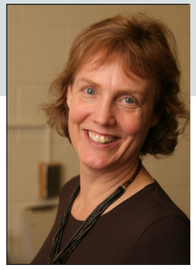
a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

IRES Annual Report

Fostering Sustainability in Human and Natural Systems

Introduction from Gunilla Öberg, IRES Director



Our mission is:
'to foster sustainable futures through integrated research and learning about the linkages among human and natural systems, to support decision making for local to global scales.'

Another exciting year has passed. The University Sustainability Initiative (USI) was launched in March 2010 after a year of intense discussions among faculty and students across UBC, with the goal of facilitating for students to take courses across campus and for teachers and researchers to collaborate across disciplinary and administrative structures. IRES faculty members played a key role in this strategic development and one of our faculty members, Dr. John Robinson was in April appointed as USI's first Executive Director (p 36). The USI involves not only students and scholars from different disciplines and Faculties, but also UBC operations. The goal is to use UBC as a 'Living Laboratory' to have students and teachers drive the university towards more sustainable solutions and at the same time use the campus as a place for learning and research, from a technical, geographical and organizational perspective. Kai Chan's course RMES 500z Ecosystem Services is a lucid example where a group of students jointly with UBC's sustainability office have developed a framework to help prioritize among competing values and include ecosystem perspectives in development projects (p 58).

IRES faculty members continue to run collaborative projects with partners in various Faculties across Campus, other universities and non-academic partners. Our warmest welcome to our new faculty members: Dr. Leila Harris (p 32) who works with social, political and cultural dimensions of environmental issues, particularly in the developing world and generally with a focus on water issues. Water issues are also in focus in the Soil, Water, Air Laboratory (SWAL, p 54) which is a university-wide initiative with IRES faculty members in the core and in the Water Governance program (p 52), two examples of the kind of interdisciplinary, collaborative initiatives that signify IRES.

Over 30 students graduated from the RMES program between 2008 and 2009 and 13 students have graduated so far in 2010 on topics varying from Certification of aquacultures, to Biofuels and land-use,

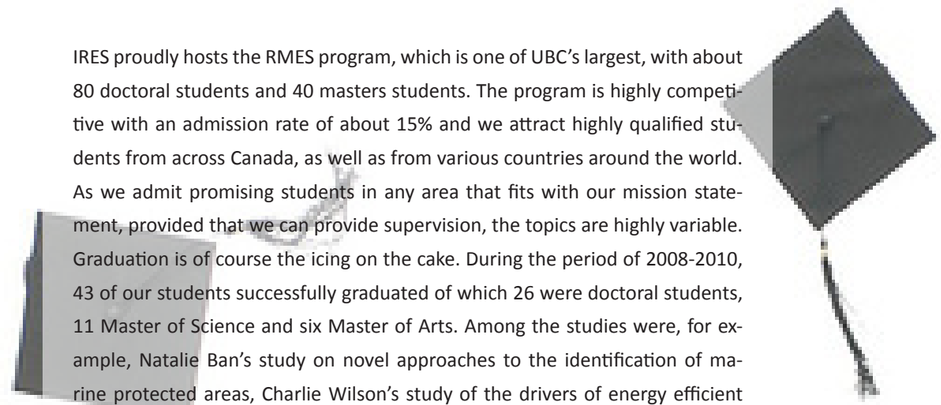
Front cover image taken by Tashi Tsering, whilst on fieldwork in Spiti. The woman is holding a "Tirping" a tool used to channel irrigation water. The head of the Tirping is made of Ibex horns for good luck.

image courtesy of H. Bottomley

Local responses to climate change and Gender, justice and livelihoods in the creation and demise of forests in North Western Ethiopia's Zeghie Peninsula (p 4). We continue to attract highly qualified students from across the world who focus on varied and diverse subjects, but we sometimes worry that we do not provide sufficiently rigorous training, especially for our masters students. We have therefore launched a curriculum review that will run during 2010-2011. The challenging task for the joint chairs Terre Satterfield and Hadi Dowlatabadi is to help IRES figure out how we can stay true to our mission, encourage students to boldly enter emerging fields and keep our flexibility and openness while providing a rigorous and solid education of top-notch quality.

IRES is a truly collaborate unit: a student may for example be supervised by one faculty member, work as a research assistant for another faculty member, have a third pay for a conference fee and a fourth chip in for the flight. From an administrative perspective, this is messy. The same 'mess' adheres to research grants and visiting scholars. Add to the mix that our graduate program has tripled in size over less than a decade with a parallel increase in the number and size of research grants, all administrated through an entirely manual filing system and it is easy to understand that administration is a challenging task. As collaboration is the very heart of IRES, we decided to create administrative structures that support the kind of flexible and creative activities that are our insignia. Administration is usually a mute point in annual reports. During the past year, the staff team has jointly developed processes and procedures to efficiently handle challenging issues. We have made considerable progress and I dare say that we soon will be able to compete for an award in admin efficiency – if such an award existed. No doubt – we're ready for a new exciting year.

RMES Graduates



IRES proudly hosts the RMES program, which is one of UBC's largest, with about 80 doctoral students and 40 masters students. The program is highly competitive with an admission rate of about 15% and we attract highly qualified students from across Canada, as well as from various countries around the world. As we admit promising students in any area that fits with our mission statement, provided that we can provide supervision, the topics are highly variable. Graduation is of course the icing on the cake. During the period of 2008-2010, 43 of our students successfully graduated of which 26 were doctoral students, 11 Master of Science and six Master of Arts. Among the studies were, for example, Natalie Ban's study on novel approaches to the identification of marine protected areas, Charlie Wilson's study of the drivers of energy efficient renovations and Jane Lister's thesis on environmental certification in the forest industry.

Image courtesy of UBC Alumni Photo archive

RMES Graduates 2008

Student	Thesis Title	Supervisor
Jana Hanova Msc	Environmental and techno-economic analysis of ground source heat pump systems	Hadi Dowlatabadi
Megan Moody MSc	Eulachon past and present	Tony Pitcher
Sheena Pappas MSc	An assessment of historical changes in aquatic biota, water and sediment quality within a catchment at a developing urban front	Hans Schrier
Natalie Ban PhD	Multiple perspectives for envisioning marine protected areas	Amanda Vincent
Miriam Bixby PhD	Evaluating social welfare implications of forestry policies when economic and environmental values matter in a British Columbia context	Kathy Baylis
Jamie Donatuto PhD	When seafood feeds the spirit yet poisons the body : developing health indicators for risk assessment in a Native American fishing community	Terre Satterfield
Maria du Monceau de Bergencial PhD	The political ecology of indigenous movements and tree plantations in Chile : the role of political strategies of Mapuche communities in shaping their social and natural livelihoods.	Terre Satterfield
Rasha Maal-Bared PhD	Comparing the distribution of pathogenic bacteria and common indicator microorganisms in biofilms on different surface types in an agricultural watershed in British Columbia	Karen Bartlett
Raul Pacheco-Vega PhD	An integrated assessment of the effect of environmental regulation, land use changes and market forces on the Mexican leather and footwear industries restructuring	Hadi Dowlatabadi
Charles Wilson PhD	Understanding and influencing energy efficient renovation decisions	Hadi Dowlatabadi
Liu Yajie PhD	An analysis of the management and economics of salmon aquaculture	Rashid Sumalia

RMES Graduates 2009

Student	Thesis Title	Supervisor
Jennifer Ardiel MSc	The introduction of safe and sustainable agriculture certification : a case study of cherry growers in the Southern Interior of British Columbia	Milind Kandlikar
Laura DeVries MA	What's at stake on uncommon ground? The Grand River Haudenosaunee and Canada in Caledonia, Ontario	Junita Sundberg
Har-Rajandeep Singh Dharwal MA	Disaster Resilience of the Vancouver Health Care System to Pandemic Influenza	Stephanie Chang
Kieran Findlater MSc	Biofuels and land use : global requirements and local impacts	Milind Kandlikar
Lara Hoshizaki MSc	What a difference a map makes : including ecosystem services within systematic conservation planning	Brian Klinkenberg
Zhi Ying Lin MSc	Trends in aquaculture production and its role in meeting human protein needs	Robert Blake
Veronica Lo MSc	Underwater aliens : quantifying propagule pressure of aquatic invasive species in Canadian shipping ports	Colin Levings
Alex Russell MSc	Everything but the moo : a stakeholder analysis of livestock waste tissue disposal options in British Columbia	Hadi Dowlatabadi
Benjamin Starkhouse MSc	What's the catch : uncovering the catch volume and value of Fiji's coral reef-based artisanal and subsistence fisheries	Rashid Sumalia
Nathan Vadeboncoeur MA	On the implications of governance institutions for sustainability and climate change adaptation : a study of Whitehorse, Yukon	Ralph Matthews

Student	Thesis Title	Supervisor
Jonathan Anticamara PhD	Ecology of recovering degraded reef communities within no-take marine reserves	Amanda Vincent
Tihut Asfaw PhD	Gender, justice and livelihoods in the creation and demise of forests in North Western Ethiopia's Zeghie Peninsula	Terre Satterfield
Sarah Burch PhD	Local responses to climate change : an exploration of the relationship between capacity and action	John Robinson
Sharon Chang PhD	Forest policy in northeast British Columbia from the 1990s to the early 2000s : comparing approaches to explaining policy change	George Hoberg
Negar Elmieh PhD	Public health responses to West Nile virus : the role of risk perceptions and behavioral uncertainty in risk communication and policy	Hadi Dowlatabadi
Robyn Forrest PhD	Simulation models for estimating productivity and trade-offs in the data-limited fisheries of New South Wales, Australia	Tony Pitcher
Shannon Hagerman PhD	Adapting conservation policy to the impacts of climate change : an integrated examination of ecological and social dimensions of change	Terre Satterfield Hadi Dowlatabadi
Shinan Kassam PhD	Debt and Cotton in Post-Soviet Tajikistan	Richard Barichello Sumeet Gulati
Jennifer Jacquet PhD	Fish as food in an age of globalization	Daniel Pauly
Alyssa Joyce PhD	Risk and opportunity in British Columbia shellfisheries : the role of limited property rights in aquaculture development	Tim McDaniels
Patricia Keen PhD	Seasonal dynamics of tetracycline resistance genes and antibiotics in a British Columbia agricultural watershed	Ken Hall
Jane Lister PhD	Co-regulating corporate social responsibility : government response to forest certification in Canada, the United States and Sweden	Peter Dauvergne

image courtesy of M. Greer

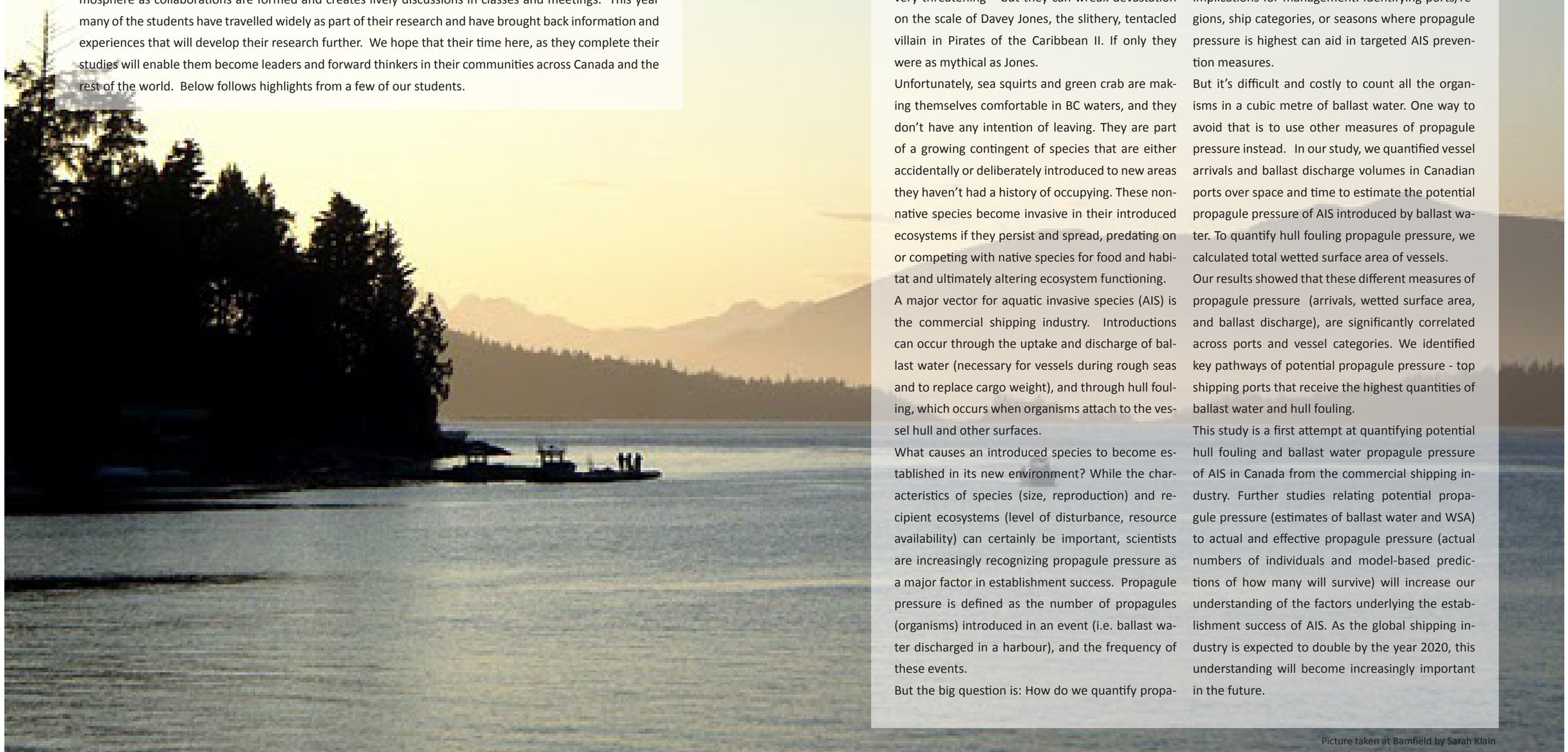
RMES Graduates 2010

Student	Thesis Title	Supervisor
Lenore Burke MA	When there's nothing left to give: social capital, informal economy and fisheries management in the Nuxalk Nation	Ralph Matthews
Andrew Devlin MA	Evaluating how urban form impacts greenhouse gas emissions in the Lower Mainland: the role of the built environment in local climate change reduction strategies	Lawrence Frank
Nathalie Maurer MSc	Agricultural Water Demand and Management in the Okanagan Basin: Apples to Golf and Grapes	Hans Schrier
Donna Pettipas MA	Dwelling and Tourism at the Wildland-Irban Interface: A Bowen Island Case Study	Les Lavkulich
David Boyd PhD	The Environmental Rights Revolution: Constitutions, Human Rights and the Environment	Terre Satterfield
Zofia Brown PhD	Occupant comfort and engagement in green buildings: Examining the effects of knowledge, feedback and workplace culture	Raymond Cole
Eny Buchary PhD	Fisheries Management in Developing Country Context	Tony Pitcher
Arnold Elias PhD	High potential: how a gramework of criteria for a unified energy system can initiate a sustainable electricity rgid and transportation system	William Rees
Sarah Foster PhD	Is Bycatch a Big Problem for Small Fish?	Amanda Vincent
Gakushi Ishimura PhD	Fisheries Resource Economics and Management Sciences	Rashid Sumalia
Eric Mazzi PhD	An integrated Assessment of Climate Mitigation Policy, Air Quality and Traffic Safety for Passenger Cars in the UK	Hadi Dowlatabadi
Marivic Pajaro PhD	The Biological, Social and Economic Indicators of Effectiveness in Community-Managed Marine Protected Areas	Amanda Vincent
Veronica Wahl PhD	Why People Help: Motibations and Barriers in Stewardship Volunteering	Patrick Mooney

image courtesy of M. Greer

Highlights from the RMES Students

RMES students are the backbone to the community here at IRES. Their varied research enhances the atmosphere as collaborations are formed and creates lively discussions in classes and meetings. This year many of the students have travelled widely as part of their research and have brought back information and experiences that will develop their research further. We hope that their time here, as they complete their studies will enable them become leaders and forward thinkers in their communities across Canada and the rest of the world. Below follows highlights from a few of our students.



Veronica Lo

Critters like sea squirts and green crab don't sound very threatening – but they can wreak devastation on the scale of Davey Jones, the slithery, tentacled villain in Pirates of the Caribbean II. If only they were as mythical as Jones.

Unfortunately, sea squirts and green crab are making themselves comfortable in BC waters, and they don't have any intention of leaving. They are part of a growing contingent of species that are either accidentally or deliberately introduced to new areas they haven't had a history of occupying. These non-native species become invasive in their introduced ecosystems if they persist and spread, predating on or competing with native species for food and habitat and ultimately altering ecosystem functioning.

A major vector for aquatic invasive species (AIS) is the commercial shipping industry. Introductions can occur through the uptake and discharge of ballast water (necessary for vessels during rough seas and to replace cargo weight), and through hull fouling, which occurs when organisms attach to the vessel hull and other surfaces.

What causes an introduced species to become established in its new environment? While the characteristics of species (size, reproduction) and recipient ecosystems (level of disturbance, resource availability) can certainly be important, scientists are increasingly recognizing propagule pressure as a major factor in establishment success. Propagule pressure is defined as the number of propagules (organisms) introduced in an event (i.e. ballast water discharged in a harbour), and the frequency of these events.

But the big question is: How do we quantify propagule pressure? This knowledge can have important implications for management. Identifying ports/regions, ship categories, or seasons where propagule pressure is highest can aid in targeted AIS prevention measures.

But it's difficult and costly to count all the organisms in a cubic metre of ballast water. One way to avoid that is to use other measures of propagule pressure instead. In our study, we quantified vessel arrivals and ballast discharge volumes in Canadian ports over space and time to estimate the potential propagule pressure of AIS introduced by ballast water. To quantify hull fouling propagule pressure, we calculated total wetted surface area of vessels.

Our results showed that these different measures of propagule pressure (arrivals, wetted surface area, and ballast discharge), are significantly correlated across ports and vessel categories. We identified key pathways of potential propagule pressure - top shipping ports that receive the highest quantities of ballast water and hull fouling.

This study is a first attempt at quantifying potential hull fouling and ballast water propagule pressure of AIS in Canada from the commercial shipping industry. Further studies relating potential propagule pressure (estimates of ballast water and WSA) to actual and effective propagule pressure (actual numbers of individuals and model-based predictions of how many will survive) will increase our understanding of the factors underlying the establishment success of AIS. As the global shipping industry is expected to double by the year 2020, this understanding will become increasingly important in the future.

Picture taken at Bamfield by Sarah Klain

Conor Reynolds and Andy Grieshop

Conor Reynolds in an autorickshaw

Autorickshaw emissions in India

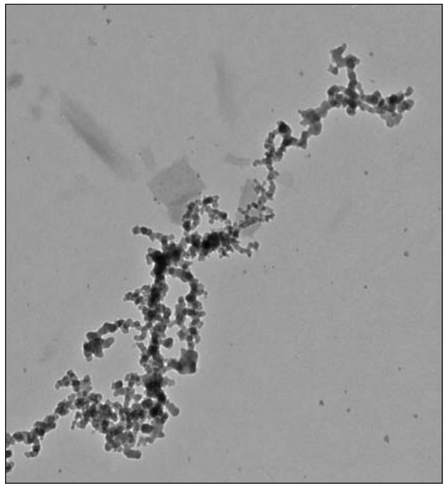
Conor Reynolds, a PhD candidate, and Andy Grieshop, a post-doctoral fellow, traveled to Delhi to measure pollutant emissions from real-world autorickshaws in September 2009. This work was part of a larger research program that aims to better understand the local and global impacts of vehicle emissions on air quality and climate change. The measurement campaign took place at the International Centre for Automotive Technology (ICAT), a state-of-the-art vehicle testing facility run by the Indian Government on the outskirts of Delhi. The IRES researchers also collaborated with academics at the interdisciplinary Transportation Research and Injury Prevention Program at the Indian Institute of Technology in Delhi. The research was primarily funded by the AUTO21 Network of Centres of Excellence "Life Cycle Environmental Assessment and Policy" project, the UBC portion of which is co-led by Professors Milind Kandlikar and Hadi Dowlatabadi.

Auto-rickshaws are three-wheeled motor vehicles that operate as taxis, and provide an important service as part of India's public transportation sector. These lightweight vehicles are common in many developing countries in Asia and elsewhere, and are manufactured with different fuel systems and engine options, making them ideal vehicles for testing. The specific aim of the research project was to quantify emissions from vehicles of different vintages, operating on natural gas and gasoline, and with different engine technologies (2-stroke and 4-stroke engines). Measurements of gaseous- and particle-phase emissions, with a special focus on the chemical composition and size of carbonaceous particulate matter (PM), will provide needed data about the pollution these vehicles produce.

There are substantial uncertainties in the links between poor ambient air quality and the potential contribution from transportation emissions. The fact that transportation exhaust is a major contributor to the climate-forcing emission burden only adds to the complexity of the problem. This research will provide guidance as to the most efficient ways to reduce vehicle emissions in rapidly industrializing countries. Reducing harmful pollutants in these countries may provide a win-win (co-benefits) opportunity for people across the globe. Developing countries benefit from reduced transportation emissions because it improves air quality in urban areas, while climate impacts can be mitigated through the reduction of pollutants that have strong warming effects, such as methane or black carbon particles.

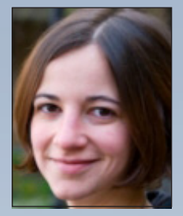
The project data is currently being analyzed, and will be used by international decision-makers and researchers to examine how reducing transportation emissions can have health and climate co-benefits. Indian policy-makers and government officials are especially interested in the results of this work because it offers new insights into the implications of a bylaw introduced in Delhi in 1998 (and implemented in 2002) that required all taxis, auto-rickshaws and buses to convert to operation on compressed natural gas. Policies such as this one may help address the poor air quality in rapidly developing cities, but it is critical for its effectiveness to be evaluated before it is widely adopted elsewhere. Such an assessment relies on the availability of high-quality emission data from in-use vehicles. Detailed characterization of PM emissions will feed into future efforts to determine the dominant sources of PM air pollution in Indian cities.

Some autos ran on both gasoline and natural gas. They had to have functioning exhaust systems. Some needed on-the-spot repairs.



Particulate matter from a gasoline-fuelled autorickshaw, as seen through a transmission electron microscope

Susanna Haas-Lyons MA



Susanna began her masters degree in fall 2009, after six years of working in the field of public participation. During the academic year, she did coursework in IRES, SCARP and Forestry. Susanna was an RA with GRAND Center for Digital Media and CALP, where she wrote a white paper on the role of digital media in communicating and mobilizing sustainability solutions and organized an on-campus demo session of tool developers. She taught a skills course in SFU's dialogue program, presented at the Canadian Conference on Dialogue and Deliberation, and wrote a paper (submitted) on MetroQuest's use of online deliberation.

Julia Reckermann MA

In the first year of her Master of Arts, Julia spent most of her time and effors on the required coursework and working on her thesis. Her study, a pre-occupancy evaluation of the Centre for Interactive Research on Sustainability (CIRS), is scheduled to take place in the fall of 2010. Further, she has started a collaborative project with a few fellow RMES students and the Sustainability Office to establish a framework for a Post Occupancy Evaluation tool that can be used to assess campus buildings' performance.

David Maggs PhD

David Maggs is now in the fourth year of his Phd, and just on the cusp of moving to candidacy. The general ideas and approach of his research have been given a conditional green light, and as of mid-April he is in the midst of writing up his proposal and preparing for a formal defense. He is also completing a seminar on Environmental Values and Risk with Terre Satterfield who is on his committee.

Tom Berkhout PhD

In February, Tom carried out a comparative research project for BC Hydro on pursuing electricity conservation and efficiency as a societal level strategy. The objectives of the research were to first answer eight questions posed by BC Hydro's Electricity Conservation and Efficiency Advisory Committee regarding intentional societal level transitions toward sustainability, and second to develop a practical framework to help BC Hydro understand the process of intentional societal-level change toward sustainable energy use.

In June, he delivered a paper at the First European Conference on Sustainability Transitions in Amsterdam. The paper looked at the institutional challenges of operationalizing BC Hydro's long-term energy efficiency and conservation goals.

In October, Tom received a one year award from MITACS BC for $45,000. The award is to support my research on how BC's long-term energy efficiency and conservation objectives are being coordinated within the province. The project will give particular attention to the planning efforts being carried out by BC Hydro the Ministry of Energy, Mines & Petroleum Resources.

Stefan Storey PhD

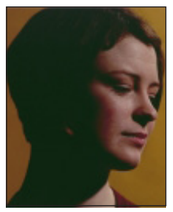
Stefan Storey is researching interdisciplinary sustinable building science. His thesis project is a dynamic life cycle sustainability analysis of the Centre for Interactive Research in Sustainability (CIRS) at the University of British Columbia. This work involves integrating life cycle costing, life cycle environmental analysis and social impact evaluation of sustainable commercial buildings to quantify building impacts, adaptability and resilience with respect to social and economic change over intergenerational periods of time. He is currently developing new metrics that will enable decision-makers to evaluate the quality of sustainable solutions for building design.

Nichole Dusyk PhD

Nichole successfully defended her proposal and achieved candidacy for her PhD. Nichole made three research visits to the communities of Fort St.John and Dawson Creek undertaking a total of 2 months of field research. She also presented a paper at the 2009 Annual Meeting of the Association of American Geographers in Las Vegas, Nevada.

Meg O'Shea PhD

In this academic year, doctoral candidate Meg O'Shea completed her thesis project fieldwork with members of a recycling initiative in Vancouver's downtown east side. Employing a qualitative methodology called photovoice, project participants took photographs of their experiences within the recycling project, and completed Interviews with Meg about their role in the recycling project, and as photographers. The photographs will be displayed in an exhibit in the downtown east side, and at a campus location to be determined. Meg hopes to be completing her thesis and defending in the next academic year. Meg also organized the CFIS/RMES Professional Development series of seminars and workshops from January to April, 2010.



Sylvia Coleman PhD

Sylvia was co-author of 4 articles (first author on 2 of them) on green building-related issues, for GLOBE-net (the online portal of the GLOBE Foundation) fall 2009 bibliography:

• Coleman, S and Storey, S (2009). Effective Green Building Policy- The City of Vancouver Case. November 2, http://www.globe-net.com/articles/2009/november/3/effective-green-building-policy--the-city-of-vancouver-case.aspx

• Coleman, S. and Brown, Z. (2009). Valuing Green Buildings: Changing Times, Changing Fields. October 5, http://www.globe-net.com/articles/2009/october/5/valuing-green-buildings-changing-times,-changing-fields.aspx

• Storey, S. and Coleman, S (2009). Life Cycle Costing: The First Step in Green Building. October 19, http://www.globe-net.com/articles/2009/october/19/life-cycle-costing---the-first-step-in-green-building.aspx

• Brown, Z, Coleman, S. (2009). Can you be Comfortable in a Green Building? Sept. 8, http://www.globe-net.com/articles/2009/september/8/can-you-be-comfortable-in-a-green-building.aspx

Also, Sylvia was co-author on :

• Dusyk, N., Berkhout, T., Burch, S., Coleman, S., & Robinson, J. (2009) Transformative Energy Efficiency and Conservation: A Sustainable Development Path Approach. Journal of Energy Efficiency 2:387–400.

The new sustainability building under construction. March 2010

RMES Masters Students

Student	Thesis Title	Supervisor
Emily Anderson	Agroforestry for Climate Change Mitigation and Rural Livelihood Improvement in Industrializing Countries	Hisham Zerriffi
Jacqueline Belzile	Lessons on Adaption from Oz to the Okanagan: Sustainable Water Use & Conservation in a Changing Climate	Gunilla Öberg
Lenore Burke	When there's nothing left to give: social capital, informal economy and fisheries management in the Nuxalk Nation	Ralph Matthews
Laura Cornish	Visioning and Backcasting for Local Climate Planning	Stephen Sheppard
Sara Elder	Social and Environmental impacts of Fair Trade Certification on Small-Scale Producers	Hisham Zerriffi Philipe LeBillion
Susanna Haas-Lyons	Collaborative environmental governance; deliberative democracy; sustainability decision-making; e-democracy and online public participation	John Robinson
Kelly Harrell	To be determined	Terre Satterfield
Kim Lau	Policy issues regarding regulation of energy services.	Hadi Dowlatabadi
Claudia Morgado	To be determined	Charles Menzies
Lindsay Nathaniel	A Visitor's Perspective of Sustainability at Whistler: How to engage visitors in Sustainability	Ralph Matthews
Jeremy Osborn	Consumer Values, Organizational Behavior and Car Sharing: A Case Study of the Co-operative Auto Network	James Tansey
Julia Reckermann	Centre for Interactive Research on Sustainability: Green building occupant behaviour	John Robinson
Darlene Seto	Sustainable Development Councils: Institutional Viability in Canada?	Kathryn Harrison
Jordan Tam	Climate Change Adaptations in Parks: Attitudes, Values and Public Preferences	Timothy McDaniels

RMES MSc Students

Student	Thesis Title	Supervisor
Mathieu Beaulieu	To be determined	Gunilla Öberg
Brooke Campbell	To be determined	Daniel Pauly
Andres Cisneros	Ecological and Economic Implications of Ecosystem-based Marine Recreation	Rashid Sumaila
Marleen de Ruiter	To be determined	Stephanie Chang
Maria Espinosa	Using Ecosystem models to advise management	Kai Chan
Liz Ferris	To be determined	Gunilla Öberg
Candace Francis	To be determined	Ken Hall
Laura Grant	Source determination of organism matter and metals: a water quality evaluation of Chapman Creek	Hans Schreier
Kirsten Harma	Changing with the Flow: An evaluation of water futures in Central B.C Watershed	Mark Johnson
Claudia HoLem	Climate Science, Equity and Development: The Role of International Institutions in Capacity Building for Climate Change	Hisham Zerriffi Milind Kandlikar
Sarah Klain	Quantifying Nature's Bounty: The Contribution of Marine Ecosystems to Local Communities	Kai Chan
Michael Lathuilliere	Water modeling in Brazil	Mark Johnson
Gerald Singh	Considering supporting ecosystem services of a keystone predator	Kai Chan
Liesbeth van der Meer	Fish Retail sector Contribution to the Global Economy	Rashid Sumaila
Penny White	Biogeography and Ecosystem Services of Lha'ask (Porphyra Abbottiae) in British Columbia	Christopher Harley Sandra Lindstrom
Julie Wilson	Cumulative Effects Assessment in watersheds with mixed land uses	Hans Schreier

RMES PhD Students

Student	Thesis Title	Supervisor
Nedzad Ajanovic		Tony Pitcher
Megan Bailey	Economics of tuna fisheries in the Western and Central Pacific Ocean	Rashid Sumalia
Christian Beaudrie	From cradle-to-grave at the atomic sclae: environmental risk and the governance of emerging nanotechnologies	Milind Kandlikar
Thomas Berkhout	How Can Large-scale Transitions Toward Sustainability be Steered	John Robinson
Gerard Chew	Barefoot doctors with satellite phones. Can rural communities become more disaster resilient through the use of technology?	Tim McDaniels
Alice Cohen	Evaluating Watersheds	Karen Bakker
Sylvia Coleman	Transitions to Sustainability: an Architecture of Social Change	John Robinson
Christina Cook	Legal Legacies & institutional Arangements in two Canadian Water Governance Regimes	Karen Bakker
Nichole Dusyk	Local Energy Planning in BC	John Robinson
Angela Eykelbosh	Examining the health effects of geogenic fluoride and arsenic and the potential for migration through water resource management	Timothy McDaniels
Kiera Findlater	Biofuel crops and Land-use	Milind Kandlikar
Julia Freeman	Biosafety and the Regulation of Agricultural Biotechnology in India	Terre Satterfield Milind Kandlikar
Pramod Ganapathiraju	A Global Study of Incentives and Disincentives to UN (FAO) Code of Conduct and IUU Fishing	Tony Pitcher
Brian Gouge	An integrated Assessment of Public Transportation	Hadi Dowlatabadi
Stephanie Grand	Effects of logging on reactive soil components in podzols of southern coastal BC	Les Lavkulich
Edward Gregr	Living Ecosystems Dynamics to Decision Making	Kai Chan
Glen Hearns	Process mechanisms for promoting cooperation in transboundary waters.	Ian Townsend-Gault

Carie Hoover	Ecosystem Modeling: Antarctic Peninsula	Tony Pitcher
Roseti Imo	To be determined	Rashid Sumalia Carl Walters
Maria Infante	Can we estimate a value at risk for the world's ecosystem services? Building a conceptual framework for an ecosystem services value at risk for sustainable resource management.	Peter Nemetz
Danika Kleiber	Women in Fisheries in the Phillipines: the impact of conservation in the invisible workers	Amanda Vincent
Sonja Klinsky	Across Years, Lands and Oceans: Justice & Scale in Climate Change Policy Decision Making	Tim McDaniels Hadi Dowlatabadi
Janalyn Kotaska	Considering Aboriginal Rights - Resource Management Decision-making and Decision makers in Post Delamuukw, British Columbia	Charles Menzies Terre Satterfield
Reza Kowsari	Modelling rural household energy services	Hisham Zerriffi
Rajeev Kumar	Stimulation Modelling of Mille Lacs Lake Eco-systems in Support of EBM	Tony Pitcher
Wing Yee Lam	Global Fisheries Economics in face of change in Climate and Energy Process	Rashid Sumalia
Jordan Levine	Sustainability, Justice and Democratisation of Science: Clayoquot Sound Biosphere Reserve	Kai Chan Terre Satterfield
Megan Mach	Invasive Species in Canada's Ports	Kai Chan
David Maggs	To be determined	John Robinson
Craig Mayberry	Measuring the Social Entrepreneur's Impact of the Effectiveness of Non-Profits: Bridging the Culture Conflict between the Social and Business Sector	Ilan Vertinsky
Nicole Miller	Evaluating urban patterns for energy and greenhouse gas performance	Stephen Sheppard
James Murphy	The potential of private enterprise and energy cost restructuring to accelerate energy efficiency investments in residential heating	Hadi Dowlatabadi
Megan O'Shea	From Compost to Choreography: How Sustainability Performed	John Robinson
Marivic Pajaro	The Biological, Social and Economic Indicators of Effectiveness in Community-Managed Marine Protected Areas	Amanda Vincent
Anton Pitts	Appropriate Bases for the Management of Wildlife Viewing Tourism	Terre Satterfield Paul Wood
Conor Reynolds	Strategies to Control Transportation Emission in Developing Countries	Milind Kandlikar

Yvette Rizzo	To be determined	Daniel Pauly
Teresa Ryan	Territorial Jurisdiction; the Economic and Cultural Significance of Eulachon Thaleichtys pacificus	Dianne Newell
Jonathan Salter	Evaluation Mental Models of Community-level Energy and their Implications for Participatory Planning Processes	Stephen Sheppard
Arvind Saraswat	Urban Air Pollution and Human Health in Developing Countries	Milind Kandlikar
Stefan Storey	Transitions to Sustainability: Green Buildings	John Robinson
Wilfram Swartz	To be determined	Rashid Sumalia
Paul Teehan	Policy options for mitigating direct environmental impacts of information and communcation technology	Milind Kandlikar
Louise Teh	Fisher's Discount Rates and Fisheries Sustainability	Rashid Sumalia

Julie Wilson MSc student uses sediment traps to collectfinesuspendedsediments from an agricultural tributary of Marshall Creek, near Abbotsford, BC.

Lydia Teh	Spatial Management of Small Scale Reef Fisheries	Tony Pitcher
Jack Teng	Environmental and Social determinants of tick-borne disease in the south Okanagan	Karen Bartlett Brian Klinkenberg
Dawit Tesfamichael	Water and Agrarian Society in the Aris Western Himalaya	Tony Pitcher Daniel Pauly
Tashi Tsering	Is the City of North Vancouver ready for innovative stormwater management?	Tsering Shakya
Nathan Vadeboncoeur	The Implications of Governance Institutions for Sustainability and Climate Change Adaptation: A Study of Whitehorse, Yukon	Ralph Matthews
Divya Varkey	Interdisciplinary Approach to Ecosystem-based Management of Coral Reefs	Tony Pitcher
Chunxiao (Cynthia) Zhao	A Sustainable Housing Study in the East Kootenay Area of BC - Present Situations, Gaps and Policy Recommendations	Kathy Baylis

Zoology PhD student Russ Markell, Rebecca Martone Post-Doc in IRES and Gerald Singh IRES MSc student in Kyuquot

image courtesy of M. Greer

Non IRES Students

Kai Chan

Christina Mak BSc (Anthropology)
Sarah Nyrose BSc (Environmental Science)
Cody Solomon BSc (Environmental Science)
Allison Thompson BSc (Environmental Science)
Carmen Ho BSc (Integrated Sciences)
Alexis Carter BSc (Integrated Sciences)

Stephanie Chang

Rajan Dhariwal MA (SCARP)
Karthick Pathman MA (SCARP)
Martin Gregorian MA (SCARP)
Erica Crawford Boettcher MA (SCARP)
Heather Fehr MA (SCARP)
Lauren Dawson MA (SCARP)
Eric Grant MA (SCARP)
Jose Fernandez MA (SCARP)
Jessica Shoubridge MA (SCARP)
Lily Yumagulova PhD (SCARP)
Dilnoor Panjwani PhD (SCARP)

Tony Dorcey

Janice Barry PhD (SCARP)
Omar Dominguez MA (SCARP)
Lucia Scodanibbio MA (SCARP)
Renee Coull MA (SCARP)
Christine Wenman MA (SCARP)
Darha Phillpot MA (SCARP)
Susan Read MA (SCARP)
Spring Ord MA (SCARP)

Scott Hinch

Alison Collins MSc (Forestry)
Marika Gale MSc(Forestry)
Jenn Burt MSc(Forestry)
David Roscoe MSc(Forestry)
Todd Mathes MSc(Forestry)
Matt Drenner PhD(Forestry)
Mike Donaldson PhD (Forestry)
Ken Jeffries PhD (Forestry)
Kim Hruska PhD (Forestry)

Tim McDaniels

Megan Fitzgerald MA (SCARP)
Amanda Proctor MA (SCARP)
Sean Tynan MA (SCARP)

Gunilla Öberg

Erin Empey MA (Journalism)

John Robinson

Emily Davis PhD (Geography)

Terre Satterfield

Justin Page PhD (Sociology)

Glenn Crossin PhD

Over the past ten years we have witnessed the collapse of many salmon stocks along the west coast of North America. Understanding the causes of these declines such that we can reverse this trend is a pressing research need which has been undertaken by Dr Scott Hinch and his colleagues. For my doctoral research, I developed a procedure, in partnership with a postdoctoral colleague, to non-invasively biopsy migratory fish in the field, and combined this with telemetry in order to link the fate and behaviour of individual fish with their physiological state in terms of energetics, stress, and reproductive development. This procedure opened the door to research possibilities never before conceived with migratory animals (including the opportunity to integrate physiological genomics and animal behaviour across large scales). I sampled and tracked some 1000 salmon across distances up to ~ 2000 km – one of the largest studies of its kind on any large migratory fish and some of the first attempts to do so within the animal kingdom. In one study, I used time-release hormone implants which were injected into salmon that were caught in the open ocean and tracked with telemetry to their natal river in order to test hypotheses about the role of maturation rate on migration timing and success. One major finding was that anadromous fish migrations (fish which move between saltwater and freshwater, like salmon) are inherently very stressful and that natural physiological stress can reach lethal levels and result in migration mortality, perhaps as high as 20-30%. The discovery that salmon may perish 'naturally' at high levels during coastal migrations has provided new tools and results to understand an emerging crisis. Many factors have been implicated, in particular climate warming, but few can be specifically proved. In another study, I captured adult salmon after they entered the Fraser River and exposed them in a field laboratory to different thermal conditions over several weeks then released them and tracked them to study the role of river temperatures on migration success. The results showed how specific thermal levels caused migration mortality. These data were used to support testimony delivered by the research team at a judicial inquiry on missing sockeye salmon. The findings have re-adjusted the Pacific salmon fisheries management paradigm regarding the manifold influence of abiotic and biotic factors on salmon migration and this research into thermal influences has led to refinements to management models used to ensure that fisheries are conducted in a risk-adverse manner.

Glenn Crossin, is a recent PhD graduate with S. Hinch who won the Best Thesis award in the Faculty of Forestry for his doctoral dissertation on the behavioural physiology of salmon migrations and the endogenous and exogenous factors responsible for survival and mortality.

Similkameen, Okanagan. Image courtesy of Jack Teng

IRES faculty members

IRES has twelve faculty members with complementary competencies who all are deeply committed to providing an outstanding graduate education in fields that require an unorthodox combination of methods, theories, concepts, models and modes of thought. We work in various interdisciplinary settings with colleagues from across the UBC campus and other universities in Canada and elsewhere. We also collaborate with industries, interest groups, governments and society and we play a central role in UBC's new sustainability initiative. Our research interests cover areas such as societal resilience to natural disasters, eco-hydrology, sustainable buildings, energy systems, the water-energy nexus, risk perception and values, ecosystem services and decision making. In addition to teaching in the RMES program, we teach undergraduate courses in other departments, such as Geography, Environmental Science (EOS), Civil Engineering and Gender studies. Below follows individual highlights from each of our faculty members.

Kai Chan

One of my most significant projects in 2009-10 was at the intersection of values and ecosystems, through the entry-point of "cultural ecosystem services". The concept of ecosystem services—the processes whereby ecosystems render benefits to people—is quickly becoming central to the management of ecosystems and natural resources, although one major category of such services has received very little concrete attention (cultural services). This absence of attention by researchers is despite the widespread recognition of the importance of these non-material benefits associated with ecosystems.

Working with IRES Prof. Terre Satterfield and various international colleagues, I spearheaded a book chapter and a paper in press making the argument that the appropriate valuation of all ecosystem services has been hindered by the failure to recognize the various kinds of values at stake—where the differences in kinds of values implies differences in appropriate kinds of valuation. I presented this paper in February 2010 at Stanford University to an interdisciplinary audience including economist Ken Arrow, climate scientist Steve Schneider, and ecologists Hal Mooney, Gretchen Daily and Paul Ehrlich.

I'm following the implications of this argument in a team effort co-led by Anne Guerry of the US National Oceanic and Atmospheric Administration (NOAA) and the Marine Natural Capital Project. This team takes the form of an international interdisciplinary working group at the National Center for Ecological Analysis and Synthesis in Santa Barbara (including Satterfield, students Sarah Klain and Jordan Levine). We are fleshing out frameworks for characterizing and valuating these non-material values associated with ecosystems, with pilot application in Hawai'i, the Gulf of California (Mexico), and the west coast of Vancouver Island (B.C.). This work is directly linked to the development of Marine InVEST (the Integrated Valuation of Ecosystem Services and Tradeoffs tool), which will also be developed for application on the west coast of Vancouver Island with a regional decision-making board (West Coast Aquatic).

The management of ecosystems and natural resources will continue to be complicated by a wide range of conflicting and intangible values, but perhaps efforts like these will assist decision-making that is ecologically sustainable and socially just.

Stephanie Chang

My research seeks to advance understanding of community vulnerability and resilience to natural disasters. This year, together with an international group of collaborators, I began a study on "New Methods to Measure, Monitor, and Assess Disaster Recovery." We are developing an approach to characterize communities' recovery from disasters by drawing on multiple sources of information (remote sensing satellite imagery, statistical data, and expert interviews). Our first case study is Punta Gorda, Florida, affected by Hurricane Charley in 2004. When the earthquake struck Haiti in January 2010, we secured funding from the U.S. National Science Foundation to extend our methods to the Haiti earthquake case.

One of my other ongoing projects concerns understanding the long-term dynamics of disaster risk in Metro Vancouver. With funding from SSHRC and NSERC, we have developed loss models for Metro Vancouver that estimate casualties, displaced households, and disruption to health care and transportation services in an earthquake. With these models, we have started to investigate how risk has changed over the last few decades, and how it is likely to change in the future.

This year, my collaborators and I also completed our multi-year project on "Analyzing Infrastructures for Disaster-Resilient Communities." Major efforts involved extending our work from earthquake hazard to flood, and disseminating results to practitioner as well as academic audiences. I have presented this work locally and internationally. I was invited to speak at the U.S. National Academy of Engineering's 2009 Frontiers of Engineering Symposium. The paper for that talk was selected for publication in the National Academy's journal The Bridge: Linking Engineering and Society.

The study produced a series of informational products and tools that are intended to help communities understand, characterize, and reduce the vulnerability of their infrastructure systems in disasters. These include: a searchable database on infrastructure failure interdependencies and their impacts; a synopsis of disaster vulnerability for two infrastructure sectors (health and transportation); a practical method for characterizing infrastructure vulnerabilities and interdependencies; an approach for developing regional priorities for infrastructure risk reduction; and two disaster scenarios (earthquake and flood) for Metro Vancouver. These outcomes are available through our project website and are documented through practitioner-oriented reports (in addition to academic journal articles).

Because infrastructure managers, emergency managers, and planners typically have very little personal experience with major disasters, we believe these informational tools will be helpful for learning from disasters experienced elsewhere. Infrastructure failure interdependencies are a particularly challenging problem because the linkages between organizations are poorly understood and rarely considered in risk reduction decision-making. In the case of Metro Vancouver, our project helped bring together infrastructure and emergency managers from a number of key organizations to develop shared understandings of the effects of potential disasters and develop priorities for planning. The methods we developed and demonstrated are, moreover, applicable to other communities and hazards across Canada.

Tony Dorcey

After almost 40 years at UBC I am thinking about transitioning in the nearer future to a part-time appointment at the University and eventually committing to other endeavours full-time. Last year I concentrated on enhancing my course offerings and working with my current students on their research.

I continue to be very interested in strengthening graduate learning in the two units in which I am appointed, IRES and the School of Community and Regional Planning (SCARP). Good as it is to see the leadership of both units in addressing sustainability challenges, I feel an even more progressive approach is urgently needed and that this presents an immense opportunity for IRES, SCARP and the University. In a presentation to the IRES Seminar Series last fall, I argued for STRONG Sustainability, STRONG Professionals: Strengthening Graduate Learning (http://tonydorcey.ca/SustSurge.html)

This conviction drives my thinking on the continuing evolution of my courses and work with graduate students on their research. Last year 4 of my 10 supervisees graduated, I taught 3 of my long-established 3-credit courses and introduced a set of 3 new 1-credit courses.

Two of my 3-credit courses are designed for students in IRES and SCARP and I have been steadily evolving them since they were first offered almost 30 years ago. Last year Negotiation, Facilitation and Mediation, which is both a skills and theory course, gave new attention to the growing debate about differing approaches to NFM and their implications for development of the fields and professions focused on reaching agreements and dispute resolution. Planning for Water Resources Management, which emphasizes principles and practices of transdisciplinarity, continued to assess the evolution of Integrated Water Resources Management around the world, in particular experience with the ambitious EU Water Framework Directive and its implications for reforming strategies, policies and institutions for water management in Canada.

My third 3-credit course, Omnibus: Becoming a Good Sustainability Planning Practitioner, is required for all incoming SCARP students. It introduces differing perspectives on the principles and practices of environmental, social and economic sustainability planning and professional practice in governmental, business and civil society organizations. A highlight of last year's course was a most stimulating day in which we experimented with using Open Space Technology to compare sustainability planning in the developed versus the developing world.

During the year, I also designed and introduced three new 1-credit courses to assist planning students in preparing for professional practice:

- Arranging and Planning for Your Planning Internship
- Learning from Your Planning Internship
- Getting a Job and Launching Your Planning Career

I did not fully appreciate how valuable these courses would be to students until I began teaching them amidst the extraordinarily challenging employment situation this year. It has been most encouraging to see the students' successes in obtaining internships and jobs as the term ends.

Full details on the agendas and materials for my integrated suite of courses and my evolving perspective on how to accelerate the transitions towards sustainability can be found on my web site (http://tonydorcey.ca). It also provides glimpses of the future endeavours to which I am transitioning.

Hadi Dowlatabadi

Was it really another year already? My metronome beats to the steps of more students completing their degrees and launching their careers. Charlie Wilson, Shannon Hagerman, Negar Elmieh and Eric Mazzi all completed their PhDs. Charlie is now a faculty member at the Tyndall Centre on Climate Change, in East Anglia. He continues to forge ahead with new ideas of how we can promote energy efficiency investments. Shannon got an SSHRC postdoc and works with the Climate Impacts Group in the University of Washington. She is continuing with her focus on the challenge of how we should conceptualize and address biodiversity protection and climate change. Negar has just landed a faculty position at Quest University. She defended her PhD just as BC recorded its first human cases of locally acquired West Nile Virus. Negar's work has a lot to contribute to improving management of risks from emergent diseases. Eric is also now in a tenure track Instructor position with the Clean Energy Engineering program. He has quickly grown to be a central figure in their new Masters of Clean Energy Engineering program and its great to be working with him on new curricula and programs at UBC.

A highlight of ongoing work was the recognition by the Auto21 Network of Centres of Excellence of Brian Gouge's and Francis Ries' collaboration with Giro Inc. and TransLink. This project promises to reduce public exposure to air pollution from public transit. TransLink have been very supportive with access to their data on fleet operations and service provision. Giro has been extremely helpful with letting us see how they optimize bus scheduling for their 200+ large municipal clients. We have been developing software that allows this process to take account of health costs associated with servicing the routes. The software automating the underlying calculations is under development and will be made available under a UBC licence to Giro and eventually other interested parties.

Outside UBC, I continued with activities aimed at bringing about better utilization of energy resources where possible. These led to new partnerships with: Ethical Beans in an attempt to make electricity from waste heat from their roaster; the Tsay Keh Dene First Nation in an attempt to develop a bio-based economy in the north end of Williston Lake; and various rental housing associations and appliance vendors to see if we could design better "default" decisions for them leading to more efficient appliance purchases. These efforts have been very instructive in showing me the challenges that lie between ideas that seem like no-brainers from an academic perspective and their implementation in the real world. I am hoping these experiences, will be a wellspring of insights for how to better the challenges in transition towards more sustainable patterns of organization and activity.

Leila Harris

I am very pleased to be the most recent arrival to join the faculty at IRES, with a joint appointment in the Center for Women's and Gender Studies (CWAGS). I am trained as a geographer and my work deals with the social, political and cultural dimensions of environmental issues, particularly in the developing world. Most of my research to date has focused on water issues in Turkey, tackling questions related to water and conflict in the Tigris-Euphrates basin, gender dimensions of transition to irrigated agriculture, scalar politics and state and nation building, or shifting state-society relations as the Kurdish southeast region undergoes significant developmental and environmental changes associated with massive damming and diversion of the Tigris and Euphrates rivers. More recent work has dealt with socio-spatial difference and environmental politics in contemporary Turkey and shifting water governance trends regionally and globally. I am looking forward to pursuing some new research dimensions as a new member of IRES, and hope to forge some collaborations that will push my work in new directions. Already, a budding collaboration with Gunilla Öberg and other colleagues is moving us towards a research proposal on social considerations related to the possibility of a distributed wastewater treatment plant on the UBC campus.

For 2009, publications include a piece on shifting state-society relations in Turkey's southeast border region as citizens in Turkey's poorest and Kurdish-dominated region reconsider their contested relationship to the state after large scale development associated with the Southeastern Anatolian Project (GAP). This was published in a special edition of the European Journal of Turkish Studies focused on the Turkish state and southeastern Turkey. A piece that considers multiple and contested narratives of environmental change in newly irrigated areas reconsiders debates related to 'local knowledge' and narrative and discursive approaches to sustainability issues, published in Local Environment. A third article published in Gender, Place, and Culture considers shifts in water governance over the past several decades from a gender perspective. The paper synthesizes major trends of water governance shifts, and documents evidence from diverse contexts to better understand gender issues and importance of feminist approaches to understand increasing water commodification/privatization as well as democratization and devolution of water governance. Finally, drawing on similar themes, a book review of a recent collection on Neoliberal Environments was also published in the Annals of the Association of American Geographers.

Recently accepted pieces that are now forthcoming include a piece entitled "Neo(liberal) Citizens of Europe: Politics, Scales and Visibilities of Environmental Citizenship in Contemporary Turkey" (Citizenship Studies) and "Negotiating Scales, Forging States: Comparison of the Upper Tigris/Euphrates and Jordan River Basins" (Political Geography, co-authored with Samer Alatout). The first piece considers lay environmentalism in contemporary Turkey in relation to ongoing trends associated with neoliberalization and Europeanization. The Political Geography piece involves a comparison of scalar politics of scientific and policy assessments of the Tigris-Euphrates and Jordan river basins. These and earlier articles can now be accessed from my IRES website.

Scott Hinch

Dr. Hinch is the Director of the Pacific Salmon Ecology and Conservation Laboratory, a group committed to the study of salmonid ecology, behaviour and physiology, and to providing management systems with information needed for the conservation and sustainable use of fish resources. This past year, his group pursued several lines of research including individual-based investigations utilizing physiological telemetry, genomics and experimental biological approaches to answer questions about the fundamental mechanisms causing fish to behave and survive as they do during ocean and freshwater migrations. The work involved large spatial scale tracking of fish over distances of a few to thousands of km, and large-scale intervention and management experiments. They also examined how current climate variability affected (and future climate scenarios could affect) populations and species of salmon in terms of their ability to adapt to environmental change, identified critical thermal survival limits and key thermal habitats, and evaluated the additive effects under changing climates of different fisheries types on by-catch release and general capture-release mortality. They also investigated how different land-use practices (e.g. riparian harvest) influenced fish habitat, behaviour and survival in small streams. Key to all this research was experimental approaches which examined specific management issues, techniques and concerns. Dr. Hinch contributed to three undergraduate courses all dealing with aquatic systems and fish, and continues to be the Director of the undergraduate program in Natural Resources Conservation.

Mark Johnson

During the past year, Dr. Mark Johnson has established a research program in ecohydrology based in the Institute for Resources, Environment and Sustainability. Together with graduate students and faculty collaborators from UBC and beyond, the research program was launched through significant funding from the Canada Foundation for Innovation, which provided support for the creation of the Integrated Watershed Analysis Laboratory (IWAL), chaired by Dr. Johnson. As a facility for the synchronous, coupled study of complex phenomena in terrestrial and aquatic environments, the goal of IWAL is to contribute towards identifying more sustainable management practices for land and water resources. As a significant first step, we have begun collaborating with a BC forest products company to identify fates and fluxes of nitrogen resulting from fertilizer application. Fertilizer use is a standard management practice in the forest products industry. The next steps in this research will focus on reducing nitrogen leaching to streams and wetlands while also minimizing production of nitrous oxide (a potent greenhouse gas) on the landscape.

While still in the build-out phase, IWAL has already acquired cutting-edge research and analytical instrumentation for field and laboratory-based studies. These include field-based laser absorption-spectroscopic instruments for high-frequency analysis of greenhouse gas fluxes in terrestrial and aquatic environments, and submersible UV-Vis spectrometers for real-time measurements of carbon and nitrogen fluxes in water. Laboratory-based equipment for environmental analysis is providing a means for establishing and strengthening collaborations with faculty and graduate student researchers from a broad range of faculties and departments at UBC. The lab facilities are housed in a collaborative research laboratory known as the Soil Water and Air Laboratory http://www.landfood.ubc.ca/swal/.

Graduate students are currently working on a number of research topics related to ecohydrology, including (to name just a few): considerations of interactions of land use change and climate change for water supply systems in BC's Okanagan basin, implications of climate change on the water balance in the rapidly transforming state of Mato Grosso, Brazil, and interactions between groundwater extraction and human health in the semi-arid state of Aguas Calientes, Mexico. You can keep track of activities and progress made by Dr. Johnson and his research group at their website: http://research.ires.ubc.ca/ecohydrology/ .

John Robinson

This was a very significant year in terms of strategic initiatives related to sustainability at UBC. In particular, two major projects of mine – the Sustainability Academic Strategy and the Centre for Interactive Research on Sustainability (CIRS)—reached important milestones which have created new capacity for UBC.

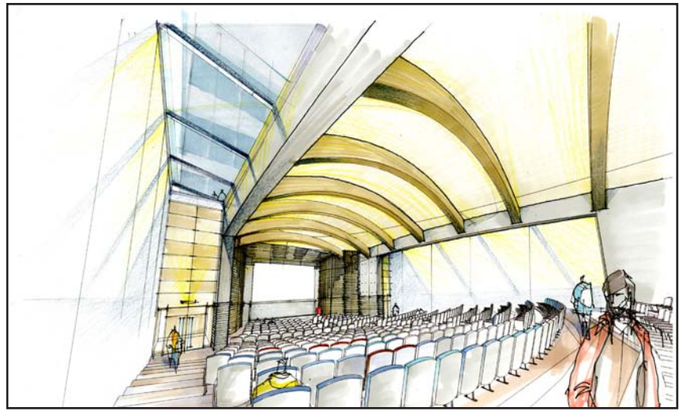
Early in 2009, I was invited by the university executive to lead the Sustainability Academic Strategy (SAS) Working Group, which was established under the President's Advisory Council – Sustainability (PAC-S) to provide a framework to guide the UBC community in ongoing planning, decision-making and resource allocation around sustainability. Membership in the Working Group included staff, faculty and students from both UBC Vancouver and UBC Okanagan as well as external community representatives. The SAS Working Group consulted widely to develop a comprehensive draft strategy which was grounded in the community experience. Members of the UBC campus communities were able to participate electronically and in-person through interactive processes.

The resulting report and recommendations were very well received by the university community, the senior executive, and the Board of Governors, and in January 2010 UBC President Stephen Toope announced the creation of a new sustainability strategic management initiative the lead the implementation of the SAS recommendations. The UBC (Vancouver) Sustainability Initiative (USI) will include a central team and three other groups, which will work together in a highly collaborative and integrated way: the Campus Sustainability Office which is responsible for the wide array of operational programs already in place, the Sustainability Teaching and Learning office which is responsible for working with existing programs across campus to develop

and facilitate a new suite of sustainability teaching and learning options, and a Research and Partnerships group, responsible for fostering new forms of collaborative interdisciplinary research, and partnerships with the private, public and NGO sectors.

The CIRS building will be the home for this initiative, bringing to fruition the vision we have pursued for CIRS as a hub of sustainability research, teaching and operational activities and partnerships. I have been offered the opportunity to lead this initiative for the first six year term, and I moved into the role of Executive Director, Sustainability for UBC Vancouver in January. I will maintain my faculty appointment in the Institute for Resources, Environment and Sustainability and will continue to teach and supervise graduate students in the RMES and Geography programs.

Construction on the $37-million CIRS building began in last September, and the building is set to open in the summer of 2011 on Sustainability Street on UBC's Vancouver campus. CIRS will be greenhouse gas-positive and a net energy producer, meaning that it will help UBC reduce the energy it uses and carbon it emits. All water will be sourced from rainwater, with wastewater treatment occurring on site. It will also serve as a living laboratory for sustainability research, development and practice. For example, building processes will be continuously monitored, including heating, cooling, lighting, equipment use, water harvesting and treatment, building occupancy, inhabitant behaviour and more. People working in the facility will be able to follow the proceedings on their desktop computers and vote on their usefulness.



Tim McDaniels

Tim McDaniels was fortunate enough to be able to build a research partnership with CATIE (Centro Agronomico Tropical de Investigacion y Ensenanza) of Turrialba, Costa Rica that will provide excellent opportunities for IRES and UBC in coming years, as the university focuses more on international linkages. CATIE is Latin America's best known and oldest research center and graduate program concerned with tropical agriculture and forestry. In recent years, CATIE has redefined its mission to focus on sustainable land use, climate adaptation and ecosystem services. CATIE is supported by the Organization of American States, and many other donors and research programs. It serves as a gateway for researchers interested in climate, land use and ecosystem services throughout Latin America. Tim began work with the Global Change program (Grupo Cambio Global) at CATIE in late 2007 on their major research project regarding climate adaptation in tropical forests, with a focus on land use, agriculture and erosion control, funded by the European Union. Tim collaborated with Raffaele Vignola and other CATIE researchers on three papers from this work, which was also supported by the Climate Decision-making Center at Carnegie Mellon University. In late 2009, the researchers submitted three proposals on climate change adaptation and ecosystem services with IRES faculty, one of which has just been funded (the others are pending). A Memorandum of Understanding was signed in December, 2009 by UBC and CATIE to provide a formal platform for ongoing research collaboration and student and faculty exchanges. Tim will be teaching a course for IRES and SCARP students in May 2010 at CATIE focusing on watershed management and climate adaptation, and Raffaele will be a visiting researcher in IRES in the coming year.

Along with Kay Teschke and Michael Brauer of SOEH, Tim McDaniels submitted a proposal and won a renewal of financial support for the Bridge program, a unique interdisciplinary graduate training program linking health, engineering and public policy. The support from CIHR and other sources will provide interdisciplinary graduate training and funding to students for the next six years. Tim also served as the director of the Bridge program in the second half of 2009 while Mike Brauer was on leave. Several IRES faculty are mentors in the Bridge program.

Gunilla Öberg

My proudest contribution this past year is my forthcoming book 'Interdisciplinary environmental studies – a primer' to be published by Blackwell and Wiley which I started to write in 2004. I am also very happy that the paper "Learning in focus groups: an analytical dimension for enhancing focus group research" has been selected to be reprinted in a major reference collection as part of SAGE Benchmarks in Social Research Methods (Wibeck et al., 2010) while the paper "Retention of chloride in soil" (Öberg and Sandén, 2005) is listed as the top-ten most cited in Hydrological processes: these two papers epitomizes that it is possible to conduct high quality research in quite disparate fields.

I have become increasingly engaged in discussions with UBC Operations in relation to various sustainability issues, with a focus on performance assessment, energy systems, waste water management and biodiversity/ecosystem services. This has resulted in several projects, which are tied to either research projects or teaching/learning projects. One of these is the Integrated Energy and Water Project (IWEP) which is a collaborative initiative with UBC operations, as well as researchers and students at UBC in dialogue with Metro Vancouver and waste water related industries as well as partners in Buenos Aires. I am very excited about the project which involves scholars with expertise in engineering, computer science and artificial intelligence (AI), decision theory, ecosystem services, economy and well-being, eco-hydrology, analytical environmental chemistry, risk perception, water governance and equity issues.

Another exiting experience from last year is that I started to develop a cross-faculty undergraduate course last spring, which was accepted by Senate in November. It is called "Applied sustainability: UBC as a living laboratory" and will be open for 3-4 year students in Applied Science, Science, Arts, Forestry, Land and food systems and Sauder School of Business. During the planning process, I was in close dialogue with the Deans of each of the involved Faculties plus a group of professors with representatives from each of these Faculties as well as with staff members from the Sustainability Office. My graduate student, Liz Ferris, has been helping out in the planning process and has done a tremendous job in bridging between the operational and the academic sides of UBC. The curriculum has received considerable positive support and was moved with impressive speed through UBC's glacial bureaucracy. I will be teaching the course for the first time in the spring of 2011.

I am the proud co-creator of the Soil, Water, Air Laboratory (SWAL) at UBC. It may sound strange, but research on soil is usually conducted separate from research on water which is conducted separate from research on air. The aim of SWAL is to act as a node at UBC for integrated research in these areas, with a biogeochemical bent, so to speak. The lab holds tremendous opportunities and is clearly moving toward an exciting future, not least because the majority of SWAL's members are very collaborative and innovative spirits. Read more on page 30 and at http://www.landfood.ubc.ca/swal

Terre Satterfield

Returning from research sabbatical the year previous, it was a pleasure to pick up again with supervision, teaching and departmental enthusiams of all kinds.

My research in collaboration with students and faculty continues to lie at the intersection of culture, justice, risk, and environmental values as examined across several domains. One major domain this year has been research into public understandings of the benefits and risks of emerging nanomaterials. Working with PhD student Christian Beaudrie, and colleague Milind Kandlikar, as well as researchers at UCLA and UCSB, we conducted a series of studies on the perceived risk of nanomaterials. More recently, with significant help from research assistant Laura de Vries, the focus has been to understand people's 'mental models' of environmental media (air, water, and soil); and secondly, to query how these models change in reference to discussing any risks and benefits nanomaterials might pose to the natural environment. Meanwhile, debates about genetic modification remain another major focus. Milind Kandlikar, PhD student Julia Freeman and I have been examining closely the case of GM cotton in India, where farmers there have taken up GM hybrids with nearly unbridled enthusiasm, lobbying the state for their approval and modifying and negotiating both the regulatory system and the plants themselves to powerful effect. Together we hope to begin answering question such as: How has policy changed in response to farmer's needs? What do the farmers themselves think? And, how has GM cotton impacted their lives, for better or for worse?

Reactions to and development of nanotechnologies and GM cotton have as much to say about social, economic, and (de)-regulatory forces as they do about 'culture' – a necessary yet slippery concept that often serves as a catch-all explanation for a wide assortment of societal conundrums. For this reason, myself, Kai Chan and students Sarah Klain and Jordan Levine, along with partners at UCSB's National Center for Ecological Analysis and Synthesis, continue to critique and develop methods for representing culture within an ecosystem services framework. Another related project in collaboration with May duMonceau (post-doc), Jana Kotaska (PhD student), Malcolm Scoble (UBC Mining Engineering), and Ginger Gibson seeks to investigate how Indigenous cultures are conceptualized, leveraged, and even financially accounted and compensated for in cases of admitted "cultural loss." Related ideas also motivate work lead by former Phd student/now post doc, Shannon Hagerman, whose is exploring (in collaboration with Hadi Dowlatabadi and myself) , expert perceptions of climate change as it effects the designation of protected areas and/or the protection of biodiversity more broadly.

I would also like to congratulate David Boyd and Anton Pitts for the outstanding work and dissertations they produced this last year. It is equally satisfying to know that all six of you who earned doctorates last year have gone onto post-docs and full time employment in your fields; well done! . I thank you all and, as always, I look forward to what I will learn from you next year.

Ilan Vertinsky

The sustainable forest management Network funded for the past four years a major national project to explore the design of new forest tenure institutions in the FEPA research unit, which is affiliated with the IRES. It is clear that there is an emerging consensus that the forest sector is in a severe crisis. Unlike crises in the past this is the consequence of a long term structural shift in the social, economic and biological environments in which the forest sector operates. Dealing with this crisis requires the articulation of new visions for the forest and bold actions.

The recently completed FEPA project consisted of a series of case studies and national surveys of community leaders, policy makers and industry executives, econometric studies of policy change impacts, modeling and a sequence of workshops with foresters, government officials, First Nations representatives, community groups and industry executives. The results are highlighted in a new report (Vertinsky I and Luckert M 2010. Design for Forest Institutions: The Challenges of Governing Forests. Sustainable Forest Management Networks, Edmonton 36pp).

The report provides a critical overview of how tenure systems evolved in Canada, how they are working, what options might respond effectively to the challenges the forest sector faces and the potential of these options to the system. The options for change suggested in the report include a set of more conventional interventions that will improve the effectiveness of the sector in achieving the current economic, social and environmental goals as well as some bold options for change that are required if long term sustainability is sought. The report articulates the following options for immediate action: removal of operational constraints to increase efficiency, allowing tenure holders to make free choices with respect to products and input mixes, choices of technology, the allocation of capital and markets served. In particular, the elimination of mill appurtenancy, minimum cut and log export controls could help obtain the highest economic values for timber resources.

Recommendations included making tenure rights more divisible and transferable. We argued that environmental regulations should be made more flexible when results based regulations can be effectively enforced, allowing tenure holders to choose the means to achieve environmental objectives. We suggested that regulatory systems based on economic instruments such as "cap and trade" can achieve efficiently higher environmental standards (as demonstrated by one of the field experiments conducted as part of the project in Alberta). Separate markets may need to be established for different ecosystem types and different environmental objectives. More reliance should be placed on credible environmental certification systems or their approved SFM certifiers.

The conclusion of our study was that though in the short term the consequences of the introduction of these reforms were disappointing the long term impacts are likely to be positive - though not sufficient to revitalize the industry. Bold options are needed to bring systematic change which might create new visions, culture and business models for managing the forests. During 2009/10 these ideas were presented to various governments encouraging debate on the governance of the forest.

Highlights from the IRES Visitors

Stewart Barr, Visiting Professor
April - June 2009
UK

Robin Naidoo, Adjunct Professor
December 2009 - November 2012
Montreal, Canada

Armin Weik, Visiting Scientist
June - August 2008
Switzerland

Teresia Svensson, Visiting Scholar
March - December 2010
Sweden

Andy Grieshop, Post-Doctoral Fellow
October 2008 - Ocotber 2010
Pennsylvania, USA

Shannon Hagerman, Post-Doctoral Fellow
July 2009 - June 2010
Vancouver, Canada

Tahir Nagji, Visiting Scholar
May - September 2010
UK

Rebecca Martone,
Post-Doctoral Fellow
September 2009 - September 2011
California, USA

Guilia Bernardi, Visiting Scholar
May - November 2010
Italy

Marina Molodovskaya, Post-Doctoral Fellow
March 2010 - February 2011
New York State, USA

Suzanne Menzel, Visiting Scholar
February - Septeber 2008
Germany

Aio Markus Haberli, Visiting Scholar,
October 2008 - January 2009
Switzerland

Maria de Lourdes Fierro Jauregui,
Visiting Scholar,
March - April 2010
Mexico

Fabien Carminati, Visiting Scholar
March - July 2010
France

Pascal Steingruber, Visiting Scholar
March - August 2010
Switzerland

Guillaume Creusat, Visiting Scholar
April - September 2009
France

Julie Boye, Visiting Scholar
March - August 2010
France

Gary Luck, Visiting Associate Professor
May 2010 - May 2011
Australia

Eduardo Couto, Visiting Professor
October 2009 - November 2009
Brazil

Maria du Monceau de Bergen,
Post-Doctoral Associate
May 2008 - September 2010
Chile

IRES continuously receives requests from visitors from around the world who wish to spend time with us and we welcome anyone who brings their own funding, conducts research in one of our relevant fields and has a champion among our faculty members. So far we have been able to provide office space for all who fulfill these criteria and during 2008-2009, we had the pleasure of hosting 5 post-docs, 1 visiting scientist, 4 visiting professors and 10 visiting scholars who have been visiting for periods of a few weeks up to a couple of years. Below follow the highlights of three of our visitors.sw

Rebecca Martone

Rebecca Martone is a postdoctoral research fellow with Dr. Kai Chan, co-coordinating the British Columbia Coastal Ecosystem Services (BCCES) project. The main focus of BCCES is an interdisciplinary transacademic project on coastal ecosystems and human communities.

Sea otters are returning to the West Coast of Vancouver Island, creating changes to coastal ecosystems and associated human communities, as well as a fascinating natural experiment. Sea otters are voracious predators of sea urchins, abalone, Dungeness crabs, geoduck clams, and other shellfish of commercial and cultural importance. But by preying heavily on these species, sea otters facilitate the large-scale expansion of kelp forests, which are one of the most productive ecosystems on the planet and a complex three-dimensional habitat for many shellfish and finfish, many of which are also of commercial and cultural importance. Sea otters therefore mediate this flip between systems resembling marine deserts and underwater equivalents of tropical forests—except that these underwater forests also seem to fertilize distant ecosystems through various kelp particles spread by ocean currents.

In the BCCES project we are striving to understand the ramifications of sea otters, kelp forests, and the many human activities that affect these and interacting organisms, including harvesting but also coastal development and pollution. We're approaching this challenge through a variety of approaches (students listed are supervised by Kai Chan, with cosupervisors noted, except where indicated otherwise):

1. field surveys and experiments of many organisms both on shore in mussel-beds and under water in kelp forests (RMES MSc student Gerald Singh, co-supervised by IRES associate Chris Harley; Rebecca Martone; Russ Markel—Zoology PhD student soon to join IRES as a postdoctoral fellow; and various undergraduate students);
2. field surveys of kelp particles and compounds, as they are distributed offshore from kelp forests near shore (EOS MSc student Brock Ramshaw, supervised by Evgeny Pakhomov);
3. remote surveys and habitat modeling of kelp forests (RMES PhD student Edward Gregr);
4. ecosystem modeling including all the species mentioned above and also fishing pressure, informed by 1-3 above (RMES MSc student Maria Espinosa; RMES PhD student Edward Gregr);
5. surveys, interviews, and workshops with local constituents and stakeholders, in partnership with a regional management board (West Coast Aquatic), to understand the nature of the human benefits (through ecosystem services; see above) and values that will be associated with ecological change modeled in 4 (PhD student Jordan Levine and soon-to-be PhD student Jordan Tam, both co-supervised by Terre Satterfield; and undergraduate Christina Mak).

Also associated with this project are numerous other students who have volunteered in the field (e.g., RMES students Megan Mach, co-supervised by Colin Levings; Sarah Klain; and Andres Cisneros, supervised by Rashid Sumaila). It's our intention to bring together these diverse kinds of research so that local and regional decision-making reflects current understanding of social-ecological interactions and their implications for things that matter most to people.

Jonathan Anticamara

My main research goal is to help improve our understanding of "How biodiversity and ecosystems respond to disturbances and management." By doing so, I hope to contribute to the responsible use, conservation, monitoring, and management of biodiversity. The following are my accomplishments in 2009: (1) I compiled and synthesized the published information on the causes and consequences of superabundant species that exhibited outbreaks in various ecosystems; (2) I completed assembling the global fishing effort database spanning from 1950 to 2009; (3) I published my thesis paper on "Spatial and temporal variation of abundance, biomass, and diversity within marine reserves in the Philippines (Diversity and Distributions, in press); (4) I co-authored a technical report on "The impacts of overfishing on marine biodiversity and habitats," and I joined the FAO/CBD/UNEP/IUCN meeting in Rome in September 2009; and (5) I presented the results of my PhD research in the University of Guadalajara-CUCEA, Mexico. In 2010 I aim to publish my papers on superabundant species, global fishing and biodiversity, and marine reserves and biodiversity. I also aim to acquire funding for "Engaging local communities and relevant stakeholders in designing long-term strategies for monitoring and managing biodiversity and the ecosystem services that biodiversity provides."

Shannon Hagerman

Shannon completed her PhD at IRES in April 2009 (Hadi Dowlatabadi and Terre Satterfield, supervisors). Her thesis examined the challenges of designing and implementing new goals and strategies for biodiversity conservation given the impacts of climate and concurrent changes. At the same time, Shannon was awarded a SSHRC post-doctoral fellowship, which she is now working on at the University of Washington (Climate Impacts Group) (with continued collaborations at IRES). Building on her PhD, one of the core objectives of this post-doctoral work is to quantitatively examine how the roles of values about nature, beliefs about ecosystem dynamics and views on uncertainty and decision making shape preferences for different conservation policy alternatives given climate impacts. Additionally, she continues to work with Terre and Hadi at IRES on a SSHRC Research Development Initiative grant in which 'event ethnographic' methods are used to better understand the design and evaluation of conservation policy alternatives as they are forged (and evolve) at a range of scientific and policy-making settings. Shannon is delighted to have been selected as one of this years 34 DISCCRS scholars http://www.disccrs.org/. She is also happy to see the 5 papers from her IRES thesis now in print (or accepted).

IRES Seminar Series

The IRES seminar series runs on a Tuesday lunch and is open for the wider UBC community. The series followed a slightly different format during the 2009-10 year. Firstly, presentations were held bi-weekly instead of weekly to explore whether this led to larger and more consistent attendance of the Institute's members. Secondly, each session was primarily designed around an IRES faculty or associate member's research and the presentations and discussions involved, whenever appropriate, the students and other colleagues collaborating with them. This format resulted in a series this year that included many more people who are involved in the Institute's research in making diverse presentations. It also resulted in audiences that were attracted by the particular topic from other departments on campus and organizations off campus. Overall, however, the new format did not noticeably increase the attendance by members of IRES.

The following talks took place during the 2009-10 IRES Seminar Series:

22 September 2009
What is “UBC as a Living Lab” and is it Realistic? Joint lecture with Liz Ferris (RMES student), Andrew Collins (Associate Director, Project Services, UBC Infrastructure development) and Gunilla Oberg (IRES Professor)

6 October 2009
Decision-Aiding for Climate Change Adaptation Within Social-Environmental Systems: Learning from Experience with Forestry, Fisheries and Biodiversity in British Columbia
Tim McDaniels (IRES Professor)

20 October 2009
Pathways Towards Disaster Mitigation Planning
Murray Journeay (Geological Survey of Canada), Sonia Talwar (Natural Resources Canada) and Stephanie Chang (IRES Professor)

3 November 2009
Can Copenhagen Deliver Climate Stabilization Without Vienna?
Hadi Dowlatabadi (IRES Professor)

17 November 2009
STRONG Sustainability, STRONG Professionals: Strengthening Graduate Learning
Tony Dorcey (IRES Faculty)

1 December 2009
BAX LAANKS Pulling Together
Charles Menzies (IRES Faculty Associate) and Jennifer Rashleigh (Ethnographic Film Unit UBC)

26 January 2010
Cultivating Societal Change in the Direction of Sustainability: Some Parts of the Puzzle
John Robinson (IRES Faculty) and RMES students Tom Berkhout, Sylvia Coleman, Stefan Storey, Meg O'Shea and Susanna Haas Lyons

9 February 2010
Subjective Well-Being, Sustainability and Economics
Christopher Barrington-Leigh (Canadian Institute for Advanced Research)

2 March 2010
Reflections on Chasing the Elusive: Hope, Intention and Disruption in the Regulation and Perceived Risk of Nanotechnologies
Terre Satterfield (IRES Faculty), Melind Kandlikar (IRES Faculty Associate) and Christian Beaudrie (RMES student).

16 March 2010
Can Groundwater Development Be Sustainable?
Tom Gleeson (Earth and Oceans Sciences and Mark Johnson (IRES Faculty)

30 March 2010
An Interdisciplinary Living Lab Course: An Ecosystem Services Approach to Sustainability for UBC and Vancouver
Kai Chan (IRES Faculty), Sarah Klain and Megan Mach (RMES students) and Natasha Sihota (Earth & Ocean Sciences student).

13 April 2010
Getting the Story Straight: Trends and Issues for Fraser River Sockeye
Scott Hinch (IRES Faculty), Mike Lapointe (Pacific Salmon Commission) and John Reynolds (SFU)

Confabs

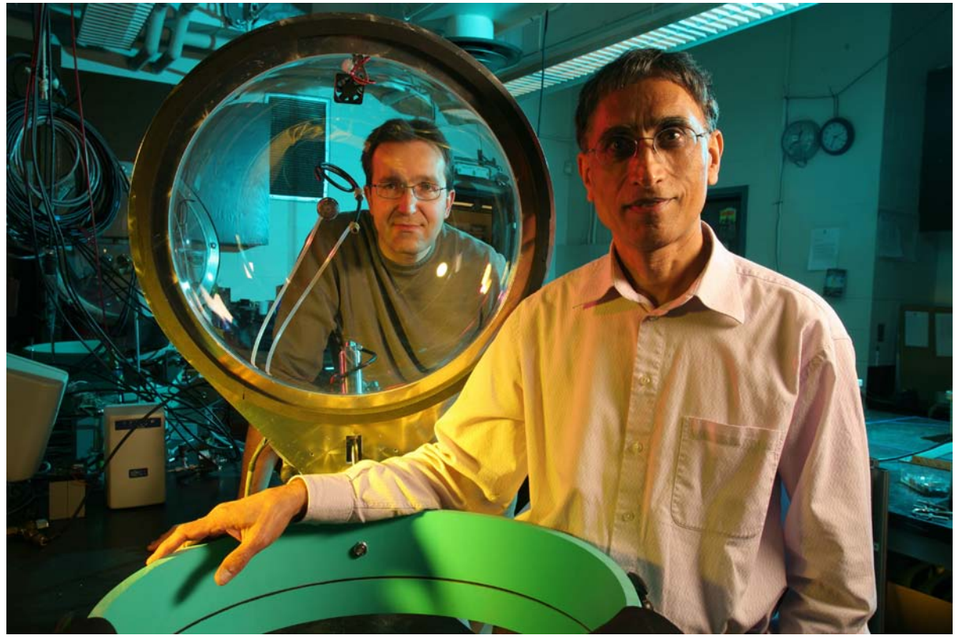
RMES students come from various academic backgrounds. Many have had some amazing professional and personal experiences in and outside of the program. In 2009, a group of students initiated the RMES Confabs as a space for fellow students to share their skills, knowledge and experiences in the format of a graduate student support group.

These informal meetings take place every other week and have included many topics ranging from sharing graduate school or professional experiences, information on uses of technology, and discussions on sustainability. This past year’s topics have been: student experiences from the Copenhagen climate talks, life satisfaction and economics, what to expect from graduate studies in RMES, experiences that led students to join IRES and electric bicycles.

The RMES confabs will continue in the fall with a new array of topics and experiences and will be scheduled on the off weeks of the IRES Faculty Seminar. Should you have a topic in mind, or would like to join the conversation board, please email Michael Lathuillière (mjlath@interchange.ubc.ca) or James Murphy (jmmurph@gmail.com).

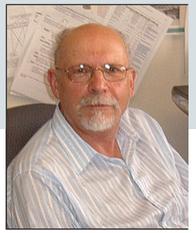
IRES faculty associates and collaboration across UBC

We have 31 faculty associates, who supervise our students, sit on their committees and participate in joint research projects. Our faculty associates come from across the UBC Campus with homes in the Faculties of Science, Arts, Applied Science, Sauder School of Business, Law, Forestry, Land and Food Systems as well as sister units in The College for Interdisciplinary Studies (CFIS). Notable for their contributions to a large number of our graduate students are for example Hisham Zeriffi and Milind Kandlikar at the Liu Institute for Global Issues, Amanda Vincent, Rashid Sumaila and Daniel Pauly at the Fisheries Centre (FC), Stephen Sheppard, Faculty of Forestry, and Ralph Matthews, Department of Sociology. Below follows highlights from three of our faculty associates and reports from two collaborative programs.



Zoran Nesic, Senior Research Engineer and Dr Rachpal Jassal, Research Associate in the SWAL Lab

Colin Levings



As an IRES Associate/DFO Research Scientist (now Emeritus) I have been working on projects related to the Canadian Aquatic Invasive Species Network (CAISN) (2006-2011) (www.caisn.ca). Funded by NSERC, DFO, Transport Canada and other sponsors and headquartered at the University of Windsor, the Network involves principles investigators (P I s) at universities and laboratories in BC, AB, ON, QC, NB, NS, and NL. The project focuses on three themes: vectors, factors affecting invasion success, and risk assessment. In addition to student research (described below), I had a major role in setting up and testing hypotheses relating to ballast water as a vector for invasive species and coordinated with the shipping industry to facilitate the collections in Vancouver. Managers were particularly interested in the role of mid ocean exchange - coastal water taken aboard cargo vessels is exchanged with mid ocean water as a procedure to minimize survival of foreign coastal species potentially brought into Canadian ports. With the superb help of DFO technicians and student assistants hired through IRES, water and sediment samples were collected from ballast tanks of 60 ships in Vancouver harbour – however about 300 ships actually had to be boarded because not all vessels were suited to the sampling protocol. This work was completed in 2009. Samples of bacteria, viruses, dinoflagellates, diatoms, and zooplankton were obtained for P I s at the various labs and shipped to them for analyses. In addition I managed the funding and helped coordinate diver collection of invasive species on ship hulls – 20 ships were sampled. Abundance data and information on ballast water, sediment volumes and ship hull surface area will be used by the various P I s across Canada to estimate effective propagule pressure (explained below) from the shipping vector. I also helped with coordination, funding, and logistics of the West Coast sample team which investigated invasive species in eight BC ports to estimate realized propagule pressure.

In addition I developed the start-up hypotheses and received CAISN funding to co-supervise two graduate students in IRES. Kai Chan and I co-supervise Veronica Lo (M Sc) and Megan Mach (Ph D). In 2009 Veronica defended her thesis - her project was an important cornerstone of the Network as she dealt with a comprehensive analysis of ballast water and shipping data on Atlantic, Great Lakes and Pacific coast (see below). Megan Mach is working on a project investigating invasive species in eelgrass beds in harbours in BC and NS. She is testing hypotheses relating to propagule pressure in her project. I also developed the start-up hypotheses for a study on zooplankton in ballast water – a project which was the thesis topic for MSc student Donald Humphrey in EOS.

Milind Kandlikar

The year 2009-2010 was remarkably productive for the multiple projects I am working and on collaborating on. The research on emissions from Indian auto-rickshaws took a giant leap forward when Conor Reynolds (RMES PhD student) and Post-Doc Andy Grieshop completed a six week long measurement campaign in October 2009. The project aims to understand how different fuel types and engine technologies can influence both Air Quality (AQ) and climate change. Andy and Conor brought 42 of these vehicles that are currently in-use to a state of the art research facility in Delhi and measured emissions of criteria pollutants (CO, NOx, PM 2.5), greenhouse emissions (CO2 and CH4) and aerosols while the vehicles were driven on a chassis dynamometer. The data are in and we are in the analysis phase: Conor is developing emission factors and assessing how climate and air quality co-impacts might be understood; Andy is characterizing the aerosols Organic (OC) and Elemental Carbon (EC) aerosols; Dan Boland (Mech E.) is developing a physics based model of the auto-rickshaw validated using the data; and Christine Lagally (Mech E) is characterizing the size, shape characteristics of the emitted aerosols. On a related front, I am also collaborating with Mike Brauer (SOEH/UBC) and others to develop a Land-Use Regression (LUR) model for characterizing pollution sources in Delhi. Arvind Saraswat will work on the LUR model for his thesis.

The research on emerging technologies - Nano and Biotechnology is also coming along nicely. Unlike the AQ work on these projects I am wearing a social science hat as well. On the NSF-funded nanotechnology project front there were two papers of note. One in Nature Nanotechnology (with Terre Satterfield and PhD student Christian Beaudrie) did a meta-analysis of survey data on public risk perceptions of nano. We showed that people know little about the technology, and among those who do there is a strong belief that the risks outweigh the benefits. A second paper in ES&T analyzed the costs of testing of nano-materials and argued against a precautionary approach and for "tiered' testing. We also have ambitious plans for assessing nanotechnology risks in the coming year, where Christian Beaudrie (RMES PhD student) will play a key role. The SSHRC frunded project on GMO work in India also made strides; Terre Satterfield and I are field testing farmer survey on risks and benefits of GMOs with Indian partners. Julia Freeman (RMES PhD) is in the process writing up papers for her thesis based on several years of field work.

I also continue to work on climate and energy related topics. Research includes: a project on capacity building for climate change with Hisham Zerriffi (see Hisham's writeup in this report for details); work on the carbon efficiency of subsidies for purchasing hybrid vehicles with Sumeet Gulati (Economics/LFS) to appear in JEEM; Paul Teehan's (RMES PhD student) thesis related on the environmental implications of cloud computing; Kieran Findlater's (RMES PhD student) Masters work on land use implications of the biofuel gold rush; and an assortment of work on climate mitigation and non-CO2 greenhouses gases. The second half of 2010 promises to be as busy as the first.

Hisham Zerriffi

Along with a great group of graduate students and collaborators at UBC and globally, I have been continuing my research activities at the intersection of technology, environment and development. This past year has seen a couple of projects come to fruition. The first is a book project about the use of small scale electricity generation technologies for rural electrification in the developing world. The title is Rural Electrification: Strategies for Distributed Generation and it will be published by Springer in the fall. The other was an Energy Policy article on Global Environment Facility funding for renewable energy projects with my University of Minnesota colleague Elizabeth Wilson.

In addition, I am continuing a number of other activities related to rural energy, environment and development, including:

• Reza Kowsari (Ph.D. student, RMES) and I continue to work together to understand household level decision-making on rural energy and to explore aspects of biomass usage for energy. This includes the development of a new framework for understanding the energy transition process that accounts for the multiple dimensions of household energy demand.

• With my colleagues at Stanford University and the Indian School of Business, I am working on a project to assess commercial cookstove projects in India. A next phase of research will involve understanding household usage of cookstoves after they've been purchased.

• Sara Elder (M.A. student, RMES) has been working with Philippe LeBillon (Geography and Liu Institute for Global Issues) to understand the role of participation in fair trade cooperatives on farmer health, using Rwandan coffee farmers as a case and focusing, in particular, on the social determinants of health.

• Emily Anderson (M.A. student, RMES) and I have been examining the issue of the relationship between carbon credits and development in the agroforestry sector. Agroforestry projects have inspired hope for the realization of co-benefits for rural livelihoods, local environment and global climate. Interviews and focus groups are being conducted to document stakeholder understandings and expectations of costs, benefits and barriers to participating in agroforestry across stakeholders engaged at all levels of project implementation.

Another area of work has been on the issue of climate science capacity in the developing world. Milind Kandlikar (Associate Professor, Liu Institute for Global Issues) and Claudia Ho Lem (M.Sc. student, RMES) and I recently completed a paper for the Wiley Interdisciplinary Reviews: Climate Change titled "Science, decision-making and development: Coping with climate variation in less-industrialized countries." The paper addresses the role of scientific knowledge in decision-making with respect to climate variability and change in the developing world, with a focus on scientific capacity. Other current and future work on this projects includes a paper analyzing participation trends in the Inter-Governmental Panel on Climate Change (IPCC), a survey of international training programs on climate change geared towards developing country scientists (surveying both program managers and participants), and case studies examining some specific capacity issues.

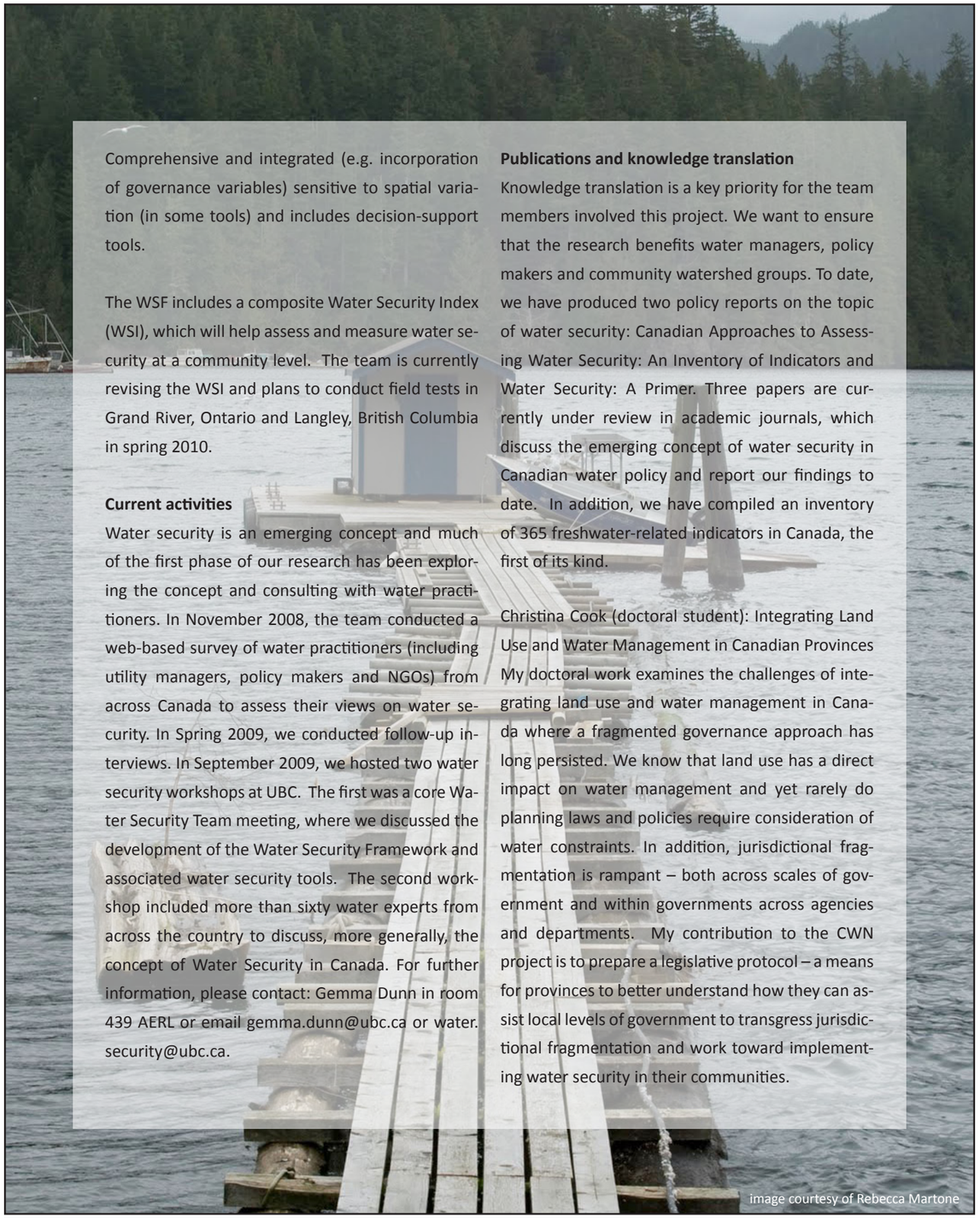
Program on Water Governance

IRES is the proud host of UBC's Program on Water Governance, which is led by Professor Karen Bakker, who is one of our faculty associates. In 2008, the Canadian Water Network (CWN) awarded Dr. Karen Bakker, Director of the Program on Water Governance (PoWG) at UBC, a four-year grant to lead a team of researchers from five Canadian universities on a project to create tools designed to assist communities in improving water security. Environment Canada, Health Canada, Natural Resources Canada and the BC Ministry of Environment are among the 14 project partners.

The project, Developing a Canadian Water Security Framework as a Tool for Improved Governance for Watersheds, will create a Water Security Framework (WSF) that includes decision-support tools for water managers. The overriding objective of this research project is to create tools to support the improvement of water security in Canada, specifically through improving governance for source protection and land use.

The WSF will be user-friendly and use data already available to many communities. The core components of the Framework are ecosystem health, human health and governance capacity. The WSF differs from other, similar frameworks as it is:

Program on Water Governance 2009 Water Security Workshop



Comprehensive and integrated (e.g. incorporation of governance variables) sensitive to spatial variation (in some tools) and includes decision-support tools.

The WSF includes a composite Water Security Index (WSI), which will help assess and measure water security at a community level. The team is currently revising the WSI and plans to conduct field tests in Grand River, Ontario and Langley, British Columbia in spring 2010.

Current activities

Water security is an emerging concept and much of the first phase of our research has been exploring the concept and consulting with water practitioners. In November 2008, the team conducted a web-based survey of water practitioners (including utility managers, policy makers and NGOs) from across Canada to assess their views on water security. In Spring 2009, we conducted follow-up interviews. In September 2009, we hosted two water security workshops at UBC. The first was a core Water Security Team meeting, where we discussed the development of the Water Security Framework and associated water security tools. The second workshop included more than sixty water experts from across the country to discuss, more generally, the concept of Water Security in Canada. For further information, please contact: Gemma Dunn in room 439 AERL or email gemma.dunn@ubc.ca or water.security@ubc.ca.

Publications and knowledge translation

Knowledge translation is a key priority for the team members involved this project. We want to ensure that the research benefits water managers, policy makers and community watershed groups. To date, we have produced two policy reports on the topic of water security: Canadian Approaches to Assessing Water Security: An Inventory of Indicators and Water Security: A Primer. Three papers are currently under review in academic journals, which discuss the emerging concept of water security in Canadian water policy and report our findings to date. In addition, we have compiled an inventory of 365 freshwater-related indicators in Canada, the first of its kind.

Christina Cook (doctoral student): Integrating Land Use and Water Management in Canadian Provinces

My doctoral work examines the challenges of integrating land use and water management in Canada where a fragmented governance approach has long persisted. We know that land use has a direct impact on water management and yet rarely do planning laws and policies require consideration of water constraints. In addition, jurisdictional fragmentation is rampant – both across scales of government and within governments across agencies and departments. My contribution to the CWN project is to prepare a legislative protocol – a means for provinces to better understand how they can assist local levels of government to transgress jurisdictional fragmentation and work toward implementing water security in their communities.

image courtesy of Rebecca Martone

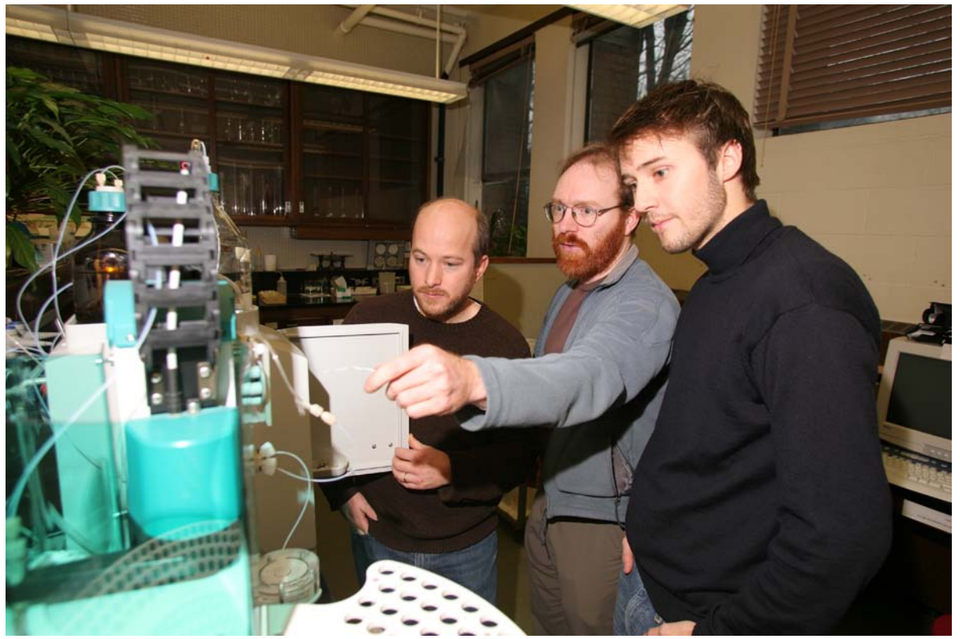
The Soil, Water and Air Laboratory (SWAL)

The Soil, Water and Air Laboratory (SWAL) has recently been established as focal node for interdisciplinary research in environmental sciences, with substantial participation from IRES faculty members, postdoctoral fellows, and graduate students. SWAL is hosted at UBC by the Faculty of Land and Food Systems (LFS). On the one hand, it is a true bricks-and-mortar style laboratory, with a core analytical facility located in the MacMillan Building and equipped with state-of-the-art instrumentation for analyses of soil, water and air. On the other hand, SWAL provides a focal point for collaborative research among scientists and students from a diverse array of academic units at UBC. Faculties with direct participation in SWAL include the College for Interdisciplinary Studies and the Faculties of LFS, Forestry, Arts, Science, and Applied Science.

Research projects conducted under the SWAL umbrella address a wide array of topics, and provide training opportunities for students and scholars in a diversity of methodologies. By integrating research from traditionally segregated disciplines into one large research cluster has allowed for numerous synergies to develop. These conversations have already resulted in several significant research proposals that encompass the breadth of expertise and techniques needed to address complex environmental issues today.

SWAL counts among its growing number of members IRES' professors Gunilla Öberg and Mark Johnson as well as emeriti Hans Schreier and Les Lavkulich.

More information about the centre can be found on the Soil, Water and Air Laboratory website at http://www.landfood.ubc.ca/swal/



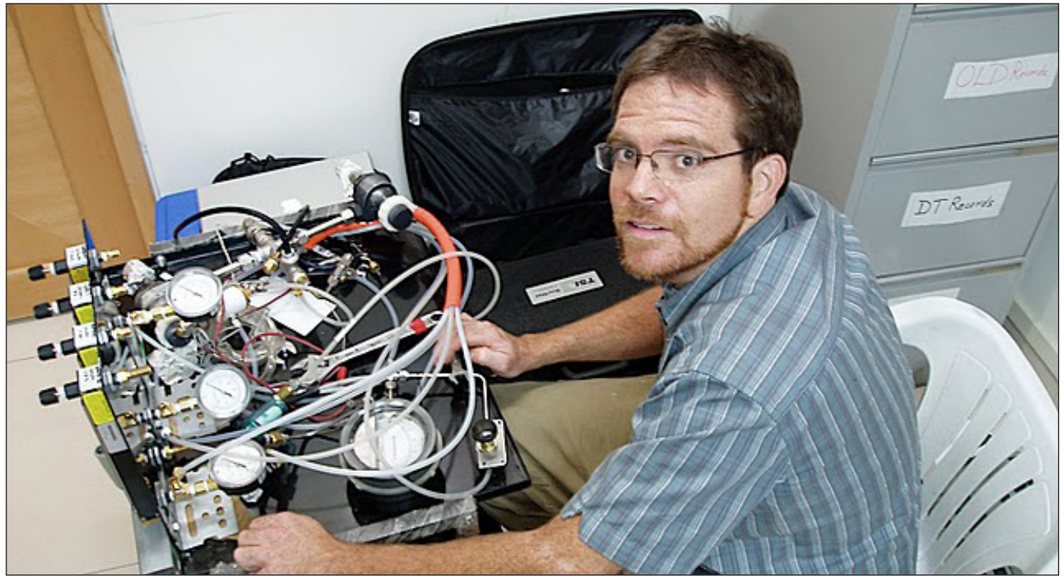
Mark Johnson Assistant Professor, Anton Pitts Lab Technician and PhD Student and Aio Haberli Internship student from the Swiss Federal Institute of Technology Zurich in the Lab

Dominic Lessard, Field Technician and Gunilla Oberg, Professor in the field

IRES faculty associates

Karen Bakker	Assistant Professor	Geography Department
Richard Barichello	Associate Progessor	Land and Food Systems
Karen Bartlett	Associate Professor	School of Environmental Health
David Close	Assistant Professor	Fisheries Centre
Raymond Cole	Director, Professor	School of Architecture and Landscape Achitecture
Peter Dauvergne	Director, Professor	Liu Institute
Simon Donner	Assistant Professor	Geography Department
Lawrence Frank	Associate Professor	School of Environmental Health and School of Community and Regional Planning (SCARP)
Ian Townsend Gault	Associate Professor	Faculty of Law
Christopher Harley	Assistant Professor	Zoology Department
Kathryn Harrison	Professor	Political Science Department
George Hoberg	Professor	Forest Resources Management Department
Milind Kandlikar	Associate Professor	Institute of Asian Research and Liu Institute
Brian Klinkenberg	Associate Professor	Geography Department
Colin Levings	Research Scientist	Fisheries and Oceans Canada, West Vancouver Laboratory
Ralph Matthews	Professor	Sociology Department
Charles Menzies	Associate Professor	Anthropolgy Department
Daniel Moore	Professor	Geography Department
Peter Nemetz	Professor	Sauder School of Buisiness
Daniel Pauly	Professor	Fisheries Centre
Tony Pitcher	Professor	Fisheries Centre
Bill Rees	Professor	SCARP

Tsering Shakya	Assistant Professor	Institute of Asian Research
Stephen Sheppard	Professor	Forest Resource Management Department
Douw Steyn	Professor	Earth and Ocean Sciences and Liu Institute
Rashid Sumalia	Director, Professor	Fisheries Centre
Juanita Sundberg	Assistant Professor	Geography Department
James Tansey	Associate Professor	Centre for Applied Ethics
Frank Tester	Associate Professor	School of Social Work
Amanda Vincent	Associate Professor	Fisheries Centre
Paul Wood	Associate Professor	Forest Resource Management Department
Hisham Zerriffi	Assistant Professor	Liu Institute for Global Issues



Post-doctoral fellow Andy Grieshop, preparing equipment to get samples of particulate matter for later analysis

...research and learning in support of decision making...

IRES mission is to foster sustainable futures through integrated research and learning about the linkages among human and natural systems, to support decision making for local to global scales. We engage actively in various ways with society and many of our students come to us because they want to achieve change. Keeping with our academic mission, we strive to foster an awareness of the necessity to balance between the wish to achieve change and the need to critically analyze alternative solutions. Among other things, this entails identifying academically acceptable strategies when navigating the reefs of engagement, advocacy, and activism.

All high-lights in this report are examples of the various ways our students and faculty members engage with issues of contemporary concern. Below follows three high-lights that specifically speak to these issues. Kai Chan (Assistant Professor) outlines the ideas behind his course 500Z Advanced Topics in Ecosystem Services, which is conducted in close collaboration with UBC operations to help drive the sustainable development at UBC; Tom Berkhout, (doctoral student), shares his thoughts on methodological challenges when conducting participatory research and Robin Naidoo (visiting scholar), shares lessons learned vis-à-vis the uptake of science by decision-makers drawing on his experience of community-based conservation projects in Namibia.

Images courtesy of Susanna Haas-Lyons. All taken at CATIE in Costa Rica during May 2010 whilst completing PLAN 545 field course

Course 500Z: Advanced Topics in Ecosystem Services

In fall 2009, Kai Chan taught a graduate project course entitled "Ecosystem Services from a City and University Perspective: An Approach to Ecological Sustainability". This course involved working with both the University's Sustainability Office and Vancouver's Greenest City Action Team in order to help UBC and Vancouver think more broadly and comprehensively about ecological sustainability. A group of us [myself, ten students (RMES students Emily Anderson, Sarah Klain, Jordan Levine, Megan Mach, Julia Reckermann, Gerald Singh, Jordan Tam; EOS students Cathryn Clarke Murray and Natasha Sihota; Forestry student Brent Chamberlain; Journalism student Erin Empey) plus Rebecca Martone (a postdoctoral associate), Carys Evans (IRES staff) and IRES director Gunilla Öberg] sought to further their own learning and the academic literature, and to contribute to real-world decision-making with these two partners—a tall order indeed. The course began with a series of excellent guest lectures including UBC Professors Bill Rees (School for Community and Regional Planning), Peter Dauvergne (Liu Centre for Global Studies), James Tansey (Sauder School for Business); Scott Harrison of BC Hydro and the World Business Council for Sustainable Development; and David Boyd of RMES and the Greenest City Action Team. Armed with a greatly enhanced understanding and sense of purpose regarding the niche to be filled, the group proceeded to produce a series of three reports for UBC's Sustainability Office demonstrating how the concept of ecosystem services can provide a framework for understanding and weighing various sustainability efforts in terms of their implications for human benefits as well as biodiversity. The group also received great praise for their presentation at the Campus Operational Sustainability Plan workshop, and they are currently tailoring their work for a series of academic publications and follow-up reports for Vancouver and UBC.

RMES Students completing fieldwork: Jana Kotaska, Stephanie Grand, Kirsten Harma, Jack Teng and Sara Elder

Tom Berkhout, PhD Student

For my Ph.D., I am looking at ongoing efforts in British Columbia to pursue aggressive (and arguably transformative) energy efficiency and conservation targets over the next 20 to 30 years. A driving motivation for this research is to recommend to policy makers and planners practical and effective governance processes for steering complex, uncertain, and politically contentious efforts to foster societal-level sustainability. Throughout the research project I have worked closely with both BC Hydro and the B.C. Ministry of Energy, Mines and Petroleum Resources. Both organizations have granted me access to closed door stakeholder and internal planning meetings. At these meetings I sit in as an "observer-as-participant" (a middle-of-the road observation approach that recognizes the influence of informal exchanges between an otherwise non-participating observer and those being observed). Working so closely with the individuals and organizations that I am ultimately trying to understand and evaluate has allowed me to gain a much fuller understanding of what takes place behind the scenes of energy use planning. In addition, it has also helped to legitimize my research among the stakeholders and practitioners that I observe. Of course, taking a more engagement oriented approach also comes with its share of challenges. First among these is the time it takes to build relationships and hopefully trust between myself and the key gatekeepers of the processes that I observe. Another challenge is linking the work that I am interested in – the governance of long-term and large-scale transitions toward sustainability – with the more immediate and incremental day-to-day work of energy use planners (e.g., developing short-term operational plans, designing and implementing programs, and developing and/or refining regulations and policies). Finally, as an observer, it is difficult to know when and how I might influence a process that I am observing. On more than one occasion thoughts similar to ones that I have just shared with a participant during a casual coffee break chat are repeated by the same participant in the meeting that I am observing. Would the same opinion have been expressed by that participant had I not chatted with him or her prior to the meeting? How much weight, then, should I give to this opinion (which I obviously agree with) compared to one that is less in line with my perspective on the situation? Despite these challenges, working closely with the people that I am studying has been extremely rewarding. In the end, I only hope that I can give back to them in the way of my research findings and recommendations, as much as they have given me.

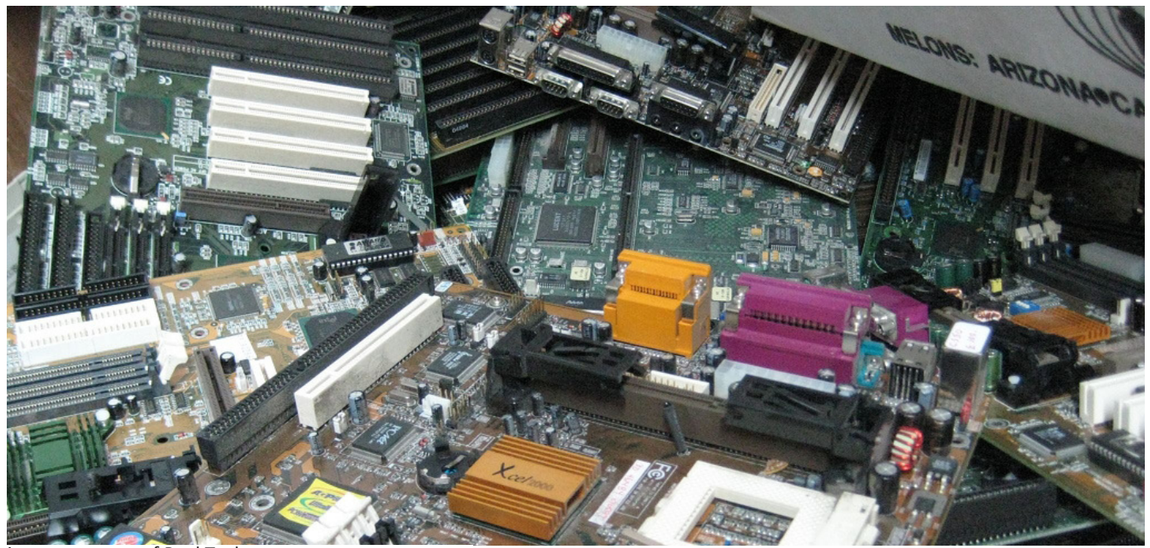


image courtesy of Paul Teehan

Robin Naidoo Conservation Science Program, WWF-US

A big part of my job as a Conservation Scientist with World Wildlife Fund is to provide research outputs and technical support for our field programs, which are located throughout the world, often in tropical, developing countries. For the past 4 years I have worked with WWF's program in Namibia, an arid country in southern Africa, which is based primarily around supporting a successful community-based conservation initiative that has positioned Namibia as a global leader in locally-led conservation efforts.

WWF is the only international non-governmental organization (NGO) with substantial operations in Namibia, and works there at the invitation of the government. As such, WWF's role is to support the efforts of national NGO's, who in turn provide support services to local communities engaged in the sustainable management of their natural resources.

Wildlife is an important natural resource on communal lands and is used in a variety of ways, including for meat, trophies, and as an input into ecotourism. As such, the management of wildlife is an issue of critical importance in ensuring a sustainable flow of benefits to local communities. However, local people often have relatively low levels of skill and education as related to wildlife management, and consequently a great deal of effort in supporting such management is expended by NGO's, who are themselves often stretched to capacity by demands on their time and resources.

I have been involved in a project that is tracking the movements of African buffalo in and around communal lands; this has been my primary point of engagement with WWF in Namibia, the Namibian government, and local communities. From this, I have learned several important lessons vis-à-vis the uptake of science by decision-makers. The first of these has involved the importance of establishing relationships with key people at the various levels of decision-making noted above. Without taking the time to do this and establish personal credibility and relationships with the appropriate stakeholders, no amount of cutting-edge science will be able to influence decision-making. Secondly, the most valuable research from an applied conservation context is not necessarily (or perhaps, not even very often) the type that gets published in top-notch international science journals. Basic maps of the locations of individual buffalos over the last few years has proved invaluable in convincing local communities of the value of zoning parts of their lands as wildlife movement corridors. Finally, it is important to be sensitive to the needs and aspirations of Namibians themselves and to act to support, rather than lead, an agenda developed by the people who are directly involved in the governance of their own natural resources. In the Namibian context this means stakeholder engagement at the earliest possible stages of the research process, and a constant need to liaise with locals and to adapt ongoing scientific research to emerging priorities as defined by communities themselves.

Research Grants

Project: Cross-system linkages and ecosystem services on the British Columbia coast
Principle Investigator: Kai Chan
Granting Agency: David and Lucile Packard Foundation
Period: October 2008 - August 2010
Total Amount:: $121,652.00

Project: Quantifying nature's bounty: the contribution of marine ecosystems to local communitites
Principle Investigator: Kai Chan
Granting Agency: SSHRC
Period: March 2009 - February 2011
Total Amount: 39,540.00

Project: BC Coastal Ecosystem Services Pilot Project
Principle Investigator: Kai Chan
Granting Agency: The Nature Conservancy
Period: May 2008 - April 2011
Total Amount: $73,709.00

Project: Coastal ecosystems services amongst tropic cascades
Principle Investigator: Kai Chan
Granting Agency: NSERC
Period: September 2008 - September 2012
Total Amount: $476,775.00

Project: Ecosystem services in the Central Interior of BC: A GIS-based assessment of their value and sensitivity to change
Principle Investigator: Kai Chan
Granting Agency: The Nature Conservancy
Period: April 2007 - December 2008
Total Amount: 21,000

Project: SuperAbundanceBase.org: serving and interpreting biooiogical abundance information
Principle Investigator: Kai Chan
Granting Agency: Canada Foundation for Innovation
Period: April 2006 - December 2010
Total Amount: $154,098.00

Project: What makes outbreaks break out? The ecology and evolution of native and non-native superabundance
Principle Investigator: Kai Chan
Granting Agency: NSERC
Period: April 2007 - March 2012
Total Amount: $96,250.00

Project: Lifecycle environmental assesssment and policy
Principle Investigator: Hadi Dowltabadi
Granting Agency: Auto 21
Period: April 2008 - March 2012
Total Amount: $137,000.00

Project: Track and manage environmental emissions and impacts
Principle Investigator: Hadi Dowlatabadi
Granting Agency: Translink
Period: January 2007 - December 2008
Total Amount: $50,000.00

Project: Implications of irreducible uncertainties in climate change on decision-making: Regional resource management and Arctic cumulative impact assessment
Principle Investigator: Hadi Dowltabadi
Granting Agency: National Science Foundation
Period: September 2004 - August 2010
Total Amount: $638,859.89

Project: Fuel choices and human welfare: an integrated assessment of the impacts of climate policy
Principle Investigator: Hadi Dowlatabadi
Granting Agency: ExxonMobil
Period: September 2005 - December 2009
Total Amount: $271,885.00

Project: Fluvial fluxes and greenhouse gases: ecohydrological perspectives on water and sustainability
Principle Investigator: Mark Johnson
Granting Agency: NSERC
Period: April 2009 - March 2015
Total Amount: $75,000

Project: The Integrated Watershed Analysis Laboratory: a facility for the synchronous, coupled study of complex phenomena in terrestrial and aquatic environments
Principle Investigator: Mark Johnson
Granting Agency: Canada Foundation for Innovation
Period: April 2009 - June 2011
Total Amount: $557,142.00

Project: Lifecycle environmental assessment and policy
Principle Investigator: Milind Kandlikar
Granting Agency: Auto 21
Period: April 2008 - March 2012
Total Amount: $137,000

Project: Canadian Aquatic Invasive Species Research Network: Theme 1: Vectors and pathways, 1.4. Baseline coastal port surveys
Principle Investigator: Colin D. Levings
Granting Agency: NSERC
Period: April 2006 - March 2011
Total Amount: $72,000

Project: Canadian Aquatic Invasive Species Network: West Coast sampling team
Principle Investigator: Colin D. Levings
Granting Agency: NSERC
Period: April 2006 - March 2012
Total Amount: $279,000.00

Project: Research Support for establishing a research office at CATIE
Principle Investigator: Tim McDaniels
Granting Agency: UBC VP Research Dev't Fund
Period: April 2009 - March 2011
Total Amount: $3,000

Project: IWEP Living Laboratory Project
Principle Investigator: Gunilla Öberg
Granting Agency: UBC Sustainability and UBC Land and Building Services
Period: September 2009 - December 2010
Total Amount: $40,000

Project: Environmental dynamics of chlorine in water and soil - transport patterns and transformation rates
Principle Investigator: Gunilla Öberg
Granting Agency: NSERC
Period: April 2007 - March 2013
Total Amount: $125,000.00

Project: CFI Infrastructure Opperating Funds
Principle Investigator: Gunilla Öberg
Granting Agency: Canada Foundation for Innovation
Period: April 2007 - March 2010
Total Amount: $15,076.00

Project: The ECALab - Environmental Chlorine Assessment Laboratory: studying the natural chlorine cycle, relation to other biogeochemical cycles, ecological role, environmental and eco-toxicological impact
Principle Investigator: Gunilla Öberg
Granting Agency: Canada Foundation for Innovation
Period: April 2008 - September 2010

Project: Development of linkages between mitigation & adaption in the intergovernmental panel on Climate Change's Fouth Assessment Report
Principle Investigator: John Robinson
Granting Agency: Environment Canada
Period: September 2004 - March 2009
Total Amount: $56,000

Project: Centre for Interactive Research on Sustainability (CIRS) Planning and Analysis
Principle Investigator: John Robinson
Period: June 2007 - March 2008
Total Amount: $10,000

Project: CIRS: Advanced High-Performance Building Envelope System with Adaptive Monitoring & Controls System
Principle Investigator: John Robinson
Period: December 2007 - November 2012
Total Amount: $864,077.97

Project: Centre for Interactive Research on Sustainability (CIRS)
Principle Investigator: John Robinson
Period: June 2007 - March 2010
Total Amount: $391,875.00

Project: Effect evaluation methodology for participatory research
Principle Investigator: John Robinson
Granting Agency: SSHRC
Period: March 2008 - June 2011
Total Amount: $25,000

Project: Centre for Interactive Research on Sustainability
Principle Investigator: John Robinson
Period: June 2007 - March 2010
Total Amount: $220,578.00

Project: Dynamic Lifecycle Energy Analysis
Principle Investigator: John Robinson with Stefan Storey
Granting Agency: BC Hydro and Power
Period: December 2007 - August 2011
Total Amount: $100,000

Project: Evaluation of the coordination of transformative energy efficiency and conservation by BC Hydro and MEMPR
Principle Investigator: John Robinson with Tom Berkout
Granting Agency: Mathematics of Information and Complex Systems (MITACS) - Networks of Centres of Excellence (NCE)/Internship funds
Period: December 2009 - February 2011
Total Amount: $45,000

Project: Centre for Interactive Research on Sustainability
Principle Investigator: John Robinson
Period: April 2009 - March 2012
Total Amount: $10,364,754.00

Project: Community Energy Planning
Principle Investigator: John Robinson with Nichole Dusyk
Granting Agency: BC Hydro and Power
Period: October 2007 - August 2010
Total Amount: $100,000

Project: Operations support for Centre for Interactive Research Sustainability
Principle Investigator: John Robinson
Period: May 2006 - March 2011
Total Amount: $178,660

Project: Representing the cultural concerns of three Aboriginal communities in risk-based policy contexts
Principle Investigator: Theresa Satterfield
Granting Agency: SSHRC
Period: April 2006 - March 2011
Total Amount: $120,632

Project: Research Pertaining to the Social lStudy of Environmental Conflicts
Principle Investigator: Theresa Satterfield
Granting Agency: Placer Dome
Period: January 2005 - December 2009
Total Amount: $26,600

Project: Event ethnography: exploring a new method for understanding the social process of adapting conservation policy to climate change
Principle Investigator: Theresa Satterfield
Granting Agency: SSHRC
Period: March 2009 - February 2011
Total Amount: $73,500

Project: CEIN - predictice toxocology assessment and safe implementation of nanotechnology in the environment
Principle Investigator: Theresa Satterfield
Granting Agency: National Science Foundation
Period: October 2008 - August 2010
Total Amount: $40,267.81

Project: Collaborative research and capacity building in new approaches to resource development on indigenous land (Lessons from Canada, New Zealand, Australia and Chile)
Principle Investigator: Theresa Satterfield
Granting Agency: UBC Martha Piper Research Fund
Period: April 2009 - September 2010
Total Amount: $24,650

Project: Centre for the Study of Nanotechnology in Society
Principle Investigator: Theresa Satterfield
Granting Agency: National Science Foundation
Period: January 2006 - December 2010
Total Amount: $103,178.33

Cotton pickers in India.
Picture courtesy of PhD student Julia Freeman

Publications

Refereed Journals

Asfaw, T; Satterfield T; (in press) Beyond Local Justice: Gender Relations in Local-Level Dispute Settlement in Ethiopia's Zeghie Penninsula. Human Ecology Review

Bastviken, D., Svensson, T., Karlsson, S., Sandén, P., and **Öberg, G.** 2009 Temperature sensitivity indicates that chlorination of organic matter in forest soil is primarily biotic. Enviromental Science and Technology 43: 3569–3573.

Belzile J. and **Öberg, G**. (submitted) Where to begin? Grappling with how to use participant interaction in focus groups.

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Clark, T.D., E. Sandblom, **S.G. Hinch**, D.A. Patterson, P.B. Frappell, A.P. Farrell. 2010. Simultaneous biologging of heart rate and acceleration, and their relationships with energy expenditure in free-swimming sockeye salmon (Oncorhynchus nerka). Journal of Comparative Physiology B - Biochemical, Systemic, and Environmental Physiology. In press.

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Conti, J., Satterfield, T., Harthorn, B (in press) Vulnerability and Social Justice as Factors in Emergent US Nanotechnology Risk Perceptions Risk Analysis

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Crossin, G.T., **Hinch, S.G.**, Cooke, S.J., Patterson, D.A., Lotto, A.G., Van Der Kraak, G., Zohar, Y., Klenke, U., and Farrell, A.P.

2010. Testing the synergistic effect of GnRHa and testosterone on the reproductive physiology of pre-adult pink salmon. Journal of Fish Biology 76:112–128.

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de Boer, W., Folman, L., Bastviken, D., Svensson, T., **Öberg, G**., del Rio, J. and Boddy, L. 2010. Mechanism of antibacterial activity of the white-rot fungus Hypholoma fasciculare colonizing wood. Canadian Journal of Microbiology (in press).

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Hagerman, S., H. Dowlatabadi, K. M. A. Chan, and **T. Satterfield**, "Propositions for adapting conservation policy to an era of change: an integrative synthesis of ecological and social insights". Global Environmental Change (in press 2010)

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Luck, Gary W., **K. M. A. Chan**, John P. Fay. "Protecting ecosystem services and biodiversity in the world's watersheds". Conservation Letters 2: 179-188 (2009) doi: 10.1111/j.1755-263X.2009.00064.x. [Recommended on Faculty 1000 Biology: http://www.f1000biology.com/article/id/1163640/evaluation]

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ARTICLES
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nature nanotechnology

Anticipating the perceived risk of nanotechnologies

Terre Satterfield[1]*, Milind Kandlikar[2], Christian E. H. Beaudrie[1], Joseph Conti[3] and Barbara Herr Harthorn[3]

Understanding emerging trends in public perceptions of nanomaterials is critically important for those who regulate risks. A number of surveys have explored public perceptions of their risks and benefits. In this paper we meta-analyse these surveys to assess the extent to which the following four hypotheses derived from previous studies of new technologies might be said to be valid for nanotechnologies: risk aversion will prevail over benefit appreciation; an increase in knowledge will not result in reduced aversion to risks; judgements will be malleable and subject to persuasion given risk-centric information; and contextual, psychometric and attitudinal predictors of perceived risk from prior studies can help anticipate future perceptions of nanotechnologies. We find that half the public has at least some familiarity with nanotechnology, and those who perceive greater benefits outnumber those who perceive greater risks by 3 to 1. However, a large minority of those surveyed (44%) is unsure, suggesting that risk judgements are highly malleable. Nanotechnology risk perceptions also appear to contradict some long-standing findings. In particular, unfamiliarity with nanotechnology is, contrary to expectations, not strongly associated with risk aversion and reduced 'knowledge deficits' are correlated with positive perceptions in this early and controversy-free period. Psychometric variables, trust and affect continue to drive risk perceptions in this new context, although the influence of both trust and affect is mediated, even reversed, by demographic and cultural variables. Given the potential malleability of perceptions, novel methods for understanding future public responses to nanotechnologies will need to be developed.

There has been unprecedented interest in anticipating how the public will respond to nanotechnology, including expectations of widespread risk aversion[1], given the possible health risks associated with nanomaterials[2]. Many in the nanotechnology community worry that public protest could follow in a manner akin to that which has shadowed biotechnology in the UK and Europe or chemical and nuclear technologies in the United States[3,4]. Those who explore public perceptions of risk[5] have traditionally studied social and psychological responses to risks, contamination events[6] and technological disasters[7] once they have occurred in order to forensically unearth the drivers of controversy including its correlates and amplifying agents[8,9]. The objective of such work has been to understand a number of phenomena: the logic of risk perceptions including their social and management contexts (for example, processes of risk regulation and risk communication); mental models or 'lay judgements' of the perceived causes and consequences of risk exposure; and attitudinal or affective variables that predict patterns of aversion to or tolerance of technological risks[10]. The correction of factually incorrect risk perceptions per se has not been the primary concern (although some of this has occurred[11]). Conversely, what is now termed 'upstream research'[12] with emerging nanotechnologies involves monitoring perceptions before any widely accepted empirical evidence of potential heath risks can be inferred, or any hint of controversy can be detected. It also means measuring perceptions of nanotechnologies well before they exist as a definable entity or class of objects in the publics' imaginations or before new regulatory contexts are in place[13]. Perception is critical[14] for a number of reasons: because human behaviour is derivative of what we believe or perceive to be true; because perceptions and biases are not easily amenable to change with new knowledge[15,16]; and because risk perceptions are said to be, at least in part, the result of social and psychological factors and not a 'knowledge deficit' about risks per se[17].

In previous social studies of risk, a cluster of factors was found to drive perceptions. These include specific qualities or 'psychometric ratings' attributed by the perceiver to the risk object, the demographic attributes and attitudinal dispositions of the perceiver, and the perceived quality of the risk communication, management and remediation contexts associated with risk events. Specifically, perceived risk is high when the new technology is rated by different publics as dreaded, involuntarily imposed, unfamiliar or unknown, invisible[18], or carrying a negative affective valence[19,20]. Perceived risk is also high if the technology (for example, nuclear power or genetically modified organisms) is seen as beyond one's personal control, involuntarily imposed and/or inequitably distributed[18]. In their aggregate, these ratings having produced characterizations or 'mental or cognitive models' of perceived risk that are basic to the processing, uptake or rejection of new [risk] information[21]. More recent work has focused on the power of 'affect' in perceived risk; specifically, the negative or positive valences rapidly and preconsciously associated with a risk object are highly and efficiently predictive of perceived risk, perhaps as much or more so than all other variables[22,23].

Second, in the US context, when the perceiver is male, white, high-income earning, and well educated, he will perceive the risks of most hazardous technologies as much lower than will those in all other demographic groups including white women, and all nonwhite men and women[24,25]. Third, high perceived risk is also attributed to attitudinal variables including those who regard themselves as vulnerable and subject to injustice[26,27], as wary of science and technology[28,29], skeptical of political authority or expertise[30,31] and as dose insensitive (that is, they see risk as a function of 'any exposure', however small)[32]. Fourth, risk

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Pidgeon, N., Harthorn, B., Satterfield, T. (2009) “Nanotech: good or bad?” The Chemical Engineer. October 2009: 48-50

Pon, L.B., **S.G. Hinch**, S.J. Cooke, D.A. Patterson, and A. Farrell. 2009. A comparison of the physiological condition of migrant adult sockeye salmon and their attraction into the fishway at Seton River Dam British Columbia under three operational water discharge rates. North Amer. J. Fish. Manag. 29:1195-1205.

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Wibeck, V., Abrandt Dahlgren, M. and **Öberg, G**. 2010 Learning in focus groups: an analytical dimension for enhancing focus group research. In “Data Collection” W. Paul Vogt (Ed) SAGE Benchmarks in Social Research Methods. SAGE Publications. (in press)

S. Yavari, **S.E. Chang**, and K.J. Elwood. “Modeling Post-Earthquake Functionality of Health Care Facilities.” Earthquake Spectra. (Accepted).

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Chan, K. M. A., E. Gregr, and S. Klain. “A critical course change”. Review of: Ecosystem-Based Management for the Oceans, by K. McLeod and H. Leslie. Science 325: 1342 – 1343.

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Chan, K. M. A., J. Goldstein, **T. Satterfield**, N. Hannahs, K. Kikiloi, **R. Naidoo, N. Vadeboncoeur**, and U. Woodside. Cultural services and non-use values. In P. Kareiva, G. Daily, T. Ricketts, H. Tallis and S. Polasky, eds., The Theory & Practice of Ecosystem Service Valuation in Conservation, Oxford University Press, 2009. In press.

Claus, A., **K. M. A. Chan,** and **T. Satterfield**. “The roles of human beings in conservation”. In N. Sodhi & P. R. Ehrlich, eds. Conservation Biology for all (textbook; chapter reviews by editors), Oxford University Press, 2009. In press.

Dorcey, A. H. J. “Sustainability Governance: Surfing the Waves of Transformation.” in Mitchell, B. (Ed.) Resource and Environmental Management in Canada: Addressing Conflict and Uncertainty. Oxford: Oxford University Press (Fourth Edition, 2010.)
Joyce, A. **Satterfield, T** (2010) Shellfish aquaculture and First Nations’ sovereignty: The quest for sustainable development in contested sea space. Natural Resources Forum 34(2): 106-123

Levine, Jordan and **K. M. A. Chan**, “Global Human Dependence on Ecosystem Services” in “Ecosystem Services and Global Trade of Natural Resources: Ecology, Economics and Policies”, Thomas Koellner ed. Routledge. In press.

McDaniels, T. 2010, “Learning from, within and for Structured decision-making processes” Chapter 10 of Gregory, R., Failing, L. , Long, G., Harstone, M. Ohlson, D. and McDaniels, T. 2010, Structured decision making for environmental policy choices” Routledge. First version submitted October , 2009

J.E. Richey, A.V. Krusche, **M.S. Johnson**, H.B. da Cunha, M.V. Ballester (2009). The role of rivers in the regional carbon balance. Invited book chapter in: Amazonia and Global Change (M. Keller, M. Bustamonte, J.H.C. Gash, and P. Silva Dias (eds.)) AGU Geophysical Monograph Series, Volume 186, American
Geophysical Union, Washington, DC. [Dec 2009].

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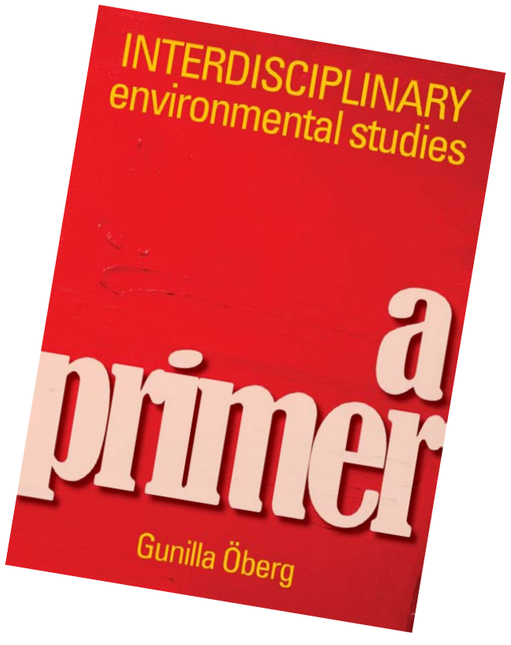

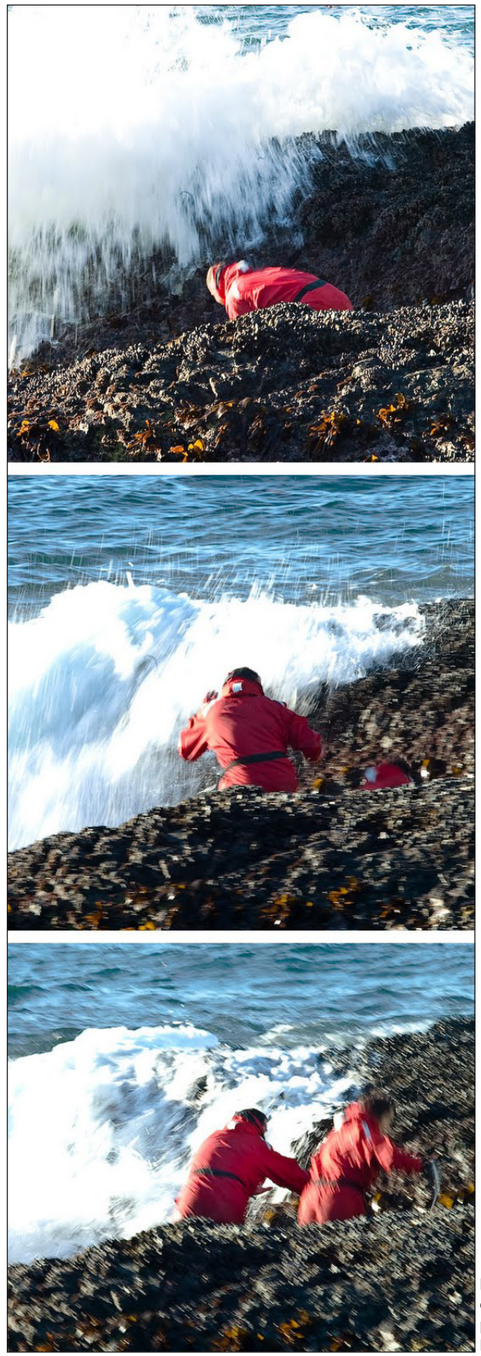

Fieldwork in the shallows comes with risks, photographs courtesy of Rebecca Martone

Refereed Books

Boyle, Michelle, & **Dowlatabadi, Hadi** (2010). Anticipatory adaptation in marginalised communities within developed countries. In James D. Ford & Lea Berrang Ford (Eds.), Climate Change Adaptation in Developed Nations. Montreal: McGill-Queens.

Cook, Christina, & **Dowlatabadi, Hadi** (2010). Learning Adaptation: Climate Risk Management in the Insurance Industry. In James D. Ford & Lea Berrang Ford (Eds.), Climate Change Adaptation in Developed Nations. Montreal: McGill-Queens.

McDaniels, T., Longstaff, H. and McDaniels, D. 2010 "A decision framework to help guide development and implementation of Carbon Capture and Storage in Alberta and Canada" Monograph (85 pages) for Institute for Sustainable Environment, Economy and Energy, University of Calgary. In press (electronic publication to be released in April 2010)

Öberg, G. 2010 Interdisciplinary environmental studies – a primer. Blackwell and Wiley. (in press)

Reports

Kai Chan, Gunilla Öberg, Emily Anderson, Brent Chamberlain, Erin Empey, Carys Evans, **Sarah Klain, Jordan Levine, Megan Mach, Rebecca Martone**, Cathryn Clarke Murray, **Julia Reckermann, Jordan Tam**, Natasha Sihota, **Gerald Singh**. 2009. An Ecosystem Services Approach to Sustainability at the University of British Columbia. For UBC Sustainability Office. 87 pp.

Chan, Kai M. A. "Making ecology relevant in a complex world". Bulletin of the British Ecological Society 41.1 (2010): 24 - 27.

Chan, Kai - 30 Environment Columns in the Vancouver Metro Apr 2008 – present, with various coauthors, often UBC students.

Klain, Sarah and **K. M. A. Chan**. 2009. Ecologically Sustainable Use, Marine Fisheries and Marine Protected Areas. For Parks Canada.

Richardson, J.S., M.C. Feller, P.M.Kiffney, R.D. Moore, S. Mitchell, and **S.G. Hinch**. 2010. Riparian Management of small streams: an experimental trial at the Malcolm Knapp Research Forest. Streamline Watershed Management Bulletin 13(2):1-3. Publisher – Forum for Research and Extension in Natural Resources, Kamloops, BC.

Satterfield, T., Roberts, M, Gregory, R, Long, g. (2009) A Decision Making Framework for Genetically Modified Organisms and their Cultural Implications. The New Zealand Environmental Risk Management Authority. 65pp.
Grist Magazine. Feb 2. http://www.grist.org/article/2010-02-01-how-personal-actions-can-kick-start-a-sustainability-revolution.

Sheldon, K., J.S. Richardson, J.DeGroot, and **S.G. Hinch**. 2010. The effects of logging second-growth forests on headwater populations of coastal cutthroat trout: a 12 year multi-stream, before-and-after experiment. Streamline Watershed Management Bulletin 13(2):11-12. Publisher – Forum for Research and Extension in Natural Resources, Kamloops, BC.

Megan Mach sampling invertibrates in Nova Scotia

Conferences and Presentations

Chan, Kai

Chan, K. M. A. The Values of Salmon & Ideas for Enhanced Reflection in Policy at Speaking for the Salmon: Summit on Fraser River Sockeye Salmon, Understanding Stock Declines and Prospects for the Future. March 2010

Can environmental science save the world? at Killam Conversation. March 2010

Interdisciplinary Transacademic Education for Sustainability: Ecosystem Services as a Case Study at NOW! Climate Action Conference, March 2010

Ecosystem services & impacts: local, remote, and global at Planning for Resilience Symposium. March 2010

Cultural Values & Ecosystem Services: Navigating Intangibility and Incommensurability Environmental Norms, Institutions and Policies workshop series Stanford University. February 2010

Sea Otters, Kelp Forests, and Coastal Communities: Disentangling Values and Ecosystem Interactions. UBC Fisheries Seminar. January 2010

What is Resilience? at Resilient Ecosystems Workshop. Pacific Institute for Climate Solutions, Victoria BC. December 2009.

Ecosystem Services: An Approach to Sustainability. At Campus Operational Sustainability Plan Workshop. December 2010.

What are cultural ecosystem services and how can they better be integrated into the concept of ecosystem services? Kerner von Marilaun Workshop: Landscape-based Cultural Ecosystem Services. At US National Science Foundation and Austrian Academy of Sciences, Lunz, Austria. November 2009.

Sea Otters, Kelp Forests, and Coastal Communities: Disentangling Values and Ecosystem Interactions. Green College, Principal's Series. October 2009.

Protecting ecosystem services and biodiversity in the world's watersheds. At National Center for Ecological Analysis and Synthesis NCEAS Eco-lunch Seminar Series Santa Barbara, CA, USA. August 2009

Ecosystem Services: A Concept for Advancing Ecological Restoration Restoration Institute, Forum. University of Victoria June 2009

Coastal Ecosystem Services amongst Trophic Cascades International Marine Conservation Congress, symposium Washington, D.C., USA. May 2009. Presented by Sarah Klain in Kai's absence.

How to Get past Doom & Gloom in the Environmental Movement: Advancing the Green Agenda. St. John's College Environmental Lecture. April 2009

Assessment of Practicality Part 2: Status of existing models and information on ecosystem services Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) Planning Meeting. Natural Capital Project, Marine Initiative. March 2009 Presented by Ed Gregr

Chan, K. M. A. (Symposium paper) "Eco-Harmony: A vision for a sustainable, achievable world: response to Nash's "Island Civilization"". Western Humanities Review 63 (2009): 56 - 66.

Chang, Stephanie

Chang, S.E. 2010. "Infrastructure Resilience to Disasters," Frontiers of Engineering: Reports on Leading-Edge Engineering from the 2009 Symposium. Washington, DC: The National Academies Press, pp.125-134.

Chang, S.E., T. McDaniels, and C. Beaubien. 2009. "Societal Impacts of Infrastructure Failure Interdependencies: Building an Empirical Knowledge Base," Proc. of 2009 Technical Council on Lifeline Earthquake Engineering (TCLEE) Conference, pp. 693-702.

Chang, S.E., C. Pasion, S. Yavari, and K. Elwood. 2009. "Social Impacts of Lifeline Losses: Modeling Displaced Populations and Health Care Functionality," Proc. of 2009 Technical Council on Lifeline Earthquake Engineering (TCLEE) Conference, pp. 563-572.

"Infrastructure Resilience to Disasters," invited presentation, U.S. National Academy of Engineering, Frontiers of Engineering Symposium, Irvine, Calif., September 2009.

Dowlatabadi, Hadi

Pricing Carbon. Liu Institute at UBC. April 2009.

Climate Change and Vector Borne Diseases, Keynote for BC Centres for Disease Control, Vancouver. April 2009

Reducing Health Impacts of Public Transit, Carnegie Mellon, Pittsburgh PA. (co-authored by B Gouge, & F. Ries). May 2009

Better Public Transit: Invited Keynote for Auto21 Network of Centres of Excellence, Hamilton ON, (co-authored by B Gouge, F. Ries, & P. Trudeau). May 2009

Beyond Carbon Prices: Invited Presentation at PICS Annual conference, Vancouver. June 2009

Rethinking Public Transit in GVRD, Invited presentation to Translink Sustainability Steering Committee, Burnaby BC. (co-authored by B Gouge, & F. Ries). July 2009

Waste Reduction and Carbon Taxes, Invited presentation at the Annual Meeting of the Saskatchewan Solid Waste Management Association, North Battleford. September 2009

Beyond Carbon Taxes: Webinar for Centre For Climate Decision-making, Carnegie Mellon University, Pittsburgh PA. October 2009

No Action Please: we are Canadian, Invited Presentation at the Inaugural Canadian Science Policy Conference, Toronto. October 2009

Potential Uses for the Wood Supply at Williston Lake, Tsay Keh Dene community gathering, BC. October 2009

Beyond Copenhagen, IRES Seminar, UBC, Vancouver. November 2009

Understanding the Jevons Paradox, US National Science Foundation Review Panel, Pittsburgh, PA. November 2009

Integrating mitigation and adaptation, US National Science Foundation Review Panel, Pittsburgh, PA. November 2009

Integrated Assessment of Emerging Zoonotic Diseases, Invited plenary for CFIAPHAC Joint Workshop on Integrated Analysis of non-Foodborne Zoonotic Risk, Ottawa ON. January 2010

Estimating the exposure to particulate air pollution from an urban transit system – an intake fraction approach, Presented at the American Association for Aerosol Research, San Diego Ca, (co-authored by F. Ries & B Gouge). January 2010

Micro-scale Emissions Models in Exposure Assessment: a case study of diesel transit buse, Prsented at CRC 2010 Conference on on-road emissions, San Diego Ca, (co-aurthored by B Gouge, & F. Ries). January 2010

Public Transit: better outcomes at no extra cost, Steering Committee of Coast Mountain Bus Company, Surrey. (co-authored by B Gouge, & F. Ries). February 2010

Whose Sustainability. Invited presentation for some conference at Liu. UBC. March 2010.

Hinch, Scott

Hinch, S.G. and J. Gardner (Editors) 2009. Conference on Early Migration and Premature Mortality in Fraser River Late-Run Sockeye Salmon: Proceedings. Vancouver, BC. Published by Pacific Fisheries Resource Conservation Council, Vancouver, BC. 120 pp. Available through http://www.psc.org/info_later-unsockeye.htm

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Martins E.G., Hinch S.G., Patterson D.A., Hague M.J., Cooke S.J., Miller K.M., Lapointe M.F., English K.K. and Farrell, A.P. Effects of river temperature and climate warming on stock-specific survival of adult migrating Fraser River sockeye salmon (Oncorhynchus nerka). International Symposium on Climate Change Effects on Fish and Fisheries: Forecasting Impacts, Assessing Ecosystem Responses, and Evaluating Management Strategies. Sendai, Japan, April 26-29, 2010.

Donaldson, M.R., T.D. Clark, S.G. Hinch, S.J. Cooke, D.A. Patterson, M.K. Gale, P.B. Frappell, and A.P. Farrell. 2010. Physiological responses of free-swimming adult coho salmon to simulated predator and fisheries encounters. University of British Columbia Faculty of Forestry Research Evening. Poster presentation, Vancouver, British Columbia. March 2010.

Gale, M.K., S.G. Hinch, M.R. Donaldson, D.A. Patterson, and S.J. Cooke. The effects of thermal and capture stress on the physiology, behaviour, and survival of adult sockeye salmon (Oncorhynchus nerka). University of British Columbia Forest Sciences Departmental Seminar, Vancouver, British Columbia, March 17, 2010.

Burt, J., S.G. Hinch, and D.A. Patterson. Family Matters: parental and temperature influences on the early life survival, morphology and burst swim performance of sockeye salmon. Pacific Ecology and Evolution Conference. Bamfield, BC. March 6-7, 2010.

Gale, M.K., S.G. Hinch, M.R. Donaldson, D.A. Patterson, and S.J. Cooke. The effects of thermal and capture stress on the physiology, behaviour, and survival of adult sockeye salmon (Oncorhynchus nerka). Pacific Ecology and Evolution Conference, Bamfield, British Columbia, March 6-7, 2010.

Gale, M.K., S.G. Hinch, M.R. Donaldson, D.A. Patterson, and S.J. Cooke. The effects of thermal and capture stress on the physiology, behaviour, and survival of adult sockeye salmon (Oncorhynchus nerka). American Fisheries Society Washington-British Columbia Chapter Annual General Meeting, Nanaimo, British Columbia, March 2-4, 2010.

Jeffries, K.M., S.G. Hinch, E.G. Martins, S.M. Drenner, C.K. Whitney, K.M. Miller. 2010. The effects of elevated water temperature on adult pink salmon survival and blood physiology. 24th Northwest Pacific Pink & Chum Salmon Workshop, Nanaimo, British Columbia, March 2-4, 2010.

Donaldson, M.R. S.G. Hinch, D.A. Patterson, S.J. Cooke, G. Raby, J.O. Thomas, J. Hills, L.A. Thompson, K.M. Miller, A. Lotto, D. Robichaud, K. English, and A.P. Farrell. 2010. Fisheries and handling-related stressors on adult Pacific salmon physiology, behaviour and survival. American Fisheries Society Washington-British Columbia Chapter Annual General Meeting, Nanaimo, British Columbia, March 2-4, 2010.

Burt, J., S.G. Hinch, and D.A. Patterson. Family Matters: parental and temperature influences on the early life survival, morphology and burst swim performance of sockeye salmon. American Fisheries Society Washington-British Columbia Chapter Annual General Meeting, Nanaimo, British Columbia, March 2-4, 2010.

Donaldson, M.R. 2010. Increasing the sustainability of multi-sector Pacific salmon fisheries in coastal rivers of British Columbia by quantifying and reducing mortality of released fish. Invited Oral Presentation, Pacific Salmon Commission Panel Meetings, Portland, Oregon. January 21, 2010.

Martins E.G., Hinch S.G., Patterson D.A., Hague M.J., Cooke S.J., Miller K.M., Lapointe M.F., English K.K. and Farrell, A.P. Effects of river temperature and climate warming on stock-specific survival of adult migrating Fraser River sockeye salmon (Oncorhynchus nerka). Workshop on Salmon Migrations, Climate Change, and Capture/Release Fisheries, University of British Columbia, Vancouver, BC, Canada. Jan. 7, 2010.

Jeffries, K.M., S.G. Hinch, and K.M. Miller. 2010. The effects of water temperature on sockeye survival and blood physiology. Workshop on Salmon Migrations, Climate Change, and Capture/Release Fisheries, University of British Columbia, Vancouver, BC, Canada. Jan. 7, 2010.

Gale, M.K., S.G. Hinch, M.R. Donaldson, D.A. Patterson, and S.J. Cooke. The effects of thermal and capture stress on migrating adult sockeye salmon (Oncorhynchus nerka). Workshop on Salmon Migrations, Climate Change, and Capture/Release Fisheries, University of British Columbia, Vancouver, BC, Canada. Jan. 7, 2010

Burt, J., S.G. Hinch, and D.A. Patterson. Incubation Environment and Parental Influences on Pacific Salmon Offspring. Workshop on Salmon Migrations, Climate Change, and Capture/Release Fisheries, University of British Columbia, Vancouver, BC, Canada. Jan. 7, 2010.

Eliason, E.J., Clark, T.D., Hinch, S. and Farrell, A.P. Pacific salmon in hot water: Examining cardiorespiratory limitations in migrating adult sockeye salmon (O. nerka). Workshop on Salmon Migrations, Climate Change, and Capture/Release Fisheries, University of British Columbia, Vancouver, BC, Canada. Jan. 7, 2010.

Roscoe, D.W. and S.G. Hinch. Historic and geographic trends in fishway design and evaluation. Invited oral presentation at “Promoting innovations in fish passage and protection” symposium at the American Fisheries Society Annual Meeting, 1 September 2009, Nashville, Tennessee.

Eliason, E.J., Clark, T.D., Hinch, S. and Farrell, A.P. Pacific salmon in hot water: Examining cardiorespiratory limitations in migrating adult sockeye salmon (O. nerka). Canadian Society of Zoology Annual Meeting, Toronto, Ontario, May 12-16, 2009

Johnson, Mark

Johnson M.S. (2009). Life Cycle Assessment of Greenhouse Gas Emissions from Dairy Production in a Central New York State Watershed. Eos Trans. AGU 90(52):Fall Meet. Suppl., Abstract B13C-0543. AGU Fall Meeting, December 14–18, San Francisco.

J. Schwerdtfeger, M.S. Johnson, Markus Weiler, E.G. Couto (2009). Isotopic Estimation of Water Balance and Groundwater-Surface Water Interactions of Tropical Wetland Lakes in the Pantanal, Brazil. Eos Trans. AGU 90(52):Fall Meet. Suppl., Abstract H41E-0948. AGU Fall Meeting, December 14–18, San Francisco.

McDaniels, Tim

McDaniels, T. 2009, "Climate Adaptation in Large Scale Social/Environmental Systems: forestry, fisheries and biodiversity examples" Climate Decision-making Center Annual Meeting, Carnegie Mellon University, Pittsburgh, May, 2009

McDaniels, T. 2010, "Building regional resilience: an expert judgment approach for characterizing vulnerability and resilience" Community and Regional Resilience Institute, Oak Ridge National Laboratory, National Workshop, Boulder Colorado. July, 2010

McDaniels, T. 2010 "Decision aiding for Climate adaptation in large scale social/environmental systems: three cases from British Columbia" PCICS at University of Victoria (also sponsored by Ministry of Environment. October, 2010.

Co-Organizer of major workshop for regional infrastructure owners and operators regarding the effects of floods on resilience of infrastructure systems in the Lower Mainland. One-day workshop, co-facilitator and co-designer. November, 2010

T. McDaniels, January 2010, Decision support for climate change adaptation in British Columbia, GCOE first Annual conference, Kyoto University, Kyoto Japan

T. McDaniels, January 2010, "Understanding Resilience in regional infrastructure systems: characterizing resilience and setting priorities", Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan

T. McDaniels, March, 2010. "Decision aiding for climate adaptation" what do we need to know?" Doshisha University, Kyoto Japan

Öberg, Gunilla

March 30 2010, "The water-energy nexus". Invited speaker at Canada-Mexico Industry-Science Workshop for Innovation in Water Sustainability Technologies. Chihuahua, Mexico.

February 24 2010, "Interdisciplinary environmental studies" Invited lecture at the Research Institute Gino Germani (IIGG), University of Buenos Aires, Argentina.

22 September 2009 What is "UBC as a Living Lab" and is its Realistic? Joint lecture with Liz Ferris (RMES student), Andrew Collins (Associate Director, Project Services, UBC Infrastructure development) and Gunilla Oberg (IRES Professor)
September 16 2009, "On Water" presentation for Metro Vancouver and UBC's joint committee

May 25-27 2009. Key-note lecture "Organic Chlorine in Soil: An Overlooked Part of the Chlorine Cycle", 1st International Conference on Urban Drainage and Road Salt Management in Cold Climates: Advances in Best Practices, University of Waterloo, Waterloo, Ontario, Canada

Robinson, John

John Robinson, "Accelerating Sustainability at UBC" presentation to Chemical and Biological Engineering CHBE599Z at UBC, Vancouver, BC, March 30, 2010

John Robinson, "Eco Communities: Designing a Sustainable Future" panel presentation at Globe 2010 Conference, Vancouver, BC, March 24, 2010
John Robinson, "Accelerating Sustainability at UBC" University of Montreal Seminar Series presentation, Montreal, Quebec, March 18, 2010

John Robinson, "On Beyond Zebra: Being Undisciplined in Support of Sustainability", Pierre Elliott Trudeau Foundation Lecture Series at Ryerson University, Toronto, Ontario, March 2, 2010

John Robinson, "A Systems View of Sustainability Indicators in Educational Institutions" presentation at CSIN conference, Toronto, Ontario, March 2, 2010

John Robinson, "Accelerating Sustainability at UBC" presentation to Applied Science 242 at UBC, Vancouver, BC, February 9, 2010

John Robinson, "Accelerating Sustainability at UBC" presentation to Interdisciplinary Studies at UBC, Vancouver, BC January 20, 2010

John Robinson, "Accelerating Sustainability at UBC" presentation at BC Hydro Lead by Example Seminar Series, Burnaby, BC, January 19, 2010

John Robinson, "Exploring Desirable Urban Future: Fostering Emergent Understanding of Urban Sustainability" keynote presentation at Cities and Carbon Management: Towards Enhancing Science-Policy Linkages Symposium, Tokyo, Japan, November 16, 2009

John Robinson, "Chasing Sustainability" presentation to UBC's Commerce Undergraduate Society, Vancouver, BC, November 6, 2009

John Robinson, "Sustainability at UBC: Centre for Interactive Research on Sustainability" presentation to UBC's Science One Program, October 26, 2009

John Robinson, "Sustainability at UBC: Centre for Interactive Research on Sustainability" presentation to University of Toronto's Centre for Environment, Toronto, Ontario, October 21, 2009

John Robinson, "Sustainability at UBC: Centre for Interactive Research on Sustainability" presentation at University of Toronto's Sustainability Office Lunch 'n Learn Series, Toronto, Ontario, October 20, 2009

John Robinson, "Chasing Sustainability" presentation to Fraser Basin Council Board of Directors, Richmond, BC, October 8, 2009

John Robinson, "Accelerating Sustainability at UBC" presentation to UBC's Green College Principal's series, Vancouver, October 6, 2009
John Robinson, "Accelerating Sustainability at UBC" presentation to UBC Alma Mater Society, Vancouver, BC, July 29, 2009

John Robinson, "Sustainability, Careers and Changing the World" panel presentation at World Changing Careers Symposium, Vancouver, July 24, 2009

John Robinson, "PNS and PIA: Exploring Sustainable Futures," presentation at Post Normal Science - Perspectives and Prospects", St Anne's College, Oxford, UK, June 26, 2009

John Robinson, "Participatory Sustainability Backcasting" presentation at International Institute for Geo-Information Science and Earth Observation, Enschede, Netherlands, June 19, 2009

John Robinson, "Climate Change and Sustainability: Realizing the Opportunity" presentation at Agenda for a Sustainable America Conference, Seattle, June 11, 2009

John Robinson, "The Partial Wisdom of Smallish Crowds: Towards an Extended Concept of Rationality in Public Policy Decisions" presentation at Pierre Eliot Trudeau Foundation Summer Institute Conference, Gananoque, Ontario, May 20, 2009

John Robinson, "Institutional Entrenchment - Creative Responses to Overcoming Barriers to Sustainability in the Post-Secondary Environment" keynote presentation at Western Canadian Universities Physical Plant Administrators Conference, Vancouver, BC, May 15, 2009

John Robinson, "Envisioning Sustainable Pathways – Recent progress in the use of Participatory Integrated Assessment for Sustainable Research," presentation at KTH Royal Institute of Technology, Stockholm, Sweden, May 4, 2009

John Robinson, "Backcasting Research at UBC" presentation at The Natural Step, Stockholm, Sweden, May 4, 2009
John Robinson, "MPSR Paper Presentation" presentation at International Human Dimensions of Programme on Global Environmental Change Open Meeting, Bonn, Germany, April 27, 2009

John Robinson, "Centre for Interactive Research on Sustainability" presentation at UBC's Senate Academic Building Needs Committee, April 22, 2009

Satterfield, Terre

"Emergence and the Anticipation of Perceived Risk in the Case of Nanotechnologies," presentation at S-Net meeting, University of Washington, Seattle, September 10, 2009, authors Satterfield, T., Kandlikar, M., Beaudrie, C., Herr Harthorn, B., Pidgeon, N., and Conti, J.

"Nanotech Risk Perception – Issues and Challenges" –presentation and paper at Nanotechnology Risk Specialist Meeting, University of California at Santa Barbara, January 29-30, 2010, authors Pidgeon, N., Herr Harthorn, B., and Satterfield, T.

"Risk Ranking for Nanomaterials Using Hazard and Intake Fraction Models," presentation at Society for Risk Analysis Meetings, Baltimore, MD, authors Beaudrie, C., Kandlikar, M., Satterfield, T., and Ramachandran, G.

"Designing for Upstream Risk Perception Research: Malleability and Asymmetry in Judgments about Nanotechnologies," paper for Nanotechnology Risk Specialist Meeting, University of California at Santa Barbara, January 29-30, 2010, authors Satterfield, T., Conti, J., Kandlikar, M., Beaudrie, C., Herr Harthorn, B., and Pidgeon N.

"Climate Impacts and Biodiversity Conservation: Examining Evolving Environmental Values, Scientific Uncertainties, and Policy Preferences," poster at DISCCRS: Interdisciplinary Climate Change Research Symposim, authors Hagerman, S., Satterfield, T., and Dowlatabadi, H.

Guest lecture at University of Western Ontario, "Rethinking Risk at the Intersection of Culture, Justice and Differing States of Nature", February 2010

"Reflections on Chasing the Elusive – Hope, Intention and Disruption in the Anticipation of Social Response to Nanotechnologies," invited lecture at Institute for Resources, Environment and Sustainability's Distinguished Speaker Series, March 2, 2010

" Reflections on Chasing the Elusive: Hope, Intention, and Disruption in the Anticipation of Nanotechnologies. Paper presented at annual American Anthropological Association conference, Washington DC. December 2009

Organized panel, "Small Acts, Large Implications: Indigenous Engagements with Environmental Policy and the State," Canadian Anthropology Society conference, May 16, 2009

Presented paper, "Designing Indices, 'Oppressive Authenticities', and Indigenous Authorship of Policy in Canada and New Zealand,"Canadian Anthropology Society conference, May 16, 2009

Keynote, Advanced Nanomaterials Conferences, Morocco, September 12 -15, 2010

IRES Annual Report
September 2010