while instructor Professor Stephen Scharper looks on at bottom left.

Undergraduate Programs

For more information, please visit www.environment.utoronto.ca.

Core Programs:

The Centre offers two core interdisciplinary undergraduate program streams, each as a major and minor:

- 1. Environment and Science (B.Sc.)
- 2. Environment Studies (B.A.)

Collaborative Programs:

The following collaborative programs combine the Centre's interdisciplinary core with a set of discipline-specific courses:

Specialist Programs:

- 1. Environment and Health (B.Sc., with the Human Biology Program)
- 2. Environmental Chemistry (B.Sc., with the Department of Chemistry)
- 3. Environmental Geosciences (B.Sc., with the Department of Geology)
- 4. Environment and Toxicology (B.Sc., with the Department of Pharmacology and Toxicology)

Major Programs:

1. Environmental Ethics

- (B.A., with the Department of Philosophy) 2. Environment and Health
- (B.Sc., with the Human Biology Program) 3. Environmental Geosciences
- (B.Sc., with the Dept of Geology)

Minor Programs:

1. Environment and Behaviour

- (B.Sc., with the Department of Psychology) 2. Environment and Energy
- (B.Sc., with the Department of Geography)3. Environmental Ethics
 - (B.A., with the Department of Philosophy)

Directed Minors:

The following directed minor programs are offered by other departments and are for students interested in acquiring a limited body of knowledge in a specific discipline.

- 1. Environmental Anthropology (B.A.)
- 2. Environmental Biology (B.Sc.)
- 3. Environmental Chemistry (B.Sc.)
- 4. Environmental Economics (B.A.)
- 5. Environmental Geosciences (B.Sc.)
- 6. Geographic Information Systems (B.A.)
- 7. Physics Life and Environmental (B.Sc.)
- 8. Physical and Environmental Geography (B.Sc.)

Undergraduate Courses

2011-12 Centre for Environment (CFE) undergraduate offerings and instructors are subject to change. For profiles of instructors, please see pages 32-41.

ENV 100H	Introduction to Environmental Studies (see article on page 11; Stephen Scharper, Anthropology UTM/CFE)
SII 199H(F)	Debating and Understanding Current Environmental Issues (Faculty of Arts and Sciences (FAS) first-year seminar course; Karen Ing, CFE)
SII 199H(S)	Sustainable and Just Futures: Environmental Politics in an Age of Global Warming (FAS first-year seminar course; Kundan Kumar, Geography/CFE)
ENV 200H	Assessing Global Change: Science and the Environment (Karen Ing, CFE)
ENV 221H	Multidisciplinary Perspectives on Environment (Karen Ing, CFE)
ENV 222H	Interdisciplinary Environmental Studies (Douglas Macdonald, CFE)
ENV 223H	Fundamental Environmental Skills (Christian Abizaid, Geog/CFE)
ENV 234H	Environmental Biology (Hélène Cyr, Ecology & Evolutionary Biology)
ENV 235H	Physics and Chemistry of the Evolving Earth (Bernd Milkereit, Physics)
IGE 236H	Human Interactions with the Environment (Miriam Diamond, Geography)
ENV 299Y	Research Opportunity Program *
ENV 307H	Urban Sustainability (Beth Savan, CFE)
ENV 315H	Chemical Analysis of Environmental Samples (Michael Gorton, Geology)
ENV 320H	National Environmental Policy (Douglas Macdonald, CFE)
IGE 321H	Multicultural Perspectives on Environmental Management (joint with Geography; Christian Abizaid, Geography/CFE)
ENV 322H	International Environmental Policy (Douglas Macdonald, CFE)
ENV 323H	Ontario Environmental Policy (Russ Houldin, sessional)
IGE 331H	Resource and Environmental Theory (joint with Geography; James Nugent, Geography)
ENV 333H	Ecological Worldviews (Kundan Kumar, Geography/CFE)
ENV 335H	Environmental Design (Sheila Waite-Chuah, sessional)
ENV 336H	Ecology in Human Dominated Landscapes *
ENV 341H	Environment and Human Health (Riina Bray, sessional)
ENV 346H	Terrestrial Energy Systems (Bryan Karney, Civil Engineering)
ENV 347H	The Power of Economic Ideas (Russ Houldin, sessional)
IGE 347H	Efficient Use of Energy *
IGE 348H	Carbon-Free Energy *
ENV 350H	Energy Policy and Environment (Keith Stewart, sessional)
ENV 395Y	Special Topics Field Course. Ecology and Conservation in the Amazon, Galápagos, and Andes (<i>see article on page 14</i> ; <i>Karen Ing, CFE;</i> <i>Don Jackson, CFE/Ecology & Evolutionary Biology</i>)
ENV 399Y	Independent Experiential Study Project *
ENV 421H	Environmental Research (see article on page 13; David Sider, sessional)
ENV 422H	Environmental Law (Paul Muldoon, sessional)
ENV 430H	Environment and Health of Vulnerable Populations (Clare Wiseman, CFE)
ENV 431H	Urban Sustainability and Ecological Technology (new in 2011-12; Brad Bass, sessional)
ENV 440H	Professional Experience Course (David Sider, sessional)
ENV 451H	Current Environmental Debates (Douglas Macdonald, CFE)
JEH 455H	Current Issues in Environment and Health (Ron Wilson, Human Biology Program, New College)
ENV 481H	Special Topics in the Environment I *
ENV 482H	Special Topics in the Environment II *
ENV 492H	Independent Studies Project (Staff)
ENV 493H	Independent Studies Project (Staff)

* Not offered in 2011-12.

Students research sustainability

Senior undergraduate course provides group research experience

BY DAVID SIDER

ENV 421H Environmental Research course

2010-12 Instructor: David Sider, Sessional Lecturer (see page 41); david.sider@utoronto.ca.

In 2010-11, senior undergraduate students in ENV421 carried out six group projects on important and diverse topics related to environmental sustainability: food consumption habits, renewable energy, ecotourism, greenwashing, light pollution, and indoor air quality. Groups developed their research proposals over the fall term and undertook their primary research, analysis of data, and report writing in the winter term. At the final class in late March 2011, groups presented their research findings to the rest of the class.

The main goals were for students to work collaboratively in groups and to gain experience in carrying out a research project from start to finish, encompassing topic selection, literature search, formulation of hypotheses, research design and methods, ethics review, data collection and analysis, and report writing.

Research carried out utilized a variety of primary research methods to obtain data, including surveys, in-depths interviews of key informants, and structured observation. A number of the groups undertook surveys of the campus population to ascertain their views on, and understanding of, a variety of topics and to find out about aspects of everyday behaviour that may have environmental implications. Others did surveys and data collection off-campus.

All groups produced interesting and insightful research findings on different facets of sustainability. For example, the greenwashing group examined the marketing strategy of "greenwashing", in which consumer products are advertised and promoted as "green" when they usually are not. Finding that a high proportion of household cleaning products in retail stores in Toronto fall into this category, their research underscores the need for greater public awareness of greenwashing strategies employed in the marketplace so that consumers can make informed purchasing decisions.

The food consumption group investigated whether certain environmental beliefs and values translate into environmentally conscious food selection choices. Surveying U of T students in different academic programs, this group found that students enrolled in programs at the Centre for Environment were more likely to buy local and organic food than other students.

The renewable energy group studied which renewable projects are already in place or in the pipeline at U of T, and which factors encourage renewable energy on campuses more widely. They found that the most important consideration in implementing renewable energy projects on university campuses, generally, is usually the business case, although non-financial benefits, such as the enhancement of institutional reputation as a leader in this area and increased opportunities for hands-on research and learning for students and faculty, can be motivating factors.

The indoor air quality group studied the relationship between indoor air quality and comfort of users of three U of T buildings, based on parameters such as temperature and dust levels as well as subjective reporting of users. They also developed an index of indoor air quality which they used to measure air quality in several buildings on campus and provide useful recommendations on how air quality could be improved through technical measures and changes in daily practices of building users.



Students in the Centre's senior undergraduate environmental research course present their research on renewable energy in class. Students from left to right Branka Vujic, Adam Rennie, Shahmineh Mavalvala, Joon Ai and Muting He studied which renewable projects are already in place or in the pipeline at the University of Toronto, and which factors encourage renewable energy on campuses more widely.

Environmental Students' Union

The Environmental Students' Union (ENSU) is a student organization that aims to create and support initiatives to increase environmental awareness and sustainability both on and off the U of T campus. Membership is open to students at the university regardless of area of study or degree. The executive, however, is comprised of elected undergraduate representatives, and positions of academic concern are reserved for students in environmental programs affiliated with the Centre for Environment (CFE).

ENSU has recently worked on environmental projects on campus such as the installation of a solar panel array on Sidney Smith Hall and a project aimed at improving the composting collections. It has also organized socials and environmental film nights, a winter retreat to Hart House Farm, and a graduate studies information session, and has also continued to play a role in the annual Environmental Career Day *(see page 27)*. A recent focus has been on increasing participation and cohesion among Centre for Environment students, as well as creating study resources for future years and strong social activities. The most prominent goal is to increase the feeling of community among environmental students on campus and co-ordination with other U of T environmental student groups.

The 2011-12 elected Executive Coordinators are CFE students **Cathy Zhao** (Environmental policy and practice major, and human Geography major) and **Ben Normand** (Environmental policy and practice major, and Religion major).

For more information, please visit http://ensu.sa.utoronto.ca or email studentaffairs.ensu@utoronto.ca.

Students explore Ecuador & Galápagos

Undergraduates study ecology and conservation in summer field course

BY KAREN ING AND DONALD JACKSON

Ecology and Conservation in the Andes, Western Amazonia and the Galápagos ENV 395Y Special Topics Field Course

Summer 2011 Instructors: Donald Jackson, Ecology and Evol. Biology, CFE Interim Director; and Karen Ing, CFE Senior Lecturer (see page 33).

The Special Topics field course was offered in Ecuador for its sixth year in May-June 2011 with **Karen Ing** and **Don Jackson** leading a group of 21 enthusiastic undergraduate students with the assistance of Ecuadorean colleagues **Jaime Guerra** and **Diego Quiroga** from the Universidad San Francisco de Quito (USFQ). The course focused on the ecology and conservation in the Andes, Western Amazonia and the Gálapagos, and students were given an unprecedented academic experience with access to locations, guides and researchers not readily available to the average visitor. The course is offered by the Centre for Environment in collaboration with Woodsworth College's Summer Abroad Program.

For a relatively small country with a total area slightly less than the state of Nevada, Ecuador's unique topography and location offers up a wealth of vegetation types ranging from coastal desert, mangrove, cloud forest, grasslands, paramos (alpine tundra), and lowland rainforest that even a 32 day field course could only allow a study of the major highlights.

The course started with lessons and hikes in the Andes which allowed students to appreciate firsthand the importance of plate tectonics in shaping the landscape and the resultant dramatic altitudinal impacts on ecosystem formation. The adventures on the Andean slopes included hiking on the undulating terrain of the paramo (alpine tundra) to visit one of the few remaining stands of Polylepis forests and was capped with a hike on Chimborazo, the world's tallest mountain as measured from the earth centre.

The next component of the course involved a week-long trip into the Western Amazonian rainforest. Our home base was the remote Tiputini Biodiversity Station, a research station jointly developed by USFQ and Boston University. It is located adjacent to the Yasuni Biosphere Reserve recognized as having the greatest concentration of species diversity in the world. Among the many spectacular sightings were seven different species of primates, five species of bats, river dolphins, anacondas, tapirs, peccaries, three-toed sloths, deers, countless birds, insects, trees and plants, providing another illustration of the co-evolutionary strategies that have evolved over millennia. Students also participated in canopy walks, night floats, piranha fishing, night trapping of bats, and an opportunity to design and carry out their own mini research projects. It was difficult to leave the rainforest, but the upcoming 10-day outing to the Gálapagos beckoned the students.

The final component of the course was a 10-day trip to the Gálapagos. Our arrival provided a stark contrast to earlier environments given the now arid conditions and prickly pear cacti towering over us. In contrast to most eco-tourism trips to the Gálapagos, our trip had us living in the various communities on the island of San Cristobal and our classes and trips involving personnel from the USFQ. This provided us with a more direct immersion into the culture, and also insight into the science and social science aspects of the Gálapagos. Students had a combination of lectures in



Professor Don Jackson (CFE Interim Director, standing far right) joins undergraduate students taking a break from excursions on Gálapagos island of San Cristobal. The course included trips to the Andes and Western Amazonia of Ecuador. (See this report cover for more photos.)

the classroom, but then got out to see the islands so famous for their biology. On our walks on the islands, the famous Gálapagos (Darwin's) finches were readily apparent as they would frequently come up to you whenever you stopped. We also had great opportunities to see how the local effects of climate were shaping the vegetation and animal life, and how the historical effects of the geology and evolution/ecology came into play resulting in the present-day ecosystem. Our stay also involved opportunities for snorkelling and seeing marine life of the area. Having playful sea lions quickly swim around you only to stop and look into your mask from a metre away was quite an experience. Similarly, swimming with sharks and other diverse marine captured all our attention.

After several days on San Cristobal, we began our "island hopping" tour, allowing us to visit islands with quite different ecological conditions and human histories given their position relative to various important oceanic currents. The differences amongst the islands and certainly emphasized various points raised during our classroom lectures. Visits to breeding facilities for the Giant Tortoises allowed us to see the different races (or subspecies) of tortoises from different islands, how the shapes of their shells differ from one island to another, and how these differences relate to their ecologies and natural selection. Snorkeling, guided walks on the islands and travelling between islands provided us with great opportunities to see many of the famous species such as the Bluefooted Boobies, Marine Iguanas, Gálapagos Penguins, and Giant Rays, often within a couple of metres of us...a remarkable opportunity to observe nature and observe it firsthand rather than simply through classroom lectures and photographs.

After several days travelling amongst the islands, it was time to return to the Quito and the mainland USFQ campus. It was also time for the students' final exam and to enjoy a night out before our 4:00 am departure to Toronto. Overall, it was a remarkable trip for all, ranging from the ecological and environmental experiences in these exotic locations, to the insight gained from our educational partners at USFQ, to the new friendships that developed.

Undergraduate Students' Awards

Congratulations to the latest recipients of the following Centre for Environment (CFE) undergraduate awards. Recipients of the Centre's other undergraduate awards will be announced in fall 2011.

Robert Hunter Scholarships: These

are awarded to outstanding CFE students in memory of Robert Hunter, journalist and cofounder of Greenpeace. The recipients, recognized at the 2011 Hunter Memorial Lecture *(see page 28)*, were:

- Lauryn Drainie (Environmental Policy and Practice);
- Jessica Elders (Environmental Ethics, Ethics Society and the Law);
- Jean Paulyn Liu (Earth Systems: Physics and Environment, Physics); and
- Zannah Matson (Peace and Conflict, Environment and Society).

Douglas Pimlott Awards and

Scholarships: These are awarded to CFE students with excellent levels of academic achievement and a demonstrated commitment to social involvement in environmental issues. The recipients, recognized at the 2011 Pimlott Memorial Lecture (*see page 28*), were:

Pimlott Award:

- Kathlynn Ahern (Env. Policy and Practice, International Dev. Studies);
- **Daryn Caister** (Environmental Policy and Practice, Urban Studies);
- Caroline Franklin (Environment and Science, Forestry Conservation Science);
- Maliha Haswary (Environmental Studies);
- **Gurushabd Khalsa** (Environmental Policy and Practice, International Relations);
- Clara Luke (Environmental Policy and Practice, English);
- Jakub Pieczarski (Environ.Studies); and
- Kelsey Rose (Environ. Policy & Practice).

Pimlott Graduating Scholarship:

- Samanatha Azzerello (Environment and Science, Economics);
- Greta Chiu (Environment and Toxicology);
- Joanna Dafoe (Environmental Policy and Practice, Peace and Conflict Studies);
- Lauryn Drainie (Env. Policy & Practice).

FOR MORE INFORMATION:

www.environment.utoronto.ca or contact David Powell, 416-946-8100, david.powell@utoronto.ca

Inaugural Jane Goodall scholarship awarded in 2011

On April 1, 2011, the Centre's Interim Director **Professor Donald Jackson** presented the inaugural Jane Goodall undergraduate scholarship to **Claire-Helene Heese-Boutin**. We were pleased to have **Dr. Jane Goodall**, acclaimed primatologist and UN Messenger of Peace, personally recognize Claire-Helene. The event also included a seminar by **Dr. Zinta Zommers** of the University of Oxford *(see page 31)*.

Claire-Helene is a June 2011 graduate with an honours B.A. in Caribbean Studies



and Environmental Studies. This scholarship is awarded to one or more outstanding undergraduate students enrolled in a CFE program with preference given to students focusing on studies of environment and development.

BELOW (TOP): Bob Hunter's wife Bobbi (far left) and Professor Stephen Scharper (right) join Robert Hunter scholarship recipients Jean Lui, Lauren Drainie, and Jessica Elders at the Hunter Memorial Lecture. (Absent: Zannah Matson.)

BOTTOM: Professor Stephen Scharper (back row left) and Monte Hummel (former President of World Wildlife Fund Canada; front, far right) join Douglas Pimlott award recipients from left to right Maliha Haswary, Joanna Dafoe, Caroline Franklin, Clara Luke and Daryn Caister at the Pimlott Memorial Lecture. (See left for other recipients.)





Collaborative Graduate Programs

FOR MORE INFORMATION:

www.environment.utoronto.ca or Pavel Pripa, Graduate Student Advisor, 416-978-3475, pavel.pripa@utoronto.ca

Graduate Program Director: DONALD JACKSON, Interim CFE Director (see p. 33).

The Centre for Environment offers two collaborative programs of study at the Masters and Doctoral level: 1) Environmental Studies, and 2) Environment and Health *(see article below)*. Students who are admitted to a "home" department apply to the collaborative program and pursue course work and research in environmental areas. Through these programs, students have the opportunity to pursue interdisciplinary, graduate education while building on their own disciplinary grounding.

Environmental Studies Collaborative Program

One of the compelling strengths of this program is the interdisciplinary environment in which teaching and research is conducted. For example, the core course, **ENV 1001H Environmental Decision Making**, is currently taught by professors from both the humanities and engineering. In this program, students are both able to specialize in an area of environmental research and gain exposure to a wide range of intellectual and methodological disciplines focused on environmental issues.

The Centre's Environmental Studies Collaborative Program currently has graduate students from across the disciplinary spectrum. Collaborating units are: Adult Education, Community Development and Counselling Psychology (OISE/UT); Anthropology; Chemical Engineering and Applied Chemistry; Chemistry; Ecology and Evolutionary Biology; Economics; Forestry; Geography and Planning; Geology; Information; Management; Philosophy; Physics; Political Science; Religion; Sociology; Sociology and Equity Studies in Education (OISE/UT); and Women and Gender Studies.

Students may also be admitted from other units on an individual basis. For example, we have recently had students also enrolled in Chemical Engineering, East Asian Studies, Mechanical and Industrial Engineering, Social Work, and South Asian Studies.

Program requirements vary with each home department. Along with the aforementioned core course, students are typically required to take an elective course and conduct research on an environmental topic fulfilling the requirements of their home department (i.e. thesis or research paper). Non-thesis Masters students are required to also complete an internship and Doctoral students are also required to present a seminar on their research.

In 2010-11, the Centre was pleased to have 15 new alumni from this program (5 Ph.D. and 10 Masters). In 2010-11, the Centre also welcomed 11 new Ph.D. and 23 new Masters students in this program, bringing the total number of that year's enrolled students to 80. (See pages 7-9 abstracts of alumni theses and papers and for other students' research topics.)

In April 2011 at its Research Day, the Centre was very pleased to present the **inaugural Alexander B. Leman Memorial Graduate Award** to one of its graduate students. This award was established by former CFE Director **Professor Ingrid Leman Stefanovic** and the Leman family. *(See page 18 for more details.)*

At the Centre for Environment, it is our mission to leverage this university's great intellectual might to produce truly interdisciplinary scholars with the interest and ability to understand, protect and enhance the environment.

Environment and Health Collaborative Program

BY CLARE WISEMAN

The collaborative graduate program in Environment and Health is offered by the Centre for Environment, in conjunction with the graduate degree programs of Geography and Planning, Medical Science, Public Health, and Women and Gender Studies. It provides an interdisciplinary perspective to the field of environment and health for students interested in studying how various chemical, biological and radiological exposures in the indoor and outdoor environments can affect the health of individuals and communities, as well as the social, policy and ethical dimensions of environment and health issues.

The public **Environment and Health Seminar Series** and core course (ENV4001H) seeks to bring in top academics and experts from a wide range of fields, backgrounds and affiliations to present their research and introduce students to a variety of interdisciplinary perspectives, methods and concepts. *(See page 30 for last year's seminars).*

Current and past students of the program have contributed greatly to the field of environment and health, researching a broad range of highly pertinent and interesting topics. (See page 10 for research topics and theses abstracts of 2010-11 students and alumni.)

In addition to teaching ENV 4001H, I will also be teaching ENV4002H The Environment and Health of Vulnerable Populations in the Fall 2011 term, which is also cross-listed as an undergraduate course (ENV430H). It explores how and why certain populations may be especially vulnerable to environmental hazards and will address not only the role of various biological, neuro-developmental and physiological factors in determining vulnerability but also related sociocultural, equity and justice issues.

The Centre also plans to offer a new graduate course ENV4003H Global Climate Change and Health in the near future. Using a seminar format, this course will examine the various ways global climate change may impact human health, from its effects on aboriginal peoples to changing patterns of disease and related issues of equity and justice.

Dr. Clare Wiseman is CFE Assistant Professor and Coordinator of the graduate collaborative Environment and Health Program (see page 37).

Graduate Faculty

The following individuals currently have graduate faculty appointments at the Centre for Environment (CFE). Membership is subject to change. For information on appointments and student supervision, please contact Pavel Pripa at pavel.pripa@utoronto.ca.

Full Members

Jonathan Abbatt, Chemistry Grant Allen, Chemical Eng. & Applied Chemistry Robert Andrews, Civil Engineering George Arhonditsis, Physical & Environmental Sciences, UT Scarborough (UTSC) Spencer Barrett, Ecology & Evolutionary Biology Steven Bernstein, Political Science Alana Boland, Geography Michael Bunce, Social Sciences, UT Scarborough Philip Byer, Civil Engineering/CFE Jing Chen, Geography Tenley Conway, Geography, UT Mississauga Paul Corey, Public Health Sharon Cowling, Geography Hilary Cunningham, Anthropology Amrita Daniere, Geography George Dei, OISE/UT Sociology & Equity Studies Donald Dewees, Economics Miriam Diamond, Geography Maria Dittrich, Physical & Environ. Sci., UTSC Birsen Donmez, Mechanical and Industrial Eng. Steve Easterbrook, Computer Science Elizabeth Edwards, Chem. Eng. & Applied Chem. Mark Engstom, Ecology & Evol. Biology/ROM Greg Evans, Chemical Eng. & Applied Chemistry Nick Eyles, Physical & Environ. Sciences, UTSC Roberta Fulthorpe, Physical & Env. Sci., UTSC William Gough, Physical & Environ. Sci., UTSC Mart Gross, Ecology & Evolutionary Biology L. Danny Harvey, Geography D. Linn Holness, Public Health Sciences Ken Howard, Physical & Environ. Sci., UTSC Donald Jackson, Ecology & Evolutionary Biology Charles Jia, Chemical Eng. & Applied Chemistry Shashi Kant, Forestry Bryan Karney, Civil Engineering Chris Kennedy, Civil Engineering J. Gary Knowles, OISE/UT Adult Education and Counselling Psychology Scott Mabury, Chemistry Laurel MacDowell, History, UT Mississauga Virginia Maclaren, Geography Heather MacLean, Civil Engineering Jay Malcolm, Forestry David Martell, Forestry Patricia McCarney, Political Science Andrew Miall, Geology Eric Miller, Civil Engineering Carl Mitchell, Physical & Envir. Sciences, UTSC G.W. Kent Moore, Physics, UT Mississauga D. Scott Munro, Geography, UT Mississauga Jennifer Murphy, Chemistry Michelle Murphy, History Blake Poland, Public Health Anthony Price, Physical & Environ. Sci., UTSC W. Scott Prudham, Geography/CFE Douglas Reeve, Chemical Eng. & Applied Chem. Helen Rodd, Ecology & Evolutionary Biology

Rowan Sage, Ecology & Evolutionary Biology Mohini Sain, Forestry K. Richard Sandbrook, Political Science Andrea Sass-Kortsak, Public Health Lawrence Sawchuk, Social Sciences, UTSC Stephen Scharper, Anthropology, UTM/CFE Barbara Sherwood Lollar, Geology Krystyna Sieciechowicz, Anthropology Frances Silverman, Medicine André Simpson, Physical & Environ, Sci., UTSC Myrna Simpson, Physical & Environ. Sci., UTSC Grace Skogstad, Social Sciences, UTSC C. Tattersall Smith, Forestry Sandy Smith, Forestry Mark Stabile, Management; Public Policy & Gov. Ingrid Leman Stefanovic, Philosophy Kimberly Strong, Physics Susan Tarlo, Public Health Sciences Ross Upshur, Family & Comm. Medicine; Public Health Willem Vanderburg, Civil Engineering/CFE Sarah Wakefield, Geography Denis Walsh, Philosophy Frank Wania, Physical & Environ. Sci., UTSC Mathew Wells, Physical & Environ. Sci., UTSC Peter Wells, Pharmacv Dudley Williams, Physical & Environ. Sci., UTSC Kathi Wilson, Geography, UT Mississauga

Associate Members

Nathan Basiliko, Geography, UT Mississauga Kerry Bowman, Joint Centre for Bioethics Andrew Green, Law A.P. (Lino) Grima, Geography H. Roland Hosein, GE Canada Inc. Marney Isaac, Physical & Environ. Sci., UTSC Andy Kenney, Forestry Kundan Kumar, Geography/CFE Sonia Labatt Douglas Macdonald, Centre for Environment Monirul Mirza, Environment Canada Barbara Murck, Geography, UT Mississauga Dennis O'Hara, St. Michael's College Matthew Ratto, Information Beth Savan, Centre for Environment Lesbia Smith, Public Health Sciences Helene Wagner, Ecology & Evolutionary Biology Clare Wiseman, Centre for Environment Cindy Woodland, Pharmacology

Members Emeriti

Paul Aird, Forestry Terry Blake, Forestry Frances Burton, Social Sciences, UT Scarborough Catherine Chalin, Public Health Frank Cunningham, Philosophy Brian Greenwood, Physical & Env. Sci., UTSC William Michelson, Sociology R.E. (Ted) Munn Edmund O'Sullivan, OISE/UT Adult Education and Counselling Psychology Henry Regier D.N. Roy, Forestry Richard Stren, Political Science Wayne Sumner, Philosophy Rodney R. White, Geography Joseph Whitney, Geography G. Ronald Williams

Graduate Courses

2011-12 Centre for Environment (CFE) graduate course offerings and instructors indicated are subject to change. For profiles of instructors, please see pages 32-41.

For more information, please visit www.environment.utoronto.ca or contact Pavel Pripa, pavel.pripa@utoronto.ca.

Core Courses

ENV 1001H	Environmental Decision
	Making (P. Byer, Civil Eng/CFE)
ENV 4001H	Seminars in Environment and
	Health (C. Wiseman, CFE)

Other Courses

ENV 1002H	Environmental Policy
	(D. Macaonala, CFE)
ENV 1004H	Orban Sustainability and
	(B. Bass, sessional)
ENV 1005H	Business and Environmental
	Politics*
ENV 1008H	Worldviews and Ecology
	(S. Scharper, Anthro UTM/CFE)
ENV 1444H	Capitalist Nature
	(W.S. Prudham, Geography/CFE)
ENV 1701H	Environmental Law
	(P. Muldoon, sessional)
FNV 1703H	Water Resources Management
2	and Policy
	(A P Grima Geography: retired)
	Environmental Pick Analysis
	(C. Ollars, assigned)
5NN (4 7071)	(C. Olison, sessional)
ENV 1707H	Environmental Finance and
	Sustainable Investing
	(J. Ambachtsheer, S. McGeachie,
	sessionals)
JEI 1901H	Technology, Society and
	Environment
JEI 1902H	Technology, Society and
	Environment II*
JGE 1212H	Fate of Contaminants in the
	Environment
	(M. Diamond, Geography)
IPV 1201H	Politics. Bureaucracy and the
51 V 120111	Environment*
	Environmental Assessment*
	Urban Wasto Managomont
JOL 142011	An International Decenative*
	Citize Industry and the
JGE 1009H	Cities, industry and the
ENIX 200011	Environment"
ENV 2000H	Independent Study
ENV 2002H	Special Topics:
	Environmental Studies
JVP 2147H	Environmental Philosophy
	(I. Stefanovic, Philosophy)
JNC 2503H	Environmental Pathways*
ENV 3000H	Special Topics:
	Environment and Health
ENV 4002H	The Environment and Health of
	Vulnerable Populations
	(C. Wiseman)

* Not offered in 2011-12.

Graduate Students' Awards



LEFT: Arthur and Sonia Labatt Graduate Fellowship recipients from left to right: Benita Tam, Smith Sundar, Mark Hathaway, Angela Loder, and Peter Ralevic. (Absent: Sedric Pankras.) RIGHT: Eric Krause Graduate Fellowship recipient Mark Hathaway (centre) with Krause family members and friends from left to right Kalman Krause, Rina Fishman-Krause, Katy Krause, Dan Murphy, and Roger Kortshot, at the Eric Krause Memorial Lecture.

The Centre for Environment (CFE) wishes to congratulate the recipients of the following graduate awards, which were presented at Research Day (see page 5) or the Eric Krause Memorial Lecture (see page 28).

John Brown Prize

This prize is was established in memory of the late John R. Brown, Professor of Environmental Health and Medicine. This year's recipients were **Andrew Thomas**, an M.P.H. student (Public Health and CFE Environment and Health program) studying the role of volatile organic compounds in controlled human exposures and **Xianming Zhang**, a Ph.D. candidate (Chemistry and CFE Environmental Studies program) studying organic contaminants using passive air sampling and modeling approach.

Sperrin Chant Award in Toxicology

This award is given to CFE graduate students completing research in toxicology who demonstrate academic excellence and strength of character. This year's recipient was **Hajera Amatullah**, M.P.H. student (Public Health and CFE Environment and Health). Her Master's research is on in-vivo and in-vitro studies of the effect of air pollution on the cardiovascular system.

GreenSaver Fairweather Award

This award was established in memory of Alastair Fairweather, a member of the Board

FOR MORE INFORMATION:

www.environment.utoronto.ca Pavel Pripa, Graduate Student Advisor, 416-978-3475, pavel.pripa@utoronto.ca of Directors of GreenSaver. This year's recipient was **Jessica Lemieux**, M.A. Candidate (Political Science and CFE Environmental Studies program). She is studying the Transition Towns Movement, a grassroots movement which seeks to create resilient communities by focussing on local sustainability and no- or slow-growth.

Eric Krause Graduate Fellowship

This fellowship established by the City of Toronto in memory of the late Eric Krause, a U of T Masters graduate of Geography and Environmental Studies. This year, the award was presented to **Mark Hathaway** at the Eric Krause Memorial Lecture held in February 2011 *(see page 28)*. Mark is a Ph.D. candidate in OISE/UT's Adult Education, Community Development and Counselling Psychology and CFE Environmental Studies program. He is examining transformative learning and an ecological worldview.

Arthur and Sonia Labatt Fellowships

These fellowships were established through a generous donation by Arthur and Sonia Labatt *(see pages 21-22)*. This year's recipients were

- Mark Hathaway, Ph.D. candidate (see Krause fellowship above);
- Angela Loder, Ph.D. candidate, Geography and CFE Environmental Studies program;
- Sedric Pankras, Ph.D. candidate, Forestry and CFE Environmental Studies;
- **Peter Ralevic**, Ph.D. candidate, Forestry and CFE Environmental Studies;
- Smith Sundar, Ph.D. candidate, Forestry and CFE Environmental Studies; and

• **Benita Tam**, Ph.D. candidate, Geography and CFE Environment and Health.

George Burwash Langford Prize

This prize is awarded to a CFE graduate student who best combines excellence in research and contribution to the work of the Centre. This year's recipient was **Nilima Gandhi**, Ph.D. candidate, Chemical Engineering and Applied Chemistry and CFE Environmental Studies. Her research is on the development of new methods to address metals' speciation, fate, and ecotoxicity issues.

Alexander B. Leman Award

This inaugural award was established in memory of Alexander B. Leman, an architect and urban planner. This year, it was presented by **Edward Leman** to **Justin Mok**, Ph.D. candidate, East Asian Studies and and CFE. His doctoral research examines the complexities in understanding the relationship between humans and environment in the cultural and environmental history of China.



Message from the Prof. Development Advisor

BY RODNEY WHITE

Despite the sceptics' convulsions over "climategate", our scientific understanding of human-induced climate change continues to grow. The globally-averaged surface temperature continues to climb. Despite a late, wet spring, this summer has provided further insight into what we should expect from living in a warmer world.

Unfortunately, the political process in North America continues to disappoint everyone who believes that climate change poses an urgent challenge to our way of life. In Canada, only Alberta has an operational climate change policy up and running. British Columbia is building steadily. In the United States, the California program survived a near-death experience and in the north-east U.S. states, the Regional Greenhouse Gas Initiative is under siege.

In these circumstances, it is very difficult to predict demand for professional development in managing environmental stress. The long term trends are clear. The timing is not. In response, we are continuing to operate in a "build and they will come" mode. To date, this approach has served us and our clients quite well.

Carbon Finance Workshop Series The Centre for Environment's Carbon Finance Executive Development workshops reflect the geographic pattern of demand and the logistical convenience of

operating from our home base. This past year, two workshops were held in Toronto, one in Vancouver and one in Calgary (*see page 24*). We have worked with members of the business community and members of our Environmental Finance and Carbon Finance Advisory Committees (*see pages* 21-22) to provide seminars and workshops.

Online Distance Education

The Centre's Distance Education Program exhibit a pattern of steady growth, in terms of student enrolments. We are also continuing to expand our offerings. The introduction of a **Certificate in Carbon Finance** in 2009-10 proved popular, despite the political uncertainties mentioned above. In the Fall of 2011, we plan to strengthen this certificate with an additional course in the preparation of greenhouse gas inventories (ECF 403; *see page 20*).

We will also introduce a **new Certificate in Water Resource Management**. For the Certificate in Renewable Energy, we plan to add a new course on solar energy in 2012. We are developing synergies between our workshops and online courses, relating both to instructors and options for students. For example, it is unlikely that we would have had the capacity to offer the online Certificate in Carbon Finance had we not built up the instructional expertise over the years through the workshop series.



Similarly, the Certificate in Water Resource Management was preceded, for several years, by workshops on The Value of Water.

New Workshops in Fall 2011

Continuing on this same water theme, a **new** Value of Water - Water Finance Executive Development Program was introduced with a workshop in Toronto on September 20-21, 2011 *(see article below)*. Like the Carbon Finance workshops, it also offers an optional certificate program.

By developing our own "flexible mechanisms", we are hoping to make it easier for our online students and workshop participants to deal with the uncertainties in the fitful political response to climate change. Only an optimist would expect the political road to climate change mitigation to become suddenly smoother.

Rodney White is Professor Emeritus in the Department of Geography and Academic Advisor for Professional Development at the Centre for Environment.

New Value of Water program starts with workshop in Fall 2011

Starting in 2011-12, the Centre for Environment's (CFE) Professional Development Program introduced a **new Water Finance Executive Development Program** with a workshop held September 20-21, 2011 in Toronto. It was intended for professionals who work indirectly and directly with the water industry with the aim of enabling them to understand, frame and act on the issues of water's financial value, scarcity and quality within fragmented and localized markets. Like the Carbon Finance workshops (*see page 24*), it also offered an optional certificate program. By attending the workshop and successfully completing a take-home final exam, candidates could obtain a Certificate of Completion in Water Finance.

The Centre is pleased to have the following members of the business, water and U of T communities as part of its newly established **Water Advisory Committee**, some of who also serve on the Centre's Environmental Finance Advisory Committee *(see pages 21-22)*:

- **Murray Clamen**, former Secretary, International Joint Commission;
- Julie Desjardins, Chartered Accountant and Consultant;
- · Kerry Freek, Editor, Water Canada Magazine;
- Patricia Koval, Partner, Torys LLP;
- Todd Latham, Publisher, Water Canada Magazine;
- Dennis E. Mahony, Partner, Torys LLP;
- Faisal Mirza, Director of Operations, Climate Change Infrastructure Corporation;
- Scott Pasternack, Manager, Corporate Issues & Council Liaison, City of Toronto; and
- **Ingrid Leman Stefanovic**, Professor, Department of Philosophy, University of Toronto *(see page 41)*.

For more information, please contact Donna Workman, CFE Manager of Program and Partnership Development, at d.workman@utoronto.ca or 416-978-7077.

Online Distance Education Programs

FOR MORE INFORMATION:

http://learn.environment.utoronto.ca or contact Donna Workman, Manager, Program and Partnership Development, 416-978-7077, d.workman@utoronto.ca

The Centre for Environment has had great success with its distance education certificate programs and courses with increasing enrollment each year. Through its internet-based courses, the programs have accommodated environmental practitioners and professionals, as well as individuals new to the field of environment who wish to pursue professional and educational development while continuing their careers. With the use of discussion forums, conferencing, and live chats, students from all over the world are able to interact with each other, the instructors and guest experts. With the recent registration by a student in Australia, we now have had students from every inhabited continent.

Graduates of the certificate programs may be eligible to apply for the Environmental Professional in Training designation, EPt, under ECO Canada's national certification program for Canadian environmental professionals.

Starting in Fall 2011, the Centre will introduce its latest online certificate program - in Water Resources Management.

Programs and Course Offerings

Course offerings and Fall 2011 instructors indicated are subject to change. Please visit the website for updates. For profiles of course instructors, please see pages 38-41.

Certificate in Water Resource Management (*New in 2011-12*)

Renewable water resources at both the global and local levels will undergo marked changes in our lifetime. Population growth in urban centres, climate change and an increasingly dependent energy infrastructure on water creates a dynamic and challenging context for ensuring adequate financing and responsible development for use of water. This new certificate program aims to increase participants' "water IQ", as well as provide a basis for learning about current and emerging water issues at the global, regional and local scale. WRM 400 Water Resource Management (new in Fall 2011; Lucy Sportza) CEM 401 Urban Water Issues (Anna Moser)

CEM 405 Global Environmental Change and Human Health (David Sider) CRE 400 Principles in Renewable Energy (Lucy Sportza)

GEM 400 Intro to GIS for Environmental Management* (Michael Govorov) *also part of Certificate in in GIS for Environmental Management.

Certificate in Carbon Finance

This certificate provides a thorough grounding in a new field which aims to help society meet its need to reduce greenhouses gases (GHGs) as rapidly as possible. "Carbon" is the short form used to refer to all the GHGs targeted by the Kyoto Protocol. Carbon Finance is a subfield within the broader subject of Environmental Finance which itself is the assessment of the ability of market instruments to achieve various environmental objectives such as clean air and water, effective solid waste management, the remediation of contaminated land, the preservation of biodiversity, and the stabilization of the climate through GHG reduction. ECF 400 Environmental Finance (Oliver Bussler) ECF 401 Carbon Finance

ECF 402 Environmental Finance Case Study: European Union Emissions Trading System (Oliver Bussler)

ECF 403 GHG Reporting and Accounting (new in Fall 2011; Tom Johnson)

CRE 400 Principles in Renewable Energy* (Lucy Sportza)

CRE 402 Wind Energy* (Anna Moser)

CRE 403 Urban Energy Systems*

*also part of Certificate in Renewable Energy.

Certificate in Environmental Management

Environmental management includes impact assessment, and also involves other strategies and tools, such as adaptive management, risk assessment, environmental site audits, assessments, remediation and conflict resolution. The objectives of this program are to develop an understanding of environmental management and to provide insight into the systems approach which can be employed to mitigate a wide range of environmental problems. Grounded in a holistic approach to sustainable development, it aims to develop strategic and inclusive solutions to resource and management case studies. It also covers the complexity of risk management in addressing health, economics and conservation.

CEM 400 Fundamentals of Environmental Management (David Sider) CEM 401 Urban Water Issues (Anna Moser)

CEM 402 Strategies in Environmental Management (David Sider)

CEM 403 Environmental Risk Assessment (Sharonna Greenberg)

CEM 404 Environment and Human Health

CEM 405 Global Environmental Change and Human Health (David Sider)

CEM 406 Climate Change and Human Health

Certificate in GIS for Environmental Management

Environmental Geographic Information System (GIS) describes the use of geo-spatial management methodology and tools in order to assist in developing an environmental management strategy. As GIS applications reach a broader audience, and the utilization of GIS spreads into new industries every day, the demand within the private and public sectors continues to grow. GIS has become a primary means of communicating spatial information in a multitude of settings in environmental applications. The objectives of this program are to build a foundation for understanding of GIS and Remote Sensing theory and techniques, and develop GIS software skills to solve practical tasks related to environmental management. GEM 400 Introduction to GIS for Environmental Management (Michael Govorov)

GEM 401 Advanced GIS for Environmental Management (Michael Govorov) GEM 402 Geospatial Technologies for Environmental Mapping with GIS GEM 403 Environmental Remote Sensing (Gennady Gienko) GEM 404 GIS Modeling for Environmental Applications

Certificate in Renewable Energy

Renewable energy is becoming one of the fastest growing industries in the face of the current environmental crisis, resulting from dependence on fossil fuels and unprecedented global rate of development. In this program students will explore historical and current perspectives on forms of renewable energy, their current usage in developed and developing nations, drivers in forming markets, and political will. The interdisciplinary approach challenges students to pursue an interdisciplinary view of the impact of renewable energy on the current global energy picture. It aims to develop strategic, consensual, and inclusive solutions to the renewable energy and environmental management case studies. CRE 400 Principles in Renewable Energy (Lucy Sportza)

CRE 401 Biofuels (Anna Moser) CRE 402 Wind Energy (Anna Moser)

CRE 403 Urban Energy Systems

Environmental Finance Advisory Committees

The Centre for Environment is pleased to have members of the business and U of T communities as part of an Environmental Finance and Carbon Finance Advisory Committees. They meet regularly to plan Environmental Finance and Carbon Finance events (see pages 23-24 for 2010-11 events) which are designed to promote dialogue on leading edge initiatives relating to sustainable investment opportunities and the growing materiality of carbon factors, with Canadian and international outlooks. Meetings and events are coordinated by Donna Workman, Manager, Program and Partnership Development. For more information, please contact her at d.workman.utoronto.ca, 416-978-7077 or visit http://learn.environment.utoronto.ca.



Jane Ambachtsheer

Partner, Mercer Investment Consulting Ms. Ambachtsheer leads Mercer's global responsible investment business, and consults to North American and international investors. She is Adjunct Professor at the Centre for Environment where she co-teaches (with Sue McGeachie) a graduate course on Environmental Finance and Sustainable Investing. She is a global advisor to the Carbon Disclosure Project.





Michael R. Barrett Partner, Corporate, Bennett Jones LLP

Mr. Barrett is a corporate lawyer, specializing in clean energy and clean technology matters. He works with domestic and international clients, including leading power developers and participants in the environmental commodities market.



Julie M. Desjardins *

Chartered Accountant and Consultant Ms. Desjardins is a chartered accountant and a consultant in performance measurement and reporting. She has been actively engaged in accounting, reporting and verification aspects of climate change. She is a member of Canadian and international advisory panels and has co-authored climate change, environmental and sustainability publications and documents on regulatory reporting.



Barbara Hendrickson *

VP, Legal & Sustainability, League Assets Corp Prior to joining League Assets Corp., Ms. Hendrickson was a partner at McMillan LLP where she co-chaired and founded its Emissions Trading and Climate Change Group. She regularly publishes in the climate change area and is currently co-authoring a book on emission trading. LawDay identified her as one of Canada's leading lawyers in environmental law and climate change.



Alex Chamberlain

Managing Partner, Investeco Capital Investeco Capital Corporation is a private equity investment firm that invests in companies specializing in renewable energy, water technologies, sustainable agriculture, and clean technologies. Prior to joining Investeco, Mr. Chamberlain practiced law at Smith Lyons (now Gowlings) and worked at PricewaterhouseCoopers Securities Inc.



Patricia A. Koval * Partner. Torvs LLP

Ms. Koval's practice focuses on corporate and securities law, with an emphasis on corporate finance (including investment funds) and mergers and acquisitions. She regularly acts in structuring international and domestic public and private financings and designing new or enhanced financial products and services. She is Co-Chair of Torys' Climate Change and Emissions Trading Group.



Elisabeth (Lisa) DeMarco Partner, Macleod Dixon LLP Ms. DeMarco heads Macleod Dixon's Toronto Energy and Environmental Finance Group. Ranked by Chambers Global as a leading climate change lawyer, she is recognized as a leader in the law relating to emissions trading, the Kyoto Protocol and carbon finance. In Ontario, she works with electricity and natural gas sector clients to assist with policy development and regulatory matters.



Sonia Labatt * Adjunct Professor,

Centre for Environment, U of Toronto For her doctoral research at the University of Toronto, Dr. Labatt examined corporate response patterns to environmental issues. She has co-authored (with Rodney White) two books titled Environmental Finance and Carbon Finance: The Financial Implications of Climate Change (John Wiley & Sons, 2002 and 2007).

Continued from page 21.



Todd Latham

Michelle J. McCulloch

Affairs, TD Bank Financial Group

Ms. McCulloch is responsible for environmental risk management in the

lending. She also manages external

stakeholder relations and reporting

President & CCO. Actual Media Inc. Mr. Latham is a media entrepreneur with two decades of experience in B2B marketing and communications, with broad industry knowledge and an extensive international network in the environment, infrastructure and government sectors. Actual Media is a publishing, research and creative design company that publishes ReNew Canada and Water Canada magazines.

Senior Manager, Corporate Environmental

context of asset management, securities, and

commitments. Prior to joining TD Bank, she





Philanthropists Arthur and Sonia Labatt receive honorary U of T doctorates



By Rodney White

On June 13, 2011, Honorary Doctor of Law degrees were conferred on Arthur Labatt and Dr. Sonia Labatt, distinguished philanthropists and volunteers. They are well known for their contribution to public life in Canada and internationally.

They have made a particular contribution to the University of Toronto. Dr. Sonia Labatt is a member of the Faculty of Arts and Science Dean's Advisory Board and is an Adjunct Professor of Centre for Environment. Arthur Labatt, co-founder and former president of Trimark Financial, is a past chancellor of the University of Western Ontario.

At the Centre for Environment, Dr. Labatt developed and taught a graduate course from 1996 to 1999 which grew out of her thesis on Corporate Perspectives in the Environment. This led to another graduate course on Environmental Finance and Sustainable Investing. An online certificate is also now offered in Carbon Finance as part of the Professional Development Program. She is also a founding member of the Environmental Finance Advisory Committee. In 1998, she and Arthur made a generous donation to establish Graduate Fellowships at the Centre (see page 18). Videos of their speeches may be found at www.youtube.com.





William (Bill) Tharp * **CEO, Climate Change Infrastructure**

Trading Association.

Gray Taylor

Partner, Bennett Jones LLP

Climate Change Infrastructure is a leading asset manager and asset management service provider focused on the low-carbon, water constrained, alternative energy and efficiency marketplace. Mr. Tharp has extensive handson and director experience in asset management, merchant banking and direct investment to numerous companies, associations and think-tanks in this field.



Rodney White *

Professor Emeritus, Dept. of Geography, U of T Dr. White is a geographer and infrastructure planner and is co-author (with Sonia Labatt) of Environmental Finance and Carbon Finance: the Financial Implications of Climate Change (published by Wiley). He serves on the Technical Advisory Board of the Carbon Reduction Fund and is Academic Advisor for Professional Development Programs at the Centre for Environment.

*Also member of the Carbon Finance Advisory Committee.

Susan McGeachie Manager, Sustainability and Climate Change,

Ms. McGeachie manages projects for both global companies and not-for-profit teaches a graduate course on Environmental Finance and Sustainable Investing.

Stefan Reichenbach * Global Head of Strategy & Marketing Commodities, Thomson Reuters

Mr. Reichenbach leads the strategy & marketing functions for the global Thomson Reuters Commodities business. He is responsible for mergers and acquisitions, strategic planning, customer insight, product inception and marketing activities. Prior to this, he built a profitable carbon information business for Thomson Reuters.

Mr. Taylor is the co-leader of Bennett Jones' climate change and emission trading practice group. He focuses on emissions trading transactions, corporate governance and climate change and sustainability business

issues. He is a director and Canadian Co-Chair of the International Emissions



organizations that address sustainabilityrelated governance and management models. She is Adjunct Professor at the Centre for Environment where she co-



In memoriam: Skip Willis

Founding member of Environmental Finance Advisory Committee will be missed

BY RODNEY WHITE

As a founding member of the Centre for Environment's Environmental Finance Advisory Committee in 2003 *(see pages 21-22)*, Errik (Skip) Willis provided a crucial link between the University of Toronto and the business community. Hence, he was a key element in allowing the Centre to develop its role in the carbon finance niche. As he was a much soughtafter consultant on the challenges and opportunities presented by climate change, in Canada and internationally, his support was crucial to the Centre.

Skip was Principal of the Willis Climate Group and provided strategic advice to public and private sector clients on issues relating to climate change and carbon markets. Previously, he was the Managing Director of Canadian Operations at an international consulting firm. Skip brought an exceptional commitment to his work, driven by a sense of urgency over climate change and his concern for younger



generations. He was a contributor to the graduate course on Environmental Finance. He loved teaching.

He also became a mainstay of our Carbon Finance workshops, ably summing up the invariably confused state of play in global climate policy. Titling his wrap-up presentation *The Way Ahead*, he managed to generate enough enthusiasm in the audience that you actually were able to cling to the belief that there was a way ahead.

More than anyone else I knew, he keenly felt that we (our age group) were guilty of generational failure. In a lecture in my undergraduate class, he actually apologized on behalf of "our generation" to the students' generation for failing to move on the climate change agenda in Canada. I never heard anyone else do that.

Skip passed away on January 4, 2011. At the Carbon Finance workshops this spring *(see page 24)*, we held receptions to inaugurate The Errick "Skip" Willis Memorial Fund administered by The Calgary Foundation. For its first project, a scholarship at U of T is being considered.

Rodney White is Professor Emeritus in the Department of Geography and Academic Advisor for Professional Development Programs at the Centre for Environment.

Webinar: First Nations and Carbon

In collaboration with the First Nations Carbon Collaborative

Webinar series, April 20 - May 25, 2011

Organized in collaboration with the First Nations Carbon Collaborative (FNCC), this series of six free weekly online seminars brought together First Nations, carbon specialists, government and environmental groups to share information regarding their projects and policies for carbon and emissions trading, science and financing.

The FNCC is an initiative aiming to develop a First Nations Carbon Market Toolkit. This community-driven project aspires to build capacity within First Nations communities so they can participate in and benefit from existing and emerging carbon and emissions trading markets. It was spearheaded by the International Institute for Sustainable Development, the Centre for Indigenous Environmental Resources and three First Nations living within Canada's frontier forests (Carrier Sekani Tribal Council, BC; Poplar River First Nation, Manitoba; and the Tåîchô Government, NWT).



The six webinars and presenters were: **1. Webinar Series Intro and Carbon 101**

- National Chief Shawn A-in-chut Atleo, Assembly of First Nations;
- Gary Bull, Associate Professor, Dept. of
- Forest Resources Management, UBC; • Shawn Burns, President and CEO, Carbon Credit Corp.
- 2. Rights of Indigenous Peoples
 - Rob Miller, Partner, Miller Titerle LLP;
 Harry Bombay, Exec. Director, National Aboriginal Forestry Association (NAFA);
 - Brad Young, Senior Policy Advisor, NAFA

- 3. Emissions Trading, Policies and Legislation in Canada
 - Stuart Wuttke, General Counsel, Assembly of First Nations;
- Rob Miller, Partner, Miller Titerle LLP.

4. Financing Carbon Projects

- Barbara Hendrickson, Miller Titerle LLP;
 Susan McLean, Principle, GreenEdge
- Capital Solutions;
- Doug Tingey, Tingey Law.

5. Offset Projects: Forestry

- Robert Falls, CEO, ERA Carbon Offsets;
- **Dirk Brinkman**, CEO, Brinkman Earth Systems.
- 6. Voices from the Field: First Nations Carbon Project Case Studies
 - Brad Young, Senior Policy Advisor, NAFA;
 Neil Hughes, Forestry Program Manager, Ecotrust Canada.

Links to the webinars and Powerpoint presentations may be found at: http://www.carriersekani.ca/programsprojects/fncc. For more information, please contact Donna Workman, d.workman@utoronto.ca.

Carbon Finance Workshop Series

Successful executive series continues in Toronto, Calgary and Vancouver

BY RODNEY WHITE



LEFT: Panellists at the October November 2010 Carbon Finance workshop in Vancouver, from left to right: Ron Ezekiel (Partner, Fasken Martineau's Energy, Environmental, Climate Change and Regulatory Practice), Andrew Dooner (Managing Director, Strategic Acquisitions, Pacific Carbon Trust), and Paul Vickers (Director, Global Sustainability, PriceWaterhouseCoopers LLP). RIGHT: At the May 2011 Toronto workshop, participants work with Faisal Mirza, Director of Operations, Climate Change Infrastructure (standing) in interactive workshop sessions using computer-based simulation and an Alberta Carbon Credit Transaction case study.

Carbon Finance Executive Development Workshops: Sep 29-Oct 1, 2010 and May 25-26, 2011, Toronto Nov 22-24, 2010, Vancouver, British Columbia June 28-29, 2011, Calgary, Alberta

"Carbon Finance"– defined broadly – is the study of the application of market-based instruments to the reduction of greenhouse gas emissions. In 2010-11, the Centre for Environment offered a total of four Carbon Finance Workshops: two in Toronto, one in Vancouver, and one in Calgary. For all four events, the Centre partnered with the International Emissions Trading Association. Additional partners included the Canadian Urban Institute for Fall 2010 in Toronto; Pacific Carbon Trust, and The Climate Registry for Vancouver; and University of Calgary's Faculty of Law for Calgary. Since 2008, the Centre has offered intensive workshops regularly in Toronto, as well as some in Calgary, Vancouver, and São Paulo, Brazil. A Certificate of Achievement in Carbon Finance may also be an option for participants who pass an exam.

The presenters and the audience included academics, members of the business community, government and NGOs. In Vancouver, the workshop was addressed by the former Premier of British Columbia, **The Honourable Gordon Campbell**, and **Robert Page**, Chairman of the National Roundtable on the Environment and the Economy. In Calgary, speakers included **Alastair Lucas**, QC, Dean of the Faculty of Law of the University of Calgary, and **Robert Savage**, Section Head of the Climate Change Secretariat of Alberta Environment.

The format has consisted of presentations and panels given by members of the carbon finance community, drawn mostly from the

FOR MORE INFORMATION:

http://learn.environment.utoronto.ca or contact Donna Workman, Manager, Program and Partnership Development, 416-978-7077, d.workman@utoronto.ca Toronto area, and supported by colleagues in British Columbia and Alberta - the only Canadian provinces with active carbon markets. We have also included computer-based simulation games to allow the audience to participate in offset bargaining and exchange trading in "carbon" – the shorthand term used to describe all greenhouse gases for which emission reductions are traded.

The workshops have been presented by the Centre's core team from U of T, the business community and NGOs and members of the Centre's **Environmental Finance and Carbon Advisory Committees** (*see pages 21-22*), and invited participants. Although the format and content were broadly similar in all four workshops, the emphasis differs from one venue to another. Emphasis also changes over the course of the year to reflect weather events as they unfold, as well as twists and turns along the policy trail. For example, the sectoral emphasis in BC is heavily on forestry, compared with oil and gas in Alberta.

Alberta already has a working carbon trading system, based on Over the Counter (OTC) transactions, so we dropped the exchangebased trading simulation (based on the European Union carbon economy) which we run as a demonstration in Toronto. In BC, there was significant participation from indigenous groups, as they are key participants in BC's emerging carbon economy. In Calgary, we enjoyed a highly relevant presentation by **Kelsey Prenevost** (Kyoto Fuels Corporation) on the Funding of a Large Scale Biodiesel Plant through Carbon Finance.

Throughout the year, we have continued to enjoy the staunch support of the Environmental Finance Advisory Committee. The Committee not only provides the backbone for the speakers' lineup for the seminars, it also helps us to interpret the feedback from the workshop participants and to plan the next year's program.

Rodney White is Professor Emeritus in the Department of Geography and Academic Advisor for Professional Development Programs at the Centre for Environment.

Jane Goodall Institute

Partnership with the Centre provides various learning opportunities for students

BY SARA HSIAO

It has been a busy year at the Jane Goodall Institute of Canada (JGI), with events across the country, Roots & Shoots youth making an impact all around the world, and our partnership with the Centre for Environment continuing to strengthen.

Dr. Jane Goodall made stops in Vancouver, Calgary, Toronto and Halifax this past year, with sold-out lectures, significant media coverage and several "first-ever" experiences. In October 2010, Dr. Goodall worked on her first guestediting role with the Calgary Herald, and in April 2011 she made her first public appearance on Canada's East Coast, in Halifax. Also in April, JGI and the Centre for Environment (CFE) jointly presented the inaugural Jane Goodall Scholarship to Claire-Helene Heese-Boutin, an honours B.A. student at U of T majoring in Caribbean Studies and Environmental Studies. Claire-Helene was awarded the scholarship by CFE Interim Director Professor Donald Jackson and was personally recognized by Dr. Goodall at the ceremony for her contributions to conservation and development (see p. 15).

CFE played a key role in our spring events this past year. On the same evening as the scholarship presentation, an environment and development seminar was held, with U of T alumna **Dr. Zinta Zommers**, of the Wildlife Conservation Research Group at University of Oxford, delivering the keynote *(see page 31)*. After the lecture, Dr. Goodall joined Dr. Zommers on stage for discussions with the audience, bringing two generations of chimp researchers together to reflect on recent controversies and perspectives in conservation research.

Roots & Shoots, JGI's global youth action program, celebrated the work of its dedicated members and champions at an event at U of T in April 2011. This year, our Roots & Shoots members have taken local action to benefit the people, animals, and environment all across Canada. They have also been involved in global efforts to make positive change, including working with communities in Uganda and serving as delegates to the COP10 Convention on Biological Diversity in Japan.

Our connection to the University is strengthening each year, with students and



Dr. Jane Goodall delivers a special lecture in April 2011 at the Royal Ontario Museum as a wrap-up to the 50th anniversary celebrations of her pioneering research on the behaviour of chimpanzees.

faculty getting involved with many of our programs. This year we recruited Dr. Viviane Labrie, Ph.D. alumna in Medical Sciences at U of T, to participate in our Teacher Workshop program in Uganda in July 2011. Viviane has fundraised a significant amount for our Africa programs and will help to facilitate environmental education workshops for Ugandan teachers. We have also recruited two work study students from the Centre for Environment, Jordana Cimicata (Hons B.Sc., Biology and Environment & Science) and Vivian Kim (Hons B.A., East Asian Studies and Environmental Ethics), who will be joining the team during the summer and fall semesters respectively.

JGI continues to be actively involved with University initiatives, large and small. Our office, located in the Earth Sciences building, is participating in the Green Ambassadors program through the U of T Sustainability Office, doing our part to lower our footprint *(see page 26)*. For the third year in a row, JGI has delivered a guest lecture for Anthropology students at the U of T Mississauga campus. This year, Program Coordinator **Sara Hsiao** presented a lecture on JGI's conservation and

development work in Africa, through our model of community-centred conservation. We were also excited to invite JGI Uganda Field Program Manager Peter Appell to Toronto in September 2011, to take part in the CFE Environment Seminar Series (see page 29) to engage the U of T and Toronto community. Finally, discussions are ongoing with U of T faculty to engage in conservation research with students from CFE and Faculty of Forestry's Master of Forest Conservation program. This is an area that JGI is excited to initiate, especially at our field site in Uganda, where we are currently undertaking a CIDAfunded, community-centred conservation project.

We look forward to the opportunities that lie ahead and another great year with the Centre for Environment and U of T.

Sara Hsiao is JGI's Program Coordinator for Roots & Shoots and Africa Programs.

FOR MORE INFORMATION & VOLUNTEER OPPORTUNITIES:

www.janegoodall.ca; 416-978-3711; info@janegoodall.ca

U of T Sustainability Office

Creating a culture of sustainability through research and engagement

BY JP DAVIDSON

The University of Toronto Sustainability Office has made great strides in the past six years since its launch in 2004. For example, it has delivered the award-winning **Rewire** program, which aims to empower students to reduce their own energy consumption through small behaviour changes, to over 10,000 students in residences. It founded **Bikechain**, U of T's free bike repair, rental and education facility. It established a strong link with the Department of Department of Facilities and Services helping it to develop and support projects, policies and initiatives that reduce consumption of resources on campus. It has also provided experience to students through courses, Work-Study jobs and volunteer activities. The Centre for Environment has been a key partner in the Office's growth and success and continues to play an important role in its research and student engagement activities.

In her position as Sustainability Director, **Dr. Beth Savan** (also Senior Lecturer at the Centre for Environment, *see page 36*) has witnessed and encouraged the growing momentum for sustainability across the University, recently reflected in the publication of the first Facilities and Services Sustainability Report (available at http://sustain.fs.utoronto.ca) and **President David Naylor**'s articulation of U of T's commitment to sustainability in U of T Magazine (Summer 2010; www.magazine.utoronto.ca). The entire University community shares this responsibility, and helps to move us forward by conducting groundbreaking renewable energy research, growing food on campus, participating in swap events, installing solar panels, and much more.

Working with collaborators across campus, the Sustainability Office has made significant progress toward its goals in the past year, including the following programs and initiatives: Green Ambassadors: Launched in January 2011, this program is a growing network of U of T staff working to make their offices more earth-friendly. Ambassadors are provided with tools to run monthly sustainability campaigns that promote simple habits like printing double-sided and shutting down equipment at night. Rewire: The Sustainability Office hosted the first external Rewire Workshop in June 2010. The day-long session was designed to transfer lessons learned from U of T's residence energy conservation program to other universities. Tools of Change (toolsofchange.com) recently selected Rewire as a landmark social marketing case study, sharing its results and lessons learned. Paper Cuts: This paper reduction program has expanded to seven libraries on the St. George campus, where setting printers to default double-siding is expected to save 750,000 sheets each year! U of T staff are also ordering fewer unnecessary phonebooks and have prevented over 5 tonnes of phonebook-related waste so far. Green Courses Program: This program recognizes instructors who take steps to reduce the environmental impacts of their courses. Since the launch of the program in February 2011, 83 courses across the three campuses have qualified.

Start Green: The Start Green program wrapped up in February

FOR MORE INFORMATION:

http://sustainability.utoronto.ca; twitter.com/SustainableUofT tel: 416-978-6792; email: sustainability@utoronto.ca



Sustainability Office staff from left to right: Sustainability Coordinator Stuart Chan, Project Coordinator Tyler Hunt, Sustainability Director Beth Savan, Sustainability Coordinator Ashley Taylor, Project Coordinator Elah Feder and Project Coordinator JP Davidson.

2011 after six months of inspiring U of T students to make energyconscious decisions at home. In collaboration with Student Family Housing and Campus Co-op, this program suggested effective and attainable ways for more than 2000 housing residents to reduce energy and water consumption. The core program reduced over 17.5 tonnes of eCO₂ while additional program events such as "Swap" events diverted 1.4 tonnes of items from landfill.

This past year, the Office's work was also recognized by two awards. Firstly, U of T received a **2010 Green Toronto Award of Excellence in Energy Conservation** from the City of Toronto which recognizes the Sustainability Office's student engagement efforts, the Athletic Centre solar thermal installation, F&S' cool and sustainable roof standard, and the U of T's first LEED (Leadership in Energy and Environmental Design) Gold Certification by the Canadian Green Building Council. Secondly, the Canada Mortgage and Housing Corporation recognized Dr. Savan's innovative work by awarding her the **2010 Excellence in Education Award for Promotion of Sustainable Practices by Educators** (*see page 36*).

The Sustainability Office strives to engage U of T students in all our programs. In the past year, Centre for Environment students have contributed to its research on green revolving funds, conservation program persistence, green procurement and key performance indicators for corporate sustainability. The Sustainability Office also recognizes student, staff and faculty achievements through its Sustainability Champion and Green Ribbon Award programs.

In the coming year, the Office will extend programs for green courses and offices and, over the long term, continue to work toward lasting solutions that integrate sustainability into our procedures and practices. Stay informed of upcoming opportunities by visiting the Sustainability Office online at http://sustainability. utoronto.ca where Listserv, Twitter, Facebook and Tumblr details can also be found.

JP Davidson is Project Coordinator, Communications and Development at the Sustainability Office.

Fullbright Specialist visits U of T

Visit of Boston greenroof expert engages students and community

BY BRAD BASS

In the Fall of 2010, the Centre for Environment was pleased to host a visit of Fullbright Specialist **Dr. Jeff Licht**, President of Botanicals Nursery LLC and Adjunct Professor at University of Massachusetts' Department of Environmental, Earth and Ocean Sciences.

During his two-week visit, the Boston expert in green roof technology and infrastructure gave seven guest lectures to students at the Centre for Environment; the Faculty of Architecture, Landscape and Design; the Faculty of Forestry; and the Faculty of Engineering and Applied Science. He also presented a well-attended community seminar as part of the Centre's Environment Seminar Series *(see page 29)*.

Initiated by **Dr. Brad Bass**, green roof expert and researcher with Environment Canada's Adaptation and Impacts Research Section *(see page 6)*, the visit also included a guest lecture in Dr. Bass' graduate course on Urban Sustainability and Ecological Technology (now also an undergraduate course). In the course, Dr. Licht set up an in-class lab exercise comparing particle size and distribution between green roof growing media and native soils. He also presented in the Centre's new course Introduction to Environmental Studies *(see page 11)*.

Slated as a cultural as much as a scientific exchange, a whirlwind tour of the campus and Toronto, and a guest lecture at Humber College resulted in multiple opportunities to begin a series of experiments, advise students about ongoing projects and consult to faculty about prospective investigations.

For more information on Dr. Licht's visit and research, please contact Dr. Bass at brad.bass@ec.gc.ca.



Environmental Career Day

An annual spring event for all university and community college students

BY DAVID POWELL

The Centre for Environment was pleased to co-present Environmental Career Day, an annual event open to all registered university and community college students. It has been a collaborative effort with the Graduate Environmental Students Association, the Toronto Undergraduate Geography Society, the Forestry Union of Students, and the Environmental Students' Union.

In 2011, the event was held on March 3 in Hart House's Great Hall with approximately 200 students in attendance. It included a Career Expo with exhibitors from U of T, government, and consulting and non-governmental organizations, providing students with useful information, career advice and many potential career, job and volunteer opportunities.

The day also included presentations by speakers from various sectors in the environmental field, answering questions about their present jobs and key steps needed for advancing one's career. The speakers included **Josephine Archbold** (City of Toronto Public Health), **Angela Bischoff** (Ontario Clean Air Alliance), **Ray Clement** (Ontario Ministry of the Environment), **Peter Love** (Former Ontario Chief Energy Conservation Officer), **Dan Mossip-Balkwill** (City of Toronto North Support Services), and **Donna-Mae Robinson** (Ontario Public Service Green Office).

David Powell is CFE Undergraduate Student Advisor and Placement Coordinator (email: david.powell@utoronto.ca).



Sharing a table at the Environmental Career Day Expo, from left to right: Kirsten Grant and Maciej Jamrozik (B.Sc. Forest Conservation students), Kathy Giesbrecht (then Faculty of Forestry Administrative Assistant, Student Services), Shelley Eisner (Graduate Administrator, U of T Scarborough Office of the Dean and Vice-Principal, Academic), and Pavel Pripa (Centre for Environment Graduate Student Advisor).

Memorial Lectures

The following Memorial Lectures were presented by the Centre for Environment in 2010-11. For photos and details of students' awards presented, please see pages 15 and 18. For more information, please contact Donna Workman at d.workman@utoronto.ca

Robert Hunter Memorial Lecture February 16, 2011

LAURYN DRAINIE, Climate Fellow, Climate Action Network Canada

Public Apathy, Funded Denial & Political Cowardice: What's a Climate Activist to Do? Following some successes and failures of recent climate negotiations, there is a general sense among many climate activists that something just isn't working. Drawing on her experiences attending international United Nations climate negotiations and working for advocacy organizations, comparisons with other social movements, and proposals from within the climate community for new approaches to activism, Ms. Drainie explored the prospects of finding an approach to climate change campaigning and activism that matches the scale of the problem.

This annual lecture is in memory of **Bob Hunter** who co-founded Greenpeace and led it through its first seven years of growth. His later years were spent in Toronto working for CityTV as their Ecology Specialist, raising ecological awareness using the power of the media.

Douglas Pimlott Memorial Lecture March 16, 2011 JOANNA DAFOE,

Canadian Tracker, Adopt a Negotiator Post 2012 Climate Politics: What the UN and Canadian Electorate Have in Common

At the December 2010 UN Framework Convention on Climate Change in Mexico, countries reached a set of near-unanimous decisions now known as the Cancún Agreements which offer some practical developments on matters of finance, adaptation, and accountability. While they do not offer any groundbreaking display of climate leadership, they do offer a lifeline for the multilateral climate process. Ms. Dafoe discussed how countries now have a limited second chance for collective action and how the Canadian electorate is uniquely positioned to act during this time.

This annual lecture is in memory of **Dr. Douglas Pimlott**, the first Director of the former Environmental Studies Program at U of T's Innis College and one of Canada's foremost environmentalists.

Cities and their citizens take action: David Miller presents 2011 Krause Lecture

Cities Leading the Way: In Canada and Around the World Eric Krause Memorial Lecture February 2, 2011

By Rodney White

The Centre for Environment was pleased to have **David Miller**, former Mayor of Toronto from 2003 to 2010, present this year's Eric Krause Memorial Lecture.

His presentation dealt with the interesting paradoxical situation whereby urban governments and their citizens (including innumerable groups of volunteers, many organized on a neighbourhood basis) have taken the initiative on environmental action even when their national governments have done very little to pave the way. This is still the case in Canada and the United States. And yet the Kyoto Protocol is an agreement between national governments in which cities have no explicit role and find it difficult to access funding. An example is the Clean Development Mechanism (CDM), a Kyoto mechanism which allows industrialized countries to pay for emissions reduction projects in poorer developing countries that do not have emissions targets. By funding projects, industrialized countries earn certified emissions reduction credits to add to their own allowances.

A further barrier to funding for urban projects to combat climate change are the transaction costs associated with accessing the available funds, which makes it very difficult to find outside funding for numerous small-scale urban initiatives. This is sometimes referred to as the "aggregation problem". How do you put a lot of small projects together to apply for funds such as the CDM?

Mayor Miller's talk was also very positive, using the example of the "C40 Leadership Group" (www.c40cities.org) which he chaired from 2008 to 2010. This Group is an urban equivalent of the G20 association of national governments, comprised of 40 partner cities and 18 affiliates from around the world, linking the experience of cities around the world in



order to tackle climate change. Through a partnership with the Clinton Climate Initiative, the C40 helps cities reduce greenhouse gas emissions through a range of energy efficiency and clean energy programs. Mr. Miller drew examples from Sao Paulo, Toronto, Los Angeles and Copenhagen to show how this can be done.

This lecture series is held annually in memory of **Eric Krause**, a former U of T undergraduate and graduate student and a former member of the environmental planning group at the City of Toronto. The lecture series, a graduate fellowship, and an internship are jointly supported by the University, the City, and individual contributors from Eric's family and friends. Eric was a pioneer of the development of the concept of an individual's Ecological Footprint in the urban context – the subject of his Master's thesis which he further developed with the City's environmental planners.

This year's recipient of the graduate fellowship, presented at the lecture, is **Mark Hathaway**, a Ph.D. candidate in the Department of Adult Education and Community Development (OISE/UT) and the Centre for Environment's collaborative program in environmental studies. For more information and a photo taken at the presentation, please see page 18.

Rodney White is Professor Emeritus in Geography and Academic Advisor for Professional Development at the Centre.

Environment Seminar Series

The following seminars were presented in this series in 2010-11. Condensed abstracts are included below.

DARREN ANDERSON, Chief Technology Officer, Vive Nano. *Green Nanotechnology: How Nanotechnology Will Affect the Environment* – *In a Good Way.* Nanoparticles are very small particles – on the order of 1/10000th the width of a human hair – and have many new properties that we can use to make useful products. These properties can include control over their interaction with light or increases in surface area per unit mass, which makes them more catalytically active, or changes in their interaction with their environment, which make them better for drug delivery or environmental remediation. This talk discussed some upcoming applications of nanotechnology that have the potential to positively impact the environment.

STEVEN BERNSTEIN, Associate Professor, Department of Political Science, U of T Mississauga. *New Directions or No Direction? Climate Change and Global Risk Governance following Cancun.* Despite sustained transnational scientific and political attention for more than 20 years, effective centralized governance through the UN Framework Convention on Climate Change and Kyoto Protocol has proven elusive. This presentation investigated the resulting fragmentation of governance responses, its limits in producing widespread shifts in behaviour and economic activity, and associated dilemmas of gaining legitimacy for multiple modes of governance (e.g., carbon markets), and also discussed the 2010 UN Climate Change Conference in Cancun.

ERIC BEYNON, Director, Integrated CO2 Network (ICO2N). *Carbon Capture & Storage: An Important Part of Canada's Environment and Energy Strategy.* Carbon Capture and Storage (CCS) is the process of capturing CO2 from large industrial sources before it is released to the atmosphere, safely transporting it, and storing it in mature oil and gas reservoirs or in other deep geological formations. This seminar discussed how CCS works, its importance in Canada and globally, and outlined the path to large scale CCS deployment. In Canada, CCS represents the single largest tool to reduce our greenhouse gas emissions and while enabling us to continue to produce energy and help to meet our commitments to reduce GHGs. ICO2N is an initiative of 16 Canada's companies working together to advance CCS in Canada.

TODD HOWELL, Great Lakes Ecologist, Water Monitoring and Reporting Section, Environmental Monitoring and Reporting Branch, Ontario Ministry of the Environment. *The Nearshore of Lake Ontario: Ecological Change and Links to Water Quality.* The nearshore lakebed of Lake Ontario is heavily overgrown with algae, much of which is Cladophora. Changes in light climate and impact of invasive dreissenid mussels have expanded habitat and improved growth conditions for benthic algae. Further, the degree to which nutrient discharges to the nearshore locally stimulate Cladophora growth is not well determined. This presentation explored the potential to moderate shore fouling by Cladophora through nutrient management.

JEFF LICHT, President, Botanicals Nursery LLC, Boston; Adjunct Professor, University of Massachusetts; Visiting Fullbright Specialist, Centre for Environment. *New Green Roof Technology*. This seminar presented new strategies using existing green roof materials in new combinations which contribute to a decrease in bulk density while maximizing stormwater retention. The reduction of weight may help increase the adoption of green roof technology on a wider range of buildings and plants specifically for green roofs. The talk also discussed the physical properties of a newly engineered "media" which consists of an inert clay, inert organic and coarse organic and is carbon positive and could theoretically be used as a "credit". *(See page 27 for more on Dr. Licht's visit.)*



Robert Paehlke of Trent University discusses the challenges of creating policy for biodiversity protection as part of the Centre's seminar series.

ROBERT C. PAEHLKE, Professor Emeritus, Environmental and Resource Studies, and Political Science, Trent University, Peterborough. *Biodiversity: New Dimensions of the Policy Challenge.* This seminar discussed some possible reasons for the challenges of biodiversity protection which may include: a time mismatch between short-term political pressures and the often gradual pace of habitat loss, the mismatch between political jurisdiction and ecosystem boundaries, gaps in scientific knowledge and the new unwillingness on the part of religious conservatives and others to accept scientific facts, an unwillingness within government to prioritize values other than economic values, and new threats including climate change.

SCOTT PASTERNACK, Supervisor, Policy Development, Toronto Environment Office, City of Toronto. *Local Government Efforts to Address Climate Change.* The need to mitigate and adapt to climate change is perhaps most pressing for our cities, which often have a great reliance on resources from energy, transportation, and agriculture sectors, the leading sources of greenhouse gas emissions. Despite having limited authority, local and regional governments have accomplished a great deal in addressing climate change. This talk discussed the sustainability response plans for Toronto and New York and argued that many of the issues that shape how cities respond are left to other orders of government thereby diluting the voice of cities.

PETER VICTOR, Professor, Faculty of Environmental Studies, York University. *Managing without Growth: Slower by Design, not Disaster.* Economic growth is the over-arching policy objective of governments worldwide. Yet its long-term viability is increasingly questioned because of environmental impacts and impending and actual shortages of energy and material resources. Furthermore, rising incomes in rich countries bear little relation to gains in happiness and well-being. Growth has not eliminated poverty, brought full employment or protected the environment. This seminar discussed a simulation model of the Canadian economy which suggests that it is possible to do this and maintain fiscal balance without economic growth.

Coordinated by Donna Workman, Manager, Program and Partnership Development

FOR MORE INFORMATION:

www.environment.utoronto.ca or contact Donna Workman, 416-978-7077, d.workman@utoronto.ca

Environment & Health Seminar Series

Coordinated by Professor Clare Wiseman (see page 37).

FOR MORE INFORMATION:

www.environment.utoronto.ca or contact Pavel Pripa, 416-978-3475 environment.seminars@utoronto.ca

The following seminars were presented in this series in 2010-11. Condensed abstracts are included below.

CAROLINE BARAKAT-HADDAD, Assistant Professor, Health Studies, University of Toronto Scarborough. Is Air Pollution a Potential Contributor of Chronic Non-Respiratory Inflammatory Disorders? This talk featured a study of childhood exposure to air pollution and chronic non-respiratory health outcomes. The study followed-up on participants of an initial study done over 30 years ago on children's exposures to total suspended particulates, fine fraction particulate matter and sulfur dioxide (SO2). Significant associations were found between exposure to SO₂ and hospital visits for respiratory illnesses, asthma, high blood pressure, and arthritis. Results suggest that childhood exposure to SO2 is a significant predictor of arthritis and high blood pressure and that exposures to air pollution across the life course may lead to chronic inflammatory disorders.

DONALD COLE, Associate Professor, Dalla Lana School of Public Health, University of Toronto. Healthy City Harvests: Generating Evidence to Inform Policy in Kampala, Uganda. Increasing concentrations of low-income families in urban settlements in Kampala has placed greater emphasis on securing household food security and income supplements through local agriculture. This talk discussed potential health risks from exposure of crops to urban contaminants and from livestock, as well as the benefits of urban farming. Policy analysis, legal reform and public policy debate, and urban governance approaches were also covered. Suggestions were made on how research may help achieve agreements among scientists and policy-makers to support safe and sustainable agriculture.

PAUL A. DEMERS, Director, Occupational Cancer Research Centre, Cancer Care Ontario. *How Widespread is Exposure to Environmental Carcinogens in Canada? Results from the CAREX Canada Project.* The objectives of the CAREX Canada project are to estimate the number of Canadians exposed to carcinogens in their workplace and community environments, and to identify how and where people are exposed, as well as their level of exposure. Estimates are being developed for a wide range of known and suspected carcinogens including industrial chemicals, metals, pesticides, water disinfection byproducts, particulate air pollution, and radon. These estimates are generated using existing Canadian data sources in combination with census population estimates using the best exposure estimation procedures available. This presentation provided an overview of the project, identified the challenges encountered, and highlighted some of the prevention and research opportunities that it has generated.

DEBBIE FIELD, Executive Director, Foodshare Toronto. Say Yes to Food: Prioritizing Healthy Food in Our Personal Lives, Neighbourhoods and in Social Policy. The current industrial food system has many problems ranging from continued and growing hunger, escalating diet related illnesses such as diabetes and obesity, and an agricultural system that is environmentally and financially unsustainable. The global food movement is developing community and social policy actions to address these problems ranging from buying local, creating support for community gardens and composting programs to calling for a national Child Nutrition Program. This talk described these initiatives, profiling the work of FoodShare Toronto.

DOUG HAINES, Director, Chemicals Surveillance Bureau, Health Canada. *Human Biomonitoring of Environmental Chemicals: Results from the Canadian Health Measures Survey.* The Canadian Health Measures Survey (CHMS) is a cross-sectional survey designed to provide national-level data on indicators of environmental exposures, health

Professor Caroline Barakat-Haddad of Health Studies, U of T Scarborough, discusses the link between exposure to air pollution and chronic inflammatory disorders.



and nutritional status, and related risks. This talk discussed the results of the first cycle which collected self-reported data, physical measures and biological specimens from 5,600 Canadians. Objectives of the bio-monitoring component are to establish nationallyrepresentative blood and urine concentrations for environmental chemicals and to provide baseline data for further studies.

HARDY LIMEBACK, Professor and Head of Preventive Dentistry, Faculty of Dentistry, University of Toronto. *Medicating the Masses* with Fluoride in Drinking Water: Do the Benefits Outweigh the Risks? Fluoridation has been controversial since it was introduced in 1945. Early studies indicate that fluoride reduced dental decay but the evidence was weak. Although dental decay rates have declined worldwide in all developed countries, it appears that fluoridation has had minimal benefit. New studies have revealed that fluoride can cause damage to the human body. For years fluoride has been dentistry's main tool in combating dental decay but now there is a new epidemic of patients being exposed to too much fluoride, with dental fluorosis (or fluoride poisoning) steadily on the rise. This lecture explored the risks versus the benefits of water fluoridation.

MARG SANBORN, Assistant Clinical Professor, Department of Family Medicine, McMaster University. *When Is It Safe to Swim in the Great Lakes*? The objectives of this seminar were to summarize the current research on health risks of swimming in the Great Lakes; to review the epidemiology of swimming, related illnesses, including emerging health concerns relevant to Great Lakes beaches; to discuss limitations of current beach monitoring with respect to prediction of human health outcomes, and to discuss the current safety of swimming in the lakes, and how to improve the margin of safety.

CHUNG-WAI CHOW, Assistant Professor, Dept. of Medicine; Investigator, Southern Ontario Centre for Atmospheric Aerosol Research, U of T. Going to Class May Be Bad for Your Health: The Biological Impact of College Street Air. Studies have suggested that environmental air pollution (EAP) induces airway inflammation, increases susceptibility to respiratory tract infections, and decreases pathogen clearance while potentiating the inflammatory response, thus contributing to asthma and chronic obstructive lung disease. However, the underlying cellular mechanisms responsible are not completely understood. This talk reviewed the in vitro models and in vivo models using different models of asthma in rodents to interrogate the cellular response to real-time EAP exposure.

The environment and national defence

A special lecture on sustainable development of Canada's military infrastructure



The Environment and Canada's Department of National Defence SCOTT STEVENSON, Assistant Deputy Minister (Infrastructure and Environment) and ROSE KATTACKAL, Director General, Environment, Department of National Defence November 25, 2010

The Centre for Environment was pleased to have **Scott Stevenson** and **Rose Kattackal** of Canada's Department of National Defense (DND) present a special public seminar in 2010.

They discussed the sustainable development of military infrastructure stemming from the Canada First Defence Strategy. In order to meet Canada's future defence and security requirements, the Government intends to replace or refurbish approximately 25 per cent of (DND) infrastructure holdings within 10 years, with approximately 50 per cent being replaced or refurbished over 20 years.

Mr. Stevenson and Ms. Kattackal also explained how DND's infrastructure is managed in a way that not only contributes to the protection of the environment, but enables the Canadian Forces to carry out military activities. The Environment Division is responsible for the conceptualisation, development and implementation of the DND and Canadian Forces' environmental and sustainable development framework; the related strategy, policies, programs, standards, guidance and systems including national oversight.

For more information, please visit www.admie.forces.gc.ca.

Environment & Development seminar

In collaboration with Jane Goodall Institute of Canada

BY LISA TAIT

Critically Assessing Conservation: Reflections from the Field Dr. ZINTA ZOMMERS, Wildlife Conservation Research Group, University of Oxford, April 1, 2011

On April 1 2011, a special presentation of the annual Environment and Development seminar was jointly presented by the Centre for Environment and the Jane Goodall Institute of Canada (JGI). We were pleased to have **Dr. Jane Goodall**, acclaimed primatologist, UN Messenger of Peace and JGI founder, attend the seminar by **Dr. Zinta Zommers** of the University of Oxford and the inaugural presentation of the Jane Goodall graduate scholarship. Dr. Goodall was in Canada to wrap up a year-long 50th anniversary speaking tour promoting her unwavering message of hope.

Using data from 16 villages and four communities of chimpanzees in Budongo Forest in Uganda, Dr. Zommers examined recent controversies in conservation such as population growth around protected areas and the role of the researcher. Awarded a Rhodes Scholarship to study at the University of Oxford, she joined Oxford's Wildlife Conservation Research Group and earned at M.Phil. in Development Studies and recently completed a Ph.D. in Zoology. Her work examines the impact of human disturbance on chimpanzee populations in Budongo Forest, Uganda. She is also a University of Toronto alumna, graduating with Honours B.Sc. in Biology and Environmental Studies.

The inaugural Jane Goodall scholarship was awarded by **Professor Don Jackson**, Interim Director of the Centre for Environment, to **Claire-Helene Heese-Boutin**, a honours B.A.



Dr. Jane Goodall, left, joins Dr. Zinta Zommers, of Oxford University's Wildlife Conservation Research Group, as Dr. Zommers delivers a lecture examining recent controversies in conservation.

student at U of T majoring in Caribbean Studies and Environmental Studies. She was personally recognized by Dr. Goodall at the ceremony for her contributions to conservation and development. *(See page 15 for a photo of the presentation.)*

Lisa Tait is JGI Director, Development & Marketing. For more information, please visit www.janegoodall.ca or email Lisa at lisa@janegoodall.ca.



Christian Abizaid Assistant Professor, Dept. of Geography

Assistant Professor, Dept. of Geography and Centre for Environment.

Office: Dept. of Geography, Room 5025B, 100 St. George St., Toronto, ON, M5S 3G3, tel: 416-978-3373, fax: 416-946-3886; christian.abizaid@utoronto.ca; http://www.geog.utoronto.ca; http://www.environment.utoronto.ca. Licenciatura (International Relations), Iberoamericana, Mexico; M.A. and Ph.D. (Geography), McGill. 2011-12 CFE Instructor of ENV 223H Fundamental Research Skills and JGE 321H Multicultural Perspectives on Environmental Management (joint course with Geography).

Research Interests: Human-environment interactions, environmental conservation and development, cultural ecology, peasant livelihoods in tropical forests, environ-mental change, human responses to natural hazards and vulnerability, human-induced environmental change, land use and land cover change, Latin America, Amazon, Mexico.

Featured Research Projects:

Floodplain Dynamics, Socioeconomic Change, and Traditional Livelihoods in the Upper *Amazon*. This project examines the prospects for economic livelihood within the context of rapid environmental and socioeconomic change. As part of my dissertation, I studied the origins, and the (social and economic) consequences of a recent meander cutoff along the Ucayali River in Peru. Since then, South American governments announced important infrastructure projects in the Amazon, under IIRSA, which are likely to change the prospects for economic livelihood in my study area. Building on my earlier research in the region, I have a unique opportunity to document long-term livelihood responses to river channel dynamics in a socioeconomic context that promises to change dramatically in the coming years.

Life and Livelihoods on Amazonian Floodplains (with O. Coomes, McGill



Philip Byer

Professor, Department of Civil Engineering and Centre for Environment.

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http://www.environment.utoronto.ca. S.M. (Civil Eng.), S.B. (Electrical Eng.), Ph.D. (Civil Eng.), Mass. Inst. Technology 2011-12 CFE Instructor of ENV 1001H Environmental Decision-Making.

Research Interests:

Environmental planning and decisionmaking, multi-objective project evaluation, environmental assessment, risk management, solid waste management, climate change.

Featured Research Project:

Decision Making Under Uncertainties for Adapting to Climate Change in Project Environmental Assessments. (Research contract from the Canadian Environmental Assessment Agency, 2009-11.) This project evaluated and recommended methodologies that can be used in project environmental assessments to help decide the type and degree of adaptation that should be used to respond to uncertainties about the degree of future climate change. The research included a review of recent environmental assessment comprehensive studies and other literature to identify the types of adaptation that has or could be used to respond to climate change for a variety of project types in Canada; a review of available decision-making criteria and approaches, such as minimax regret and adaptive management, for making decisions under conditions of uncertainty; and an analysis of when and how these criteria and approaches can be used in project

University). The floodplains of the Amazon River and its tributaries are considered to be among the last agricultural frontiers in Amazonia. Research on floodplain use and economic livelihoods of riverine people points to the development potential (i.e., fertile soils, ease of transportation, and protein availability), but also the constraints (i.e., particularly flooding) presented. This research draws on insights from field studies among riverine dwellers in the Peruvian Amazon to challenge some of the common assumptions about life and resource use on the floodplain in the Upper Amazon.

Recent Publications:

- Coomes, O., Y. Takasaki, C. Abizaid and B. Barham. 2010. Floodplain fisheries as natural insurance for the rural poor in tropical forest environments: evidence from Amazonia. *Fisheries Management & Ecology*. 17:513-521.
- Coomes, O.T., C. Abizaid and M. Lapointe. 2009. Human modification of a large meandering Amazonian river: genesis, ecological and economic consequences of the Masisea cutoff on the central Ucayali, Peru. *Ambio* 38(3): 130-34.
- Abizaid, C. 2005. An anthropogenic meander cutoff along the Ucayali River, Peruvian Amazon. *The Geographical Review* 95(1): 122-135.

environmental assessments for helping practitioners decide how the project should be planned to adapt to climate change.

Recent Publications:

- Byer, P, A. Colombo, A. Sabelli, and C. Ches. 2011. *Decision Making Under Uncertainties for Adapting to Climate Change in Project Environmental Assessments.* Research report to the Canadian Environmental Assessment Agency. 73 pages.
- Byer, P. 2009. Improving municipal waste management planning. *Journal of Policy Engagement* 1(5):7-10.
- Byer, P., M. Lalani and J.S. Yeomans. 2009. Addressing and communicating climate change and its uncertainties in project environmental impact assessments. *Journal of Environmental Assessment Policy and Management* 11(1):29-50.
- Byer, P. and J.S. Yeomans. 2007. Methods for addressing climate change uncertainties in project environmental impact assessments. *Impact Assessment* and Project Appraisal 25(2): 85-99. (Awarded prize by International Association for Impact Assessment for best paper published in 2007 in Impact Assessment and Project Appraisal.)

Karen Ing

Senior Lecturer and *Undergraduate Coordinator*, Centre for Environment.

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M.Sc. (Zoology), Toronto. 2011-12 CFE Instructor of SII 199H Debating and Understanding Current Environmental Issues, ENV 200H Assessing Global Change: Science and the Environment, ENV 221H Multidisciplinary Perspectives on Environment; and Co-Instructor of ENV 395Y Special Topics Field Course: Ecology and Conservation in the Andes, Western Amazonia and the Galápagos.

Research Interests:

Environmental education, interdisciplinary team teaching, valuing ecosystem services and well-being; incentive mechanisms for provisioning of ecosystem services.

Featured Research Projects:

Incentive Mechanisms for the Provision of Ecosystem Services in Ontario. The provision of ecosystem services poses challenges similar to as those associated with the provision of public goods. These challenges become more serious when the providers are private landowners. In partnership with conservation authorities in Southern Ontario, this project is being undertaken to enable community

Donald Jackson

Professor, Department of Ecology and Evolutionary Biology; Interim Director, Centre for Environment.

Office: Centre for Environment, Room 1020 33 Willcocks St., Toronto, Ontario, M5S 3E8; tel: 416-978-6526; fax: 416-978-3884; director.environment@utoronto.ca; http://labs.eeb.utoronto.ca/jackson/. BSc., M.Sc., Ph.D. (Zoology), Toronto. 2011-12 CFE Co-Instructor of ENV 395Y Special Topics Field Course: Ecology and Conservation in the Andes, Western Amazonia and the Galápagos.

Research Interests: The mechanisms by which environmental conditions determine the composition of ecological communities and species distribution; fish and aquatic invertebrate communities; statistical methodologies; environmental contaminants; ecological restoration/recovery.

Featured Research Projects:

Impact of Invasive Species on Biodiversity of Lakes. Much of our research focuses on factors impacting the biodiversity of ecological systems. One research theme relates to the impact of invasive species on the biodiversity of lakes. We have ongoing projects examining the impact of invasive species of fish and invertebrates on our native species, determining the potential invisibility of Canadian lakes, and assessing how large-scale organizations to implement the most appropriate incentive mechanisms by enhancing their capacities, and to facilitate relevant policy changes related to the provision of ecosystem services, at the national, provincial, and municipal levels.

Ecosystems and Human Well-Being (UNEP). In collaboration with **Professor Shashi Kant** (Faculty of Forestry, U of T), the goal of this project is to increase awareness and understanding of the links between ecosystem and human well-being, especially in developing countries. Workshops have been offered in China and Vietnam.

Team Teaching: Does It Strengthen Or Undermine a Learning Community? With a cross-disciplinary group of U of T colleagues, this study explores the extent and variety of team teaching models at U of T. Over 64 team taught courses were surveyed in the Faculty of Arts & Science to assess the perceived advantages and disadvantages of team teaching both from the faculty and student perspective.

Survey of Raccoon Movement in the Niagara Region from 1994 to 1997. This project was a critical component in developing Ontario's strategies on management and potential disease spread of raccoon rabies into Southern Ontario. It analyzed data from the Trap-Vaccinate-Release program in the Niagara Region to study movement trends associated with variables such as sex, age, and seasons.



Natural Recovery/Restoration. Although most environmental studies show deterioration in biodiversity, environmental quality and virtually all other attributes measured, we have been studying the natural recovery of an area severely impacted by mining and acidification near Lake Superior. Although these types of impacted systems generally show limited recovery even with considerable cost and effort expended by humans, our research area has shown unparalleled recovery in habitat and all types of aquatic life without human intervention. This set of systems provides a great model system of ecological development.

Statistical Ecology. Determining relationships between many species present in ecological communities and the many associated environmental conditions provides significant challenges. Our lab has a strong emphasis on the development and use of statistical methodologies, typically multivariate statistical methods, that can be used to determine these associations, test for relationships, and develop predictive tools for research and management.



Recent Publications:

Rosatte, R., M. Ryckman, K. Ing, S. Proceviat, M. Allan, L. Bruce, D. Donovan, J.C. Davies. 2010. Density, movements, and survival of raccoons in Ontario, Canada: implications for disease spread and management. *Journal of Mammalogy* 91(1): 122-135.

Neumann, M, S. Browning, J. Clarke, J. Harlow, D. Harrison, K. Ing, L. Kushnir, C. Kutas, J. Pitre, R. Serbanescu, M. Wall, and R. Wilson. 2008. Serial team teaching and the evolving scholarship of learning: students' perspective. *Collected Essays on Teaching and Learning* 1: 28-34.



Forthcoming and Recent Publications:

Walker, S.C. and D.A. Jackson. Randomeffects ordination: describing and predicting multivariate correlations and co-occurrences. *Ecological Monographs*. (In press.)
Neff, M.R. and D.A. Jackson. 2011. Effects of broad-scale geological changes on patterns in macroinvertebrate assemblages. *Journal of the North American Benthological Society* 30: 459-473.

Gido, K.B and D.A Jackson.(Editors.) 2010. Community Ecology of Stream Fishes: Concepts, Approaches, and Techniques. American Fisheries Society. 664 pages.



Kundan Kumar Assistant Professor, Dept. of Geography

and Centre for Environment. Office: Dept. of Geography, Room 5025A, 100 St. George St., Toronto, ON, M5S 3G3; tel 416-978-2958; fax: 416-946-3886; kundan.kumar@utoronto.ca; http://www.geog.utoronto.ca; http://www.environment.utoronto.ca. B.Sc. Hons (Physics), Delhi; M.A. (Forestry Management), Indian Institute of Forest Management; Ph.D. (Resource Development), Michigan State. 2011-12 CFE Instructor of SII 199H



Douglas Macdonald

Senior Lecturer, Centre for Environment. Office: Centre for Environment, Room 1049B (5 Bancroft Ave. entrance). Mailing address: 33 Willcocks St., Toronto, ON, M5S 3E8; tel: 416-978-1558; fax: 416-978-3884; douglas.macdonald@utoronto.ca; http://www.environment.utoronto.ca. Hon. B.A., M.A., Toronto; Ph.D. (Environmental Studies), York. 2011-12 CFE Instructor of ENV 222H Interdisciplinary Environmental Studies, ENV 320H National Environmental Policy, ENV 322H International Environmental Sustainable and Just Futures: Environmental Politics in an Age of Global Warming, and ENV 333H Ecological Worldviews.

Research Interests:

Forest rights and tenure, forest tenure reforms; democratization and decentralization of forest governance, environment and climate justice, environmental governance and civil society, social and environmental movements.

Featured Research Projects:

Democratizing Forest Governance in India: Rights, Justice and Conservation (SSHRC, 2010-11; with **Professor Neera M. Singh**, Faculty of Forestry, U of T). This research examines the forest reform process in India and its implications for marginalized forest dwellers, in context of the recently enacted Forest Rights Act. It seeks to understand how organizing by forest dwellers can contribute to a more democratic and just forest governance.

Environmental Governance and Civil Society in Developing Countries. Environmental governance is one of the most contentious arenas in developing countries, as globalization and neo-liberalism often push the environmental costs to those people who are most vulnerable and marginalized. I am interested in addressing how civil society and social mobilizations organize to influence and modify environmental governance to seek more just and sustainable outcomes in India.

Policy, ENV 451H Current Environmental Debates, and ENV 1002H Environmental Policy.

Research Interests: Politics of Canadian environmental policy making; waste and pollution policy; the business firm and trade association as environmental policy actors, Canadian national, federal-provincial climatechange policy; environmental legitimacy as a source of political power.

Research Projects:

(See page 4 for more details on the following research projects.)

Governance Innovation and the Transition to a Low Carbon Economy (Carbon Management Canada, 2010-12; with **James Meadowcroft** and **Glen Toner** of Carleton University). This project is concerned with innovation in governance practices to address climate change and accelerate the transition towards a low carbon Canada.

Allocating Canadian Greenhouse Emission Reductions Amongst Sources and Provinces: Learning from the EU and Germany (SSHRC, 2009-12; with Jochen Monstadt, Technische Universität Darmstadt, Germany and Kristine Kern, Wageningen Universiteit, The Netherlands). This project studies the failure of the Canadian federal government and provinces to reach agreement on one effective, coherent national climate change policy which *Climate Justice.* Climate change, its outcomes and efforts at its amelioration amplify a recurrent pattern in recent history – that those who are weak and powerless will pay the price for the excesses of the powerful. Climate change impacts will primarily be felt by those who have least contributed to greenhouse emissions. Ironically, those worst affected are also the least well-endowed and capable to face the challenges that climate change poses. Furthermore, measures for climate change amelioration have the potential of further disrupting the lives of the marginalized and poor.

Forthcoming Publications:

Kumar, K. The Sacred Mountain: Confronting Global Capital at Niyamgiri. Special edition of *Journal of Development and Change*. (Forthcoming.)

Kumar, K. Erasing the Swidden: Constructing forest-agriculture dichotomies in Orissa. In S. Lele (ed.), *Beyond Joint Forest Management: Rethinking the Forests Question in India.* Oxford University Press, Delhi. (Forthcoming.) Kumar K et al. Historical injustices: The creation of poverty through forest tenure deprivation in Orissa. In O. Springate-Baginski (ed.), *Understanding Livelihood Impacts of Participatory Forest Management Implementation in India & Nepal.* Overseas Development Group, University of East

Anglia, U.K. (Forthcoming.)

explicitly states what portion of the over-all cost of action will be borne by each province and studies lessons learned from two other federated systems, Germany and the EU. *The Oil and Gas Industry and Government of Canada Climate-Change Policy: Objectives, Legitimacy and Organization* (SSHRC, 2009-11). This research attempts to understand the sources of the political power of the oil and gas industry as it has lobbied to influence Government of Canada climate-change policy during the past twenty years.

Policy Instrument Choices Influencing Sustainable Transportation in the City of Toronto (SSHRC, 2010-11; with Jean Mercier of Université Laval). This project examines the use of instruments such as government organization, subway capital cost funding and zoning intensity to encourage a shift from the private motor vehicle to other modes of transport.

Forthcoming and Recent Publications:

Macdonald, D. Harper energy and climate policy: failing to address the key challenges. In G.B. Doern and C. Stoney (eds.) *How Ottawa Spends 2011-12*. McGill-Queen's University Press, Kingston-Montreal. (Forthcoming.)

Macdonald, D. 2007. Business and Environmental Politics in Canada. Broadview Press, Peterborough, Ontario. 240 pages. (Winner of the Donald Smiley Prize.)

W. Scott Prudham

Professor, Department of Geography and Centre for Environment. Office: Dept. of Geography, Room 5007, 100 St. George St., Toronto, ON, M5S 3G3; tel: 416-978-4975; fax: 416-946-3886; scott.prudham@utoronto.ca; http://www.geog.utoronto.ca; http://www.environment.utoronto.ca. B.A.& Sc., McMaster; M.A. (Geography), Victoria; Ph.D. (Energy and Resources), California, Berkeley. 2011-12 CFE Instructor of ENV 1444H Capitalist Nature.

Research Interests: The commodification of nature; market-based mechanisms for dealing with environmental problems; political ecology; political economy and environmental change/politics in North America; industrial and alternative forestry in western North America; social regulation of commercial biotechnology in agriculture and forestry.

Featured Research Project:

Double Movements: A Political Ecology of Land, Labour and Livelihoods in British Columbia (SSHRC, 2008-12). This project examines the inter-connected political, ecological, economic and cultural aspects of commodification in British Columbia's forest economy. The goals are to understand trajectories of commodification, specifically

Stephen B. Scharper

Associate Professor, Department of Anthropology, U of T Mississauga and Centre for Environment.

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Research Interests:

Environmental ethics, environmental worldviews, liberation theology and ecology, religions and environmentalism.

Featured Research Projects:

Cosmological Underpinnings of Urban Sustainability. This research has explored some of the cosmological and spiritual presuppositions that lie behind the integration of urban ecological thought and planning, involving the work of wildlife biologist Aldo Leopold and cultural historian and Passionist priest Thomas Berry.

relating to forest based work and forest products production, but also to examine opportunities and constraints facing sustainable livelihoods based on forest appropriation. It proposes and addresses several interconnected questions: How do labour and land come to circulate as commodities? How does commodification rely on specific processes of political, cultural, and institutional objectification whereby the social allocation of labour and land seem to elude everyday influence? How are these processes evident in the historical and contemporary political ecology of BC's globalist forest economy? What strategies are appropriate and available through which sustainable livelihoods based on forest use in BC's Cowichan Valley may be reclaimed, and what can be learned from these?

The research addresses these issues through a combination of historical and contemporary analysis, using secondary and primary sources of evidence, including active, and action oriented collaboration with NGOs and community forestry groups in the province.

Recent Publications:

Prudham, S. and W. Coleman. 2011.
Introduction: Property, autonomy, territory, and globalization. In: W. Coleman (ed.)
Property, Territory, Globalization: Struggles
Over Autonomy. University of British
Columbia Press, Vancouver. Pages 1-28.
Prudham, S. 2011. Making forests "normal":

Religion and Ecology: Exploring the Interconnection of Liberationist and Ecological Theologies (recently completed SSHRC project). This research was on the integration of liberation theology and newer religious approaches to environmental questions, such as the new cosmology of Thomas Berry. While much of the religious conservation around ecology has entailed ontological, doctrinal, and cosmological or "worldview" questions, there have also been religious responses that take issues of class, race, gender, poverty, and justice seriously. Indeed, many tensions have surfaced and continue to exist between these two broadly outlined ecological approaches. Thus, the question has emerged whether the ecological contributions of the world's religions are chiefly in the realm of worldviews, doctrine, and cosmology, or in the realm of a political and economic critique.

This research probed this question by focusing on one of the most challenging religious developments of the past thirty years – that of the theology of liberation, a theology that takes poverty, and increasingly, ecological destruction, seriously. Early formulations of the theology of liberation, through its use of the social sciences and critique of structural economic and political systems such as developmentalism and modernization, yields an approach where



Sustained yield, improvement, and the establishment of globalist forestry in British Columbia. In: W. Coleman (ed.) (See above.) Pages 80-100.

- Prudham, S. and N. Heynen. 2011. Introduction: Uneven development 25 years on: space, nature and the geographies of capitalism. *New Political Economy* 16(2): 223-232.
- Prudham, S. 2009. Pimping climate: a critique of Richard Branson's entrepreneurial activism. *Environment and Planning A* 41: 1594-1613. (Winner of Ashby Prize awarded to the most innovative paper published in Environment and Planning A in 2009.)



questions of worldview and cosmology potentially unite with social, economic, and political critiques, leading to a possible integration of social, religious, and ecological concerns instructive for religious ecological engagement.

Forthcoming Publications:

Scharper, S. A renewed look at renewable energy: toward a holistic approach. *Alternatives*. (Forthcoming Fall 2011.)
Stefanovic, I.L. and S.B. Scharper (eds.) *The Natural City: Re-Envisioning the Built Environment*. University of Toronto Press. 356 pages. (Forthcoming December 2011.)



Beth Savan

Senior Lecturer, Centre for Environment; Director, U of T Sustainability Office.

Office: Sustainability Office, Room 208, South Borden Building, 487 Spadina Crescent. Mailing address: c/o Campus Mailroom 563 Spadina Crescent, Toronto ON, M5S 2J7; tel: 416-978-8202; fax: 416-978-3884; b.savan@utoronto.ca;

http://www.environment.utoronto.ca; http://www.sustainability.utoronto.ca. B.Sc. Hons., Toronto; Ph.D., London, U.K. 2011-12 CFE Instructor of ENV 307H Urban Sustainability.

Research Interests:

Sustainability planning, energy conservation, community based research, environmental education and community based social marketing, environmental assessment.

Featured Research Projects:

Usability, Pilot Testing and Evaluation of B*Focused Productivity System (SME FEDDEV ARC, 2011-12; with Dr. Ellie Farahani, post-doctoral researcher and Professor Birsen Domnez, Mechanical and Industrial Engineering). In collaboration with Kangaroo Design, this project will develop a hardware/software solution that minimizes work interruptions. B*focused research considers usability and behavioural factors for product effectiveness. Usability research identifies the optimal technology interfaces for effective employment among user populations; behavioural research identifies the social conditions necessary for effective adoption, and builds on best practices developed at the U of T Sustainability Office (see page 26). The goals of this project include heightened productivity on the individual and firm level, and enhanced social sustainability including employee satisfaction. (See page 3 for more details.)

The Use of Revolving Funds in Confronting Market Barriers to Electricity Conservation in Ontario Institutions (Sustainable Prosperity Grant, with John Maiorano, M.Ed. student, OISE/UT and Centre for Environment). This project will investigate and document the political, economic, staff resources and market barriers preventing long term investment in conservation projects through revolving funds and similar mechanisms. The research will address these barriers and means to overcome them through interviews with Ontario institutions, with a focus on universities.

Forthcoming and Recent Publications:

- Taylor, A., B. Savan and J. Fiddler. Overcoming Barriers to Sustainability and Implementing Institutional Reform. *Journal* of Sustainability in Higher Education. (Forthcoming.)
- Savan, B., and Z. Matson. The Behaviour Imperative: Unlocking the potential of everyday change to reduce global carbon emissions. In T. Kaime (ed.), *Climate change law and cultural legitimacy: Interdisciplinary Perspectives.* Carolina Academic Press, Durham, North Carolina. (Forthcoming.)
- Savan, B., and Z. Matson. Changing behavior to conserve resources: what works and what doesn't. In C. Weng Wai (ed.) *Non Structural Environmental Management*. Universiti Teknologi Malaysia. (Forthcoming.)
- Savan, B.I., S. Flicker, B. Kolenda and M. Mildenberger. 2009. How to facilitate (or discourage) community based research: recommendations based on a Canadian survey. *Local Environment* 14(8): 783-796.

Beth Savan receives CMHC Excellence in Education Award for Promotion of Sustainable Practices



Congratulations to **Dr. Beth Savan**, Director of the U of T Sustainability Office and Senior Lecturer at the Centre for Environment, who has been awarded the 2010 Excellence in Education Award for Promotion of Sustainable Practices by Educators. She received the award at a special presentation as part of the U of T Dept. of Facilities and Services' Green Ribbon Award ceremony in July, 2011.

The award of the Canada Mortgage and Housing Corporation (Ontario Region) honours outstanding educational contribution to sustainable practices in the fields of architecture, planning, landscape architecture, urban design, geography, engineering, and environmental studies. It recognizes educators who have integrated sustainable concepts in housing and community development into the academic curriculum.

Dr. Savan is the inaugural Sustainability Director at U of T, where she has been responsible for establishing the U of T Sustainability Office (SO), managing its staff, engaging students in sustainability activities on campus, and overseeing energy and resource conservation programs. Now in its sixth year, SO was one of the first dedicated sustainability offices in Canada and has established a unique model of bridging research, teaching and operations.

Under her direction, SO provides more than 100 students with research, employment and leadership opportunities and engages thousands more as program participants. Dr. Savan has positioned SO to provide students with skills and experience by engaging them in conservation projects that use the university as a living laboratory. It prepares students for environmental jobs after graduation and provides the university community with much needed capacity for conservation project implementation.

For more information, see page 26 or visit http://sustainability.utoronto.ca.

Willem Vanderburg

Professor, Department of Civil Engineering and Centre for Environment; Director, Centre for Technology and Social Development.

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http://www.civil.engineering.utoronto.ca; http://ctsd.utoronto.ca;

http://www.environment.utoronto.ca. B.A.Sc., M.A.Sc., Ph.D (Mech. Eng.), Waterloo.

2011-12 CFE Instructor of JEI 1901H Technology, Society and the Environment I (joint course with Dept. of Civil Engineering).

Research Interests:

Ecology of technology (how technology fits into, depends on and interacts with human life, society and the biosphere); preventive engineering and management (adjusting theory and practice to help create cleaner and greener technologies); relationship between culture of society and "cultures" of science and technology, with emphasis on embedded values, beliefs and world-views.

Featured Research Projects:

Knowledge Infrastructure for Sustainable Cities. The evolution of contemporary cities

Clare Wiseman

Assistant Professor and Coordinator, Environment and Health Collaborative Graduate Program, Centre for Environment. Office: Centre for Environment, Room 2097, 33 Willcocks St., Toronto, Ontario, M5S 3E8; tel: 416-978-2972; fax: 416-978-3884; clare.wiseman@utoronto.ca; http://www.environment.utoronto.ca. B.E.S. Hons. (Waterloo), M.Nat.Res.Mgmt. (Simon Fraser), Dr. phil.nat. (Frankfurt). 2011-12 CFE Instructor of ENV 4001H Graduate Seminars in Environment and Health and ENV 430H/4002H Environment and Health of Vulnerable Populations.

Research Interests: Organomineral associations in soils, human health effects of contaminant exposures, environmental health of vulnerable populations, metal emissions and their potential impacts.

Featured Research Projects:

Urban Gardening & Airborne Particulate Matter: Exploring the Fate of Traffic-Related Emissions and the Effectiveness of Risk Reduction Measures. (Centre for Urban Health Initiatives seed grant, in collaboration with Foodshare, 2009-11). This research examines the fate of traffic-related metal emissions in the urban environment, their uptake by commonly cultivated plants and the effectiveness of soil remediation measures. into sustainable cities will be affected by the decisions of countless specialists according to an established intellectual and professional division of labour. They belong to groups responsible for advancing and applying a body of knowledge, making up a knowledge infrastructure. Some characteristics of these infrastructures are being studied insofar as they inhibit the evolution toward sustainable cities. The results will be used to unleash the potential of preventive approaches aimed at achieving the desired results while preventing or minimizing undesired consequences.

Desymbolization. For as long as humanity has been a symbolic species, cultures have been the bases for making sense of and living in the world. Contemporary ways of life have created a flood of desymbolizing experiences that are undermining our ability to relate highly specialized knowing and doing to a broader context, thus creating a great many "collisions" with human life, society and the biosphere. Desymbolization is now one of the primary threats to a livable and sustainable future. This diagnosis is the basis for a prescription to turn this situation around, beginning with the university and the professions.

Different plant species are cultivated at several locations in Toronto, with variable traffic densities to assess the soil accumulation and fate of metal emissions over time, their bioaccessibility and potential health risks of consumption. This research looks at the extent soil mineralogy influences the transport of trace metals from the solid to liquid phase where they become bioaccessible to plants and how soil ageing under field conditions influences the availability of trace metals for uptake by plants. *(See page 2 for more info.)*

Platinum Group Element Emissions: Environmental Concentrations, Exposure Levels and Human Health Risks (Ongoing collaboration with Fathi Zereini, University of Frankfurt). Investigates platinum group element (PGE) emissions from automobiles, equipped with catalytic converters, and how their concentrations have increased over time. Potential human exposures and health impacts are also assessed. Current research examines the bioaccessibility of PGE in the human lung in the presence of organic complexing agents, together with other trace elements, in airborne PM samples collected in Germany using physiologically-based extraction tests.

Children and Contaminants in Public Settings: Assessing Dermal Exposure Levels and Risks. Preliminary research is underway to assess the feasibility of dermal wipe techniques to determine contaminant exposures in children



Forthcoming and Recent Publications:

- Vanderburg, W.H. *Our War on Ourselves*. Toronto: University of Toronto Press. (Forthcoming January, 2012).
- Vanderburg, W.H. 2009. The anti-economy hypothesis. Part 1: from wealth creation to wealth extraction; part 2: theoretical roots; part 3: toward a solution. *Bulletin of Science, Technology and Society* 29(1): 48-74.
- Vanderburg, W.H. 2006. Can the University escape from the labyrinth of technology? (Parts 1-4) *Bulletin of Science, Technology and Society* 26(3): 176-221.



playing in public parks and playgrounds. Metal exposures from local emission sources and through contact with various construction materials in Toronto is the focus of this study initiated in August 2010.

Recent Publications:

Zereini, F and CLS Wiseman. (Editors.) Urban Airborne Particulate Matter: Origins, Chemistry, Fate and Health Impacts.
Springer Verlag, Berlin. 680 pages.
Wiseman, CLS and F Zereini. 2009. Airborne particulate matter, platinum group elements and human health: a review of recent evidence. Science of the Total Environment 407: 2493–2500.

PROFILES: OTHER INSTRUCTORS & SESSIONAL LECTURERS

In addition to its core faculty members (see pages 32-37), the Centre for Environment (CFE) is pleased to have other experts from within and without the University instructing its undergraduate, graduate, and distance education courses. The following individuals instructed CFE courses in 2010-11 and/or may instruct in 2011-12 (subject to change). Please see pages 12, 17, 20 for respective undergraduate, graduate and distance education course listings.



Alan Abelsohn

CFE Undergraduate Sessional Lecturer ENV4001H Grad Seminars in Environment & Health, 2010-11 Dr. Abelsohn is a Family Physician and Assistant Professor in the Dept. of Family and Community Medicine and Dalla Lana School of Public Health at U of T. He is a physicianepidemiologist in the Health Canada's Air Quality Health Index program and has published on environment and health, air pollution; health, climate change, and ethics. He also designed CFE distance courses on environment & health.



Riina Bray

CFE Undergraduate Sessional Lecturer ENV 341H Environment & Human Health Dr. Riina Bray is the Medical Director of the Environmental Health Clinic at Women's College Hospital, Toronto. She has recently completed research on toxic metals in Canadians, a scoping review on health effects, physician and public health management strategies. She has been involved in the development of educational resources in children's health and the environment.



Jane Ambachtsheer

CFE Adjunct Professor & Sessional Lecturer ENV 1707H Environmental Finance and Sustainable Investing Ms. Ambachtsheer is a Partner of Mercer, based in Toronto. She leads Mercer's global responsible investment business, and consults to North American and international investors. She was a consultant to the United Nations and is a global advisor to the Carbon Disclosure Project. She is a member of the Centre for Environment's Environmental Finance Advisory Committee (see page 21-22).



Brad Bass

CFE Adjunct Professor & Sessional Lecturer ENV431/1004H Urban Sustainability & Ecological Technology Dr. Bass is a Researcher in Environment Canada's Adaptation and Impact Research Section with an office and lab at the Centre for Environment. His research interests include simulating adaptation with anticipatory/ emergent computing, green walls and green roofs, community energy systems planning and adaptations to climate change. (See page 6 for his projects).



Marco Belmont

CFE Undergraduate Sessional Lecturer ENV236 Human Interactions with the Environment. 2010-11 Dr. Belmont is a research consultant at Toronto Public Health where he researches, develops policy, and implements programs on environmental health. After working for the Ministry of Environmental Protection in Mexico, he obtained a Ph.D. in environmental toxicology from Trent University and completed postdoctoral work in the U.S. and Canada. He also teaches at Ryerson University.



Oliver Bussler **CFE Distance Education Instructor** Carbon Finance Certificate Program

Mr. Bussler is Director, Emissions Management at TransAlta Corporation and is responsible for providing strategic direction to TransAlta's emission portfolio. He has developed a broad skill set in the world of environmental and carbon finance, having spent the past decade involved with Canadian environmental policy, project development and carbon offset acquisitions.



Miriam Diamond

Professor, Dept. of Geography, U. of Toronto ENV 236H Human Interactions with the Environment JGE 1212H Contaminants in the Environment Dr. Diamond is interested in chemical contaminants from source to health effects. Her research includes measuring and modelling sources, fate and exposure of the plasticizers phthalates indoors to advancing methods in Life Cycle Impact Assessment. Her projects focus on minimizing exposure to contaminants via indoor and outdoor environments.



Larry Frisch

CFE Distance Education Instructor

Environmental Management Certificate Program, 2010-11 Dr. Frisch is Assistant Director of the Vancouver Coastal Health Research Institute and former Executive Medical Director for Quality and Patient Safety at the Vancouver Island Health Authority. He is a paediatrician, and public health physician/epidemiologist and has taught at the University of Hawaii, the University of Kansas, and Northeastern Ohio Universities Colleges of Medicine and Pharmacy.



A.P. Lino Grima

Associate Professor (retired), Geography, U of T ENV 1703H Water Resource Management and Policy Dr. Grima has taught environmental/water resources management at the University of Toronto since 1972. His research and advocacy of Great Lakes water quantity and quality issues go back to the 1970s. He has published over 60 scientific papers and several books on natural resources and environmental management. He has also served as a consultant for public and private bodies.



Gennady Gienko

CFE Distance Education Instructor GIS for Environmental Management Certificate Program Dr. Gienko is an Associate Professor in the School of Geomatics at the University of Alaska Anchorage, where he develops and teaches undergraduate and graduate courses in Geographic Information Systems, Geospatial Image Analysis, Remote Sensing and Photogrammetry. He has extensive international experience in geospatial science, geomatics and photogrammetry.





Michael Gorton

Asst. Professor, Dept. of Geology, U of Toronto ENV 315H Chemical Analysis of Environmental Samples Dr. Gorton is a geochemist who has specialized in the trace element geochemistry of rocks and especially, the rare earth elements. His research includes a wide range of practical applications on the origin of rocks and theoretical studies on the effects of intense alteration on the usefulness of trace element geochemistry in rocks. He also specializes in analytical methods and supervises a range of analytical instruments.



Michael Govorov

CFE Distance Education Instructor GIS for Environmental Management Certificate Program Dr. Govorov has instructed in the Centre's GIS (Geographic Information Systems) in Environment Management distance program since its advent and was instrumental in its initial development. He has been teaching GIS and Remote Sensing in the online environment for over five years and currently teaches and prepares undergraduate and postgraduate courses at the Vancouver Island University.



Sharonna Greenberg **CFE Distance Education Instructor Environmental Management Certificate Program** Dr. Greenberg is a chemist whose research involved designing new polymers and technologies. These technologies are used in manufacturing electronics, pharmaceuticals and pesticides, and they rely on more environmentally friendly chemical species, eliminating the need for toxic metals. She is currently teaching at the University of Toronto and Ryerson University.



Andrew Hall

CFE Distance Education Instructor Carbon Finance Certificate Program, 2010-11

Andrew Hall has worked in the field of carbon finance for the past four years and specialized in the subject as a core component of his MBA. He works for Capital Power Corporation in the Environment and Emissions Portfolio group where he is responsible for originating, developing and transacting carbon offset projects. Prior to this, he worked for Lloyds Banking Group in Tokyo and London.



L. Danny Harvey

Professor, Dept. of Geography, U of Toronto JGE 347H Efficient Use of Energy, 2010-11 JGE 348H Carbon-Free Energy, 2010-11

Dr. Harvey's research focuses on computer climate modelling, with applications to the understanding of past climatic changes and projection of future climatic change due to emissions of greenhouse gases. Particular emphasis is on coupled climate-carbon cycle models and the impacts of different future global energy scenarios.



Russ Houldin

CFE Undergraduate Sessional Lecturer ENV 323H Ontario Environmental Policy; ENV 347H Power of Economic Ideas; ENV 350H Energy Policy & Environment Mr. Houldin has worked, mainly as a policy adviser, in the Ontario Public Service for over 30 years in a variety of Ministries. He is currently a senior adviser to the Ontario Energy Board. His interests include environmental and ecological economics; sustainable electricity systems; environmental and economic regulation; and Ontario environmental policy.



Charles Jia

Professor, Dept. of Chemical Engineering & Applied Chemistry, University of Toronto JNC 2503H Environmental Pathways, 2010-11 Dr. Jia's research applies sciences and engineering principles to address environmental problems related to sustainable energy. His projects address clean air, clean water and climate change and develop new technologies for minimizing industrial emissions. He also studies the fate, transport and impacts of pollutants in the natural environment.



Tom Johnson CFE Distance Education Instructor Carbon Finance Program

Mr. Johnson has over 10 years of experience in the environmental and greenhouse gas sectors. He has held senior roles related to both GHG accounting and reporting and to carbon finance, and is currently helping the province of Ontario implement its Cap and Trade system. He holds a B.A. in Geography and Environment from McGill University, and is Qualified as an ISO 14964 GHG Auditor by Environment Canada.

J of T

Bernd Milkereit

Professor, Department of Physics, U of T ENV235H Physics & Chemistry of the Evolving Earth Dr. Milkereit is a geophysicist with interests in seismic imaging, borehole geophysics, petrophysics and scientific drilling. He has over 35 years of international experience and joined Physics at U of T in 2001 as the first Teck Chair in Exploration Geophysics. His current research is on scale and frequency dependent geophysical responses for mineral, hydrocarbon and groundwater exploration and monitoring.



Bryan W. Karney Professor, Dept. of Civil Engineering, U of T

ENV 346H Terrestrial Energy Systems Dr. Karney is also Associate Dean, Cross-Disciplinary Programs in the Faculty of Applied Science and Engineering. His current research considers the design, analysis, operation and optimization of various water resource and energy systems, with emphasis on hydroelectric and pumped storage systems, pipe networks and water distribution systems. He is also interested in engineering education and ethics.



Anne Moser

CFE Distance Education Instructor

Environmental Management & Renewable Energy Programs Ms. Moser received a Master's degree in Chemical Engineering from the University of Erlangen-Nuernberg, Germany and then started her doctoral studies in Mechanical and Industrial Engineering (MIE) at U of T. Her research focuses on the aerodynamics of small-scale vertical axis wind turbines with the aim of improving turbine efficiency. She has also been a teaching assistant for alternative energy courses.



Nana-Owusua Kwamena Post-Doctoral Fellow to 2010, Chemistry, U of T ENV235 Physics & Chemistry of the Evolving Earth, 2010-11 Dr. Kwamena is an Environmental Assessment Officer with the Canadian Nuclear Safety Commission. Her research interests have focussed on the fate and transport of organics in the environment, in particular the physical and chemical processes that govern the heterogeneous reactions and uptake behaviour of organic compounds on aerosol particles, thin organic films and ice surfaces.

Kwamena



Jane McDonald **CFE Distance Education Instructor** Carbon Finance Program, 2010-11

Ms. McDonald is a Senior Business Analyst at Manitoba Hydro and former Executive Director of Sustainable Prosperity in Ottawa. She has also served as the Director of Competitiveness and Carbon Markets for Environment Canada, as negotiator for the Canadian delegation to the UN climate negotiations, and as Associate Vice-President in the Toronto office of international carbon brokers CO2e.com-Cantor Fitzgerald.





Susan McGeachie

CFE Adjunct Professor & Sessional Lecturer ENV 1707H Environmental Finance and Sustainable Investing Ms. McGeachie develops sustainability-related governance and management models for clients with Deloitte's Sustainability and Climate Change practice. Her experience includes developing corporate sustainability strategies and change management models, and analysing the environmental, social and governance performance of large cap stocks. She is a member of CFE's Environmental Finance Advisory Committee (see pages 21-22).



Paul Muldoon

CFE Adjunct Professor & Sessional Lecturer ENV 422H/1701H Environmental Law

Mr. Muldoon is the Vice-Chair at the Environmental Review Tribunal, a body that adjudicates appeals, applications and referrals under 12 statutes. Prior to this, he was the Executive Director at the Canadian Environmental Law Association. He has graduate degrees from McMaster University and McGill University and has co-written two books on Canadian environmental law and policy.







Lenore Newman

CFE Distance Education Instructor Environmental Management Certificate Program, 2010-11 Dr. Newman holds the Canada Research Chair in Food Security and Environment at the University of the Fraser Valley. She earned her Ph.D. in Environmental Studies from York University, and her research is on sustainable food systems and urban sustainable development, including the urban nature/ culture interface. She also writes for the popular press in the area of food security.

James Nugent **CFE Undergraduate Instructor**

JGE 331H Resource & Environmental Theory Mr. Nugent is a Ph.D. candidate in the Department of Geography at U of T. He examines the responses of trade unions to the current dual ecological and economic crisis viewed through climate change politics and the dawn of the "green economy". He is also interested in biological conservation through an environmental justice lens and in the (re)production of environmental ideologies.



Christopher Ollson CFE Graduate Sessional Lecturer

ENV 1704 Environmental Risk Analysis and Management Dr. Ollson is VP Strategic Development with Intrinsik Environmental Sciences in Mississauga. He has been practicing in the field of environmental risk and toxicology for 15 years. He also maintains an active research program in the oral bioavailability of contaminants. He is an Adjunct Assistant Professor, Royal Military College of Canada and Adjunct Lecturer at U of T Scarborough.

David Sider

CFE Sessional Lecturer & Distance Ed Instructor ENV 440H Professional Experience Course; and Environmental Management Distance Education Program Dr. Sider received his Ph.D. in Geography and Environment at U of T, for which he carried out his fieldwork in India, focusing on communitybased approaches to water supply, sanitation, and solid waste management in low-income urban settlements. He has also worked with environmental organizations in Nicaragua, Malaysia, and Canada.





Lucy Sportza

CFE Distance Education Instructor Environmental Management, Renewable Energy Programs

Dr. Sportza has also been teaching in the online environmental Management, Renewable Energy Programs Dr. Sportza has also been teaching in the online environment and undergraduate program at the University of Guelph for the last several years. She has a M.A. and Ph.D. in Planning from the University of Waterloo. Her doctoral research focused on planning for Toronto's urban parks and protected areas. Her current interests focus on the use of parks and other protected areas as part of overall urban sustainability.



Ingrid Leman Stefanovic Professor, Department of Philosophy, U of T JVP 2147 Environmental Philosophy;

guest lecturer in ENV 1001H Environmental Decision Making Dr. Stefanovic was the inaugural Director of the Centre for Environment, 2005-10. Her research relates to perceptions of space and how values and attitudes affect decision making, ranging from the philosophy of architecture to children's perceptions of urban nature. Her most recent coedited book is *The Natural City: Re-Envisioning the Built Environment.* (U of T Press, 2011).



Keith Stewart

CFE Undergraduate Sessional Lecturer ENV 350H Energy Policy and Environment Mr. Stewart has worked as an energy policy analyst and advocate for various non-profit

analyst and advocate for various non-profit groups for over a decade and currently works for Greenpeace Canada where he promotes the efficient use of renewable energy. He is the coauthor of the book *Hydro: The Decline and Fall of Ontario's Electric Empire* and author of numerous articles, reports and op eds on climate change policy and politics.



Sheila Waite-Chuah CFE Undergraduate Sessional Lecturer ENV 335H Environmental Design

Ms. Waite-Chuah has been teaching environmental/sustainable design for 15 years. Her interest in sustainable design is intimately linked with sustainable development, in both local and global contexts. She received a Masters in Environmental Studies from York University. She also teaches sustainable design and is Coordinator for the Sustainability Office at the Ontario College of Arts and Design University.

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Cover photos: Undergraduate students, flora and fauna of Ecuador and Galápagos taken during Summer 2011 field course ENV395Y.

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