THE INSTITUTE FOR RESOURCES, ENVIRONMENT AND SUSTAINABILITY





2003 - 2004 ANNUAL REPORT



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Directors Message

The year 2004 marks the 25th Anniversary of the interdisciplinary graduate resource management program. When the late Dr. Peter Larkin, friend and colleague, sat across from his desk as my Dean and said, "Les we need to do something about what's happening to our resources", I had no idea of what we were launching.

From most meagre beginnings, with considerable scepticism and naïve enthusiasm, the Resource Management Science program accepted the first four eager students in September 1979. This program, with an enrolment exceeding one hundred concerned and dedicated graduate students, has evolved to today's Resource Management and Environmental Studies program, and from interdisciplinary to increasingly transdisciplinary. Interdisciplinary has become academically legitimate and those faculty and students that shared the concern of human activity on resource exploitation, conservation and environmental guality helped build the research foci that is central to the graduate program, the Institute for Resources, Environment and Sustainability and the Fisheries Centre. Both institutions form focal points that attract students, post-graduate individuals, adjunct faculty, research associates, affiliated faculty (from existing academic units), visiting scholars and community groups and the public. The IRES evolved from a focus on water and one that remains as a central focus. Water is a resource, a necessity for human existence, has no substitutes and is increasingly treated as a societal commodity. Water is a "systems" integrator, be it a watershed or a living organism. Thus, water is the indicator of both ecosystem and human health. Integrated with human needs, wants and desires, with all the uncertainties of our understanding of natural and human built systems and energy, allows systems to function sustainably. It has been this reality that has driven the evolution of the IRES and the associated RMES. I hope Peter is pleased!

The past year has been one of maturity. The Institute for Resources, Environment and Sustainability and the Resource Management and Environmental Studies graduate program received the first external review by three prominent Canadian scholars. I am pleased that the report was positive about the calibre of the faculty, students both present and past and with the dedicated and competent support staff. I feel privileged to be associated with such great people. I also extend my sincere thanks to so many others who have moulded the Institute and the RMES program over the past years.

I was most pleased to see the students organize the RMES Graduate Student Society this past year. After attempts in the past, the Society happened; thanks to the efforts of Laura Lapp. I am optimistic that this society will enhance the effective communication within the student body, which, as a result of the sheer numbers, has become less cohesive. As well, that dialogue, which is essential among students, faculty and staff, will be enhanced. Of course, social functions and having fun are important.

Academic activities within the Institute remained high and productive. Demand for the RMES program continues to increase, faculty members continue to be productive scholars and the graduates maintain the high standards in their professional activity that they built upon during their stay at the University of British Columbia. Again, the past years' graduates were able to secure employment. The ability of faculty members to attract competitive research support continues to be high. Our adjuncts and associate members continue to increase their contributions to the IRES/ RMES by offering student assistantships, by supervising and mentoring, by offering lectures, courses and seminars and contributing to the overall social and academic life of the programs. They often feel left out; but they are most appreciated.

I owe much of the success that was achieved over the past year to the support staff. Leslie Stephenson has put together a synergistic staff that function as a collective team. This is not an easy task when one

considers that there are over one hundred graduate students in excess of 1.3 million dollars of research and associated grants/ contracts, that we are located in four buildings on the campus, and that in addition to the more "normal" academic functions there is a certificate program, an international internship program, an affiliated government research group (AIRG) and a federal government outreach program (C-CIARN-BC). It is an exciting and dynamic "institute".

I am most grateful to all the students for their enthusiasm, ideas, questions and congeniality. They are the University. I have been fortunate to receive positive support from faculty and staff and from Dean Frieda Granot.

I know one should never single out individuals for special thanks, however, since this is my last message from the Director, I will take the chance. I must thank Dr. John Grace, former Dean of the Faculty of Graduate Studies for his unquestioning support and Dr. Hans Schreier, who took the chance to be the first "resource manager".

I must also single out Jaimie Dickson and Leslie Stephenson who bear the brunt of my idiosyncrasies and continue to make the place run.

I wish simply but most sincerely success and fulfilment for all the RMES students past, present and future. May every great thing for the future come about for all associated with the IRES. I know Peter is pleased!

Tuum est!

Les

Introduction

The year 2003 – 2004 was one of change and the beginning of a new era for the Institute and the Resource Management and Environmental Studies (RMES) graduate program. The first External Review of the Institute occurred in October 2003. The Institute has a short and long term time frame. The IRES was established in September 2002, while its components were created as early as 1972. The evolution of IRES and RMES and its present form were reviewed by the external panel comprised of Dr. Susan Elliott, Dean of Social Sciences, McMaster University (Chair); Dr. David Schindler, Killam Memorial Professor of Ecology, University of Alberta; and Dr. Kay Teschke, Professor Health Care and Epidemiology, The University of British Columbia. The report was, in general, laudatory of the accomplishments of our students and faculty and made several pertinent recommendations for future consideration with regard to the interdisciplinary RMES program, the streamlining of the administration of the Institute and the necessity of sustaining the strength and reputation of the Institute, as new faculty replace retiring faculty and the Director over the next five years to a decade. These recommendations are under advisement, and will be addressed during the coming year. This marks the beginning of the new era.

During the year we welcomed two new faculty members, both cross-appointed with the School of Community and Regional Planning. Dr. L. Frank was appointed as the Bombardier Chair in Transportation and Dr. Stephanie Chang as the Canada Research Chair in Economics of Natural Disasters. There is no doubt that both will make, and are already making, significant contributions to the enrichment of the graduate experience of our students and the University, in addition to providing a synergistic complement to the research agenda of the IRES, the SCARP and the University. Simply put, we are delighted and fortunate to have attracted such high calibre individuals.

Graduate student enrolment continued to increase. This is causing some concern with respect to the human, space and infrastructure resources available to maintain and foster a stimulating and effective learning environment. As might be expected the size of the graduate student body, now over 110, has caused challenges in support facilities, financial needs and communications. The increase in size has resulted in several interest groups forming within the RMES. This is understandable but it does detract from the cohesion of the student body and to some extend of the faculty. The size and diversity of interests' places additional demands on the support staff, which has not grown in relation to either the increase in graduate students or the numbers of faculty members. Increased efforts will be needed to address the communications and cohesiveness realities.

On a most positive note, as the result of the initiative of Ms. Laura Lapp, the RMES student body formalized the RMES Graduate Student Society, in concert with the UBC Graduate Student Society. This is a most exciting development, as it allows for more effective communication of the RMES students with the Administrative Office, the Faculty of Graduate Studies and the various student organizations affiliated and associated with the University of British Columbia. The RMES student society has already contributed to a significant role in educational, social and communications goals of the program.

Dr. Michael Healey accepted the challenge of chairing a program/curriculum review committee. Members of the committee are Dr. Terre Satterfield from IRES and two student representatives from RMES, Ms. Jane Lister and Mr. Dale Marsden. In addition a University representative Dr. Laurie Ricou was asked to serve on the review committee to provide a University perspective. Dr. Ricou, Professor of English, was a former Associate Dean of Graduate Studies and was responsible for interdisciplinary studies and programs for the Faculty. He will add an academic UBC perspective to this important review. RMES is indebted to Dr. Ricou for taking on this role, and most significantly during his sabbatical leave. A report has been prepared and will form the basis of discussion and debate for program enhancement over the next year. The report will aid in the future direction of the RMES program, congruent with recommendations by the External Review Committee and the previously completed alumni and student surveys.

We had some staff changes. Ms. Cynthia Hampton, Administrative Assistant resigned to go back to University to complete her B.A. degree in Geography and Ms. Layle Larusson, Financial Officer, accepted a position with the Provincial Government in Victoria. The Administrative Assistant position will not be filled, as a result of budget constraints. This will place an increased burden on an already busy administrative staff. Fortunately, Leslie Stephenson, Assistant Director, will be recruiting a new Financial Officer and Jaimie Dickson has assumed the responsibility of Administrative Assistant.

The International Internship program experienced another successful year. Unfortunately, Human Resourced Development Canada, who had funded up to ten internship positions, has discontinued their internship program indefinitely. However, applications have gone forward to Environment Canada and CIDA for continued intern support.

The BC office of the Canada Impact and Adaptation Research Network (C-CIARN-BC) completed a successful year and has evolved a new focus. A research gap analysis and review is underway to identify research needs and priorities. The reports' audience is the stakeholder groups in BC. In consultation with the national C-CIARN office and recognizing the need for more social science orientation, the C-CIARN-BC office was transferred form IRES to the Department of Anthropology/Sociology at UBC and Dr. Ralph Matthews has accepted the role of manager.

The relationship with Environment Canada's Adaptation and Impact Research Group (AIRG) continues to thrive. The AIRG group has provided significant synergies to the RMES teaching program and for aiding RMES graduate students thesis projects. Major contributions of AIRG scientists are in the Okanagan Study, under the direction of Dr. Stewart Cohen and our Chinese connection thanks to the efforts of Dr. Yongyuan Yin. We were fortunate to recruit Rachel Welbourn as the research and office coordinator for AIRG.

During 2003 – 2004, 111 graduate students were enrolled in the RMES program, including 14 in the M.A. program, 36 in the M.Sc. program and 61 Ph.D. candidates. Of the total there were slightly more females (65) than males (46). 10 students graduated from the RMES program during this year. 6 completed with a M.Sc. and 4 with Ph.D.'s.

Both the IRES and RMES thank the valuable contributions of the Adjunct Professors and Associate faculty members to our programs. Their expertise, suggestions and recommendations, as well as their giving unselfishly of their time, enriches the learning and research opportunities for the students and for the University in general. The networking that these individuals provide within the University, form the private sector, and government institutions is immeasurable. And in keeping with the goals of TREK 2000 and the new Green Paper on TREK 2010, simply, thank you.

The new Aquatic Ecosystem Research Laboratory (AERL) is underway. Board 4, approval by the UBC Board of Governor's has been granted. Construction of the AERL will begin in April 2004. The considerable efforts of Leslie Stephenson, Cynthia Hampton, and increasingly Jaimie Dickson from IRES, Jackie Alder from the Fisheries Centre, and Rob Brown of UBC Properties Trust is acknowledged with thanks. A most complex yet exciting endeavour.

Although not entirely within the reporting year, the IRES congratulates Dr. John Robinson in obtaining the Canadian Foundation for Innovation grant for the new Centre of Interactive Research on Sustainability (CIRS) building to be built at the Great Northern Way site. 2004-2005 will be an exciting and busy year to bring collaboration on side and to aggregate the necessary financial and infrastructure needs. The announcement was made in March 2004 for the innovative building that by concept and design is an experiment in sustainable buildings.

Resulting from the exciting and productive academic year, the favourable external review assessment, the positive addition of new faculty, continued support by research agencies and our adjuncts and associates, and the renewed enthusiasm and organized graduate student body, the IRES/ RMES accepts the new challenges to continue the interdisciplinary and transdisciplinary research and educational synergies at UBC.

Report on Activities

I. Administration

The year was extremely busy. The office staff spent a considerable amount of effort preparing the background document for the external review. Archival data from the past decade was requested to be gathered and summarized. It was fortunate that the IRES and its predecessors had prepared annual reports, which were of great assistance in compiling the required information.

I congratulate the office staff for the most competent document that was the result of that combined effort. And, during the same time period the planning process for the Aquatic Ecosystem Research Laboratory (AERL) took on a new and dynamic "life".

A number of new committees were established for the IRES to make administrative operations more effective. An Admissions Committee was established, to review and make recommendations on new students to the RMES program. Also, committees were established for Awards, Seminars and Visitors and Program/ Curriculum Review (A list of committees, committee chairs and committee members may be found in Appendix 1).

During the reporting year there were several support staff changes. Ms. Cynthia Hampton, administrative assistant, resigned in September to return to University and complete her B.A. degree in Geography. As a result of budget restraints the vacated position was eliminated. Fortunately Ms. Jaimie Dickson agreed to take on the additional responsibilities. Also, our Financial Officer, Ms. Layle Larusson, resigned in March 2004 to take a new position with the provincial government in Victoria. This position has been re-advertised.

There was a major change with the Committee – Canadian Impact and Adaptation Research Network (C-CIARN-BC) office. The C-CIARN-BC coordinator resigned in December following a leave period over one month. This lead to discussions wit the National Coordinating Office in Ottawa and the C-CIARN-BC office was transferred from the IRES to the Department of Anthropology and Sociology. This was a logical transfer as C-CIARN-National felt that there should be a more social science identity and presence for the network. Les Lavkulich was relieved as manager and Leslie Stephenson as administrator. Dr. Ralph Matthews accepted the responsibility of manager of C-CIARN-BC and is in the process of hiring the appropriate staff.

II. Programs of IRES

A. Resource Management and Environmental Studies (RMES)

Overview and Statistics

The table below provides information on the student enrolment in the RMES program.

	Females	Males	Total
M.A.	10	4	14
M.Sc.	23	13	36
Ph.D.	32	29	61
			111

Interest in the interdisciplinary graduate program in Resource Management and Environmental Studies continues to be high. The following table provides an estimate of applications and acceptance numbers.

	2003 - 2004	2002 - 2003	2001 - 2002
# of full time applications	111	122	101
# accepted	25	31	29

The RMES program is grateful and acknowledges the financial assistance received from a number of competitive sources of fellowships, sponsorships and scholarships. These awards aid, as do faculty sponsored research assistantships, in providing a high quality learning environment.

- Natural Sciences and Engineering Research Council
- Social Sciences Research Council
- Bridge Program

- NRC
- Commonwealth

The Institute appreciates and thanks these sponsoring agencies for their support.

Courses Taught

The following is a summary of the courses offered and guest lectures given by members of IRES.

- Cohen, S.
- RMES 520/ GEOG 539 Climate Change in the 21st Century

Guest Lecture

- ApSci 262 Climate Change Challenges for Engineers, March 16, 2004
- Climate Change and Water Management in the Okanagan—Expanding the Dialogue: Geography Graduate Colloquium, March 3, 2004
- Dowlatabadi, H.
- RMES 500A Introduction to research methods
- RMES 502 Research seminars
- RMES 542 Integrated Assessment.
- INDS 502E Modeling Democracy, Ethics & Genomics
- Directed Readings Energy
- Dorcey, A.H.J.
- SCARP 540A Planning for Sustainability
- SCARP 595 Negotiation, Facilitation & Mediation in Planning
- SCARP 597 Planning for Water Resources Management
- SCARP 547/549 Master's Project/ Thesis
- SCARP 548C Introduction to GIS Planning
- SCARP 550 SCARP Directed Studies
- SCARP 548X SCARP Internships

Frank, L.

- Plan 580 Land Use Transportation
- Plan 581 Non-motorized Transportation
- Plan 549 Master's Thesis
- Plan 547 Master's Project
- Hall, K. J.
- CIVIL 405 Environmental Impact Studies
- CIVIL 407 Sanitary Engineering Laboratory
- PHARM 448 Applied Toxicology
- CIVIL 568 Water Pollution Engineering and its Ecological Impact
- RMES 500b Directed Studies

Guest Lectures

- EOS, Marine Pollution
- Healey, M.C.
- EOSC 478 Introduction to Marine Fisheries

Guest Lecture

- EOSC 474 Marine Pollution Effects of pollution on marine ecosystems.
- RMES 515 Integrated Watershed Management Effects of Dams on Fish
- Hinch, S. G.
- CONS 449 Directed Studies in Natural Resource Conservation
- CONS 451 Integrated Field School
- CONS 486 Fish Conservation and Management
- CONS 498 Undergraduate Thesis
- FRST 386 Aquatic Ecosystems and Fish in Forested Watersheds
- RMES 586 Fish Conservation and Management

Guest Lecture

- RMES 500b Watershed Management
- BIOL 402 Aquatic Ecology

- BIOL 500 Graduate seminar in Ecology
- CONS 101 Introduction to Conservation Science
- FRST 388 Engineering Hydrology
- WOOD 288 Introduction to Forestry

• Kandlikar, M.

- RMES 500C Research Methods in Resource Management
- RMES 500Q Science, Technology and Human Development

• Lavkulich, L.M.

- RMES 501 Perspectives on Resources and Environment
- RMES 502 Graduate Seminar
- SOIL 430 Pedology
- SOIL 504 Advances in Soil Chemistry and Mineralogy
- AGRO 460 Agroecosystems

McDaniels, T.L.

- PLAN 599 Managing Environmental Risks
- PLAN 550 Directed Studies
- PLAN 548X Internships
- PLAN 548T

Guest Lectures

- Applied Ethics Graduate class on biotechnology and society -lecture on Risk analysis and decision making, April 2003
- Review of research proposals for Bridge program research design class, April 2003
- GELS (genomics and ethics) research program on citizen involvement and decision making for managing genomics risks April 2003
- Overview of policy analysis for MAPPS graduate program, policy analysis module, September, 2003
- SOEH graduate applied research practicum class, October 2003
- Undergraduate Engineering Economics class, risk analysis overview
- SCARP Omnibus class, values as a basis for planning, November, 2003
- Robinson, J.B.
- Geog 423 The Development of Environmental Thought

• Geog 550B Individual Directed Studies on Community Place-making and Sustainability

Guest Lectures

- APSC 262 QUEST, Feb 24, 2004.
- AHIS 333 (Emily Carr) QUEST and Ethics, Feb 12, 2004
- ENVR SCI 200, Energy, Climate Change and Sustainable Development, Nov 20, 2003

• Satterfield, T.

- ANTH 330 Rural Peoples and the Global Economy
- RMES 530 Science, Policy, and Values in Resource Management
- RMES 500A Introduction to Research Methods and Design
- RMES 502 Graduate Seminar Series

Guest Lectures

- Environmental Studies 300
- Zoology 501
- Occupational Health and Environmental Hygiene Seminar Series
- RMES 502
- Organized guest lectures and visits to the RMES/IRES for: Evelyn Pinkerton (SFU); Scott Brennan (Western Washington University); Kathryn Harrison (UBC-Political Science)

• Schreier, H.E.

- AGRO 401 Soil Proc. Agriculture
- RMES 515 Integrated Watershed Management
- RMES 516 Urban Watershed Management
- RMES 517 Agricultural Watershed Management
- RMES 518 Water and International Development

Guest Lectures

- EOSC 474 Marine Pollution: Groundwater Pollution, September 18, 2003
- Geog 310 Environment and Resources: Water Management in Urban Environments, October 6, 2003
- FOR 444 Agroforestry Integrated Agro-forestry in the Himalayas, October 16, 2003
- SOIL 200 Fundamentals of Soil Science. Nutrients & Erosion in Nepal, April 2, 2004

- Vertinsky, I.B.
- BAIM 502 Cultural and Political Environment of International Business
- Yin, Y.
- RMES 520 Global Climate Change Carbon sequestration case study

Students Supervised

• Chang, S.

M.A./M.Sc.

- D. Cole (SCARP)
- Cohen, S.

Serves on 2 Ph.D. supervisory committees

Dorcey, A.H.J.

M.A./M.Sc.

- C. Beaubien (SCARP)
- S. Bicego (SCARP)
- K. Bouris (SCARP)
- J. Brownell (SCARP)
- M. De La Pena Domene (SCARP)
- P. Fenske (SCARP)
- A. Fish (SCARP)
- T. Harding (SCARP)
- J. Hill (SCARP)
- L. Lapp (RMES)
- S. McJannet (SCARP)
- H. Shay (SCARP)
- B. Sherrell (SCARP)
- N. Sippert (RMES)
- D. Smith (SCARP)
- P. Whitelaw (SCARP)

• J. Yoo Rifkin (SCARP)

Ph.D.

- S. Dang (SCARP)
- J. Irwin (IRES)
- E. Ohara (SCARP)
- M. Senbel (SCARP)

Serves on 3 additional PhD and 2 Masters supervisory graduate committees.

Dowlatabadi, H.

M.A./M.Sc.

- Z. Bornik (RMES)
- A. Levine (RMES) co-supervised with M. Kandlikar
- P. Shepherd (RMES) co-supervised with J. Tansey

Ph.D.

- M. Boyle (RMES)
- N. Elmieh (RMES)
- E. Mazzi (RMES)
- J. McDonald (RMES)
- R. Pacheco (RMES)
- C. Wilson (RMES) co-supervised with T. McDaniels
- H. Zerriffi (RMES)
- Frank, L.
- M. Andresen (GEOG)
- D. Buchanan
- D. Enns (SCARP)
- S. McMillan (SCARP)
- R. McNally (SCARP)
- B. Patterson (SCARP)
- M. Pickersaill (SCARP)
- K. Rao (SCARP)

• M. Wittgens (SCARP)

Serves on 1 additional supervisory graduate committee.

• Hall, K.J.

M.A./M.Sc.

- C. Francis (RMES)
- H. Goble (CIVIL)
- K. Kinnee (RMES)
- E.T. Li (CIVIL)
- G. Mattu (RMES)
- M. Muraro (RMES)
- G. Solano (RMES)
- S. Wilson (RMES)

Ph.D.

- P. Keen (RMES)
- W. Tao (CIVIL)

Serves on 8 additional PhD and 9 MSc supervisory graduate committees.

Healey, M.C

M.A./M.Sc.

- J. Frolek (RMES)
- C. Lobsinger (Zoology)
- C. Matheson, (Zoology)

Ph.D.

- M. Pearson (RMES)
- L. Rempel (GEOG)

Serves on 1 additional PhD supervisory committee.

• Hinch, S.G.

M.A./M.Sc.

- J. Degroot (FRST)
- K. Mackenzie (FRST)
- M. MacNutt (FRST)
- J. Young (FRST)

Post Doctoral Fellows

- S. Cooke (FRST)
- S. Larsson (FRST)
- E. Mellina (FRST)
- G. Wagner (FRST)

Serves on 4 additional PhD and 5 MSc supervisory graduate committees.

• Kandlikar, M.

M.A./M.Sc.

- J. Ardiel (RMES)
- J. Gerrard (RMES)
- A. Levine (RMES)
- Y. Ogushi (RMES)

Serves on 3 additional PhD supervisory graduate committees.

• Lavkulich, L.M.

M.A./M.Sc.

- E. Downarowitz (RMES)
- C. Gravel (RMES)
- C. Leduc (RMES)
- A. McCue (RMES)

Ph.D.

- J. Carruthers (RMES)
- S. Grand (RMES)
- R. Maal Bared (RMES)

Serves on all RMES graduate committees and 2 additional Ph.D. and 2 Masters supervisory graduate committees

McDaniels, T.L.

M.A./M.Sc.

- J. Bundali (SCARP)
- S. Clumpner (PLAN)
- B. Chow (PLAN)
- D. Galland (RMES)
- K. Gerwing (PLAN)
- R. Kelley (SCARP)
- H. Longstaff (RMES)
- M. Vancaillie (SCARP)

Ph.D.

- M. Bazelywich (SCARP)
- R. McNally (SCARP)
- W. Smith (RMES)
- C. Wilson (RMES)

Serves on 1 additional Masters and 1 additional PhD supervisory committees.

• Robinson, J.B.

M.A./M.Sc.

- A. Frank (GEOG)
- F. Ghatala (RMES)
- E. Levin (GEOG)
- V. Long (GEOG)
- A. Savelson (RMES)

PhD

- K. Roberts (RMES)
- A. Shaw (RMES)
- S. Talwar (GEOG)

Serves on 4 additional PhD supervisory committees.

• Satterfield, T.

M.A./M.Sc.

- L. Ligouri (RMES)
- Y. Yim (RMES)
- M. Zelmer (RMES)

PhD

- T. Asfaw (RMES)
- M. du Monceau (RMES)
- D. Boyd (RMES)
- D. Brownstein (RMES)
- J. Donatuto (RMES)
- A. Pitts (RMES) co-supervisor with Paul Wood
- J. Timko (RMES)

Serves on 1 additional Masters and 3 additional PhD supervisory committees.

Schreier, H.E.

M.A./M.Sc.

- J. Brydon (RMES)
- L. Elliot (RMES)
- J. Houston (SOIL)
- S. Magwood (RMES)
- J. McDonald (RMES)
- I. Smith (RMES)

PhD

- G. Hearns (RMES)
- M.C. Roa (RMES)
- J. Ross (RMES)

Serves on additional 5 Ph.D. and 8 Masters supervisory committees.

• Vertinsky, I.B.

M.A./M.Sc.

• A. Li (COMM)

Ph.D.

- M. Au (COMM)
- O. Branzei (COMM)
- K. Fuller (COMM)
- G. Hickey (COMM)
- A. Mathey (COMM)
- C. Mayberry (COMM)
- A. Peer (COMM)

Post Doc

- S. Mitrovic Minic
- Yongyuan, Y.

Serves on 3 Ph.D. and 3 Masters supervisory committees

University Graduate Student Supervisors (non IRES)

The RMES program encourages and fosters interdisciplinary and transdisciplinary graduate education and learning and is thus grateful to all faculty members for their dedicated and high level of supervision given to the RMES students. Increasingly and enriching the program, faculty members from other administrative units have accepted supervision challenges for RMES students. This is most rewarding for the students and the University

- Y. Alila (Forestry)
- R. Barichello (Agricultural Sciences)
- R. Cole (Architecture)
- M. Feller (Forestry)
- G. Hoberg (Forestry)
- R. Matthews (Anthropology and Sociology)
- P. Mooney (Landscape Architecture)
- P.N. Nemetz (Commerce and Business Administration)
- T.J. Northcote (Forestry Emeritus)
- D. Paterson (Landscape Architecture)
- D. Pauly (Fisheries Centre)
- T.J. Pitcher (Fisheries Centre)
- W.E. Rees (Community and Regional Planning)
- R. Sumalia (Fisheries Centre)
- F. Tester (Social Work)
- A. Trites (Zoology)
- J. Vercammen (Agricultural Sciences/Commerce)
- A. Vincent (Fisheries Centre)
- J.R. Wood (Political Science)
- P. Wood (Forestry)
- G. Wynn (Geography)

Theses Completed

Ten students completed their graduate programs during 2003 - 2004. The degree, the name of the student, thesis title and the name of supervisor are as follows:

Masters – M.Sc

- Coombs, Andrea
- Downarowicz, Ewa
- Magwood, Simone
- Neve, Silke
- Paradis, Erika
- Pinto, Xavier

Ph.D.

- Bixler, Dori
- Edinburgh, Melanie
- Rolfe, Janet T.
- Schreiber, Dorothee

B. International Internship Program

The 2003-04 IRES/SDRI Youth Internship Program was launched with great success. The following is an account of the activities that have taken place since March 31, 2003.

Background

For the past six years, the Internship Program has offered opportunities for younger Canadian experts in the area of sustainable development to work in diverse organizations and professional areas within this field in countries worldwide, particularly developing countries. The Program has now expanded its scope to include the areas of resources and environment.

The internship program seeks to prepare a new generation of ecologically and socially responsible Canadians to further human, environmental, and international collaborations and sustainable development objectives. The Program promotes career opportunities in Canada and abroad and is designed to enhance positive, long-term and mutually beneficial partnerships between UBC, Canadian institutions and other nations bridging the gap between education and employment.

Intern applicants must be post-secondary graduates, age 30 and below, and can come from varied backgrounds in the humanities and social sciences, natural sciences, engineering, environmental, international development, focused regional studies, First Nations studies, business, education, law, agriculture, social work, health or planning fields, natural resource management; and other disciplines or professional sectors. They should also have an active interest in environmental and international development issues and be pursuing related career opportunities. While these positions are open to youth across Canada, we would like to encourage more IRES and UBC graduates to apply for these internships in order to extend the relationship between students and their professors beyond their time in academia to move the graduates into their desired professional careers.

All interns undergo a pre-departure orientation and training program here at IRES before their placement. Upon their return, as well as during the term of the internship, interns receive support from the Program in finding employment. Of the twelve interns who completed last years program, nine are currently employed and three are enrolled in graduate programs.

Current Figures

In the year 2003-2004, the Internship Program sought and received funding for four internships from Environment Canada's Science Horizons Youth Internship Program. We received \$10,000 for two of the internships and \$9,000 for the other two internships for a total of \$38,000 to be used toward project costs. The Science Horizons internships last from May to December 2003. The Internship Program also sought and received funding for five internships from the CIDA (Canadian International Development Agency) International Youth Internship Program in the amount of \$15,000 each (total of \$75,000). Twenty percent of the total from CIDA was used for administrative costs and eighty percent for intern costs. Interns this year worked in overseas placements in the following countries: South Africa, India (two interns), Thailand (two interns), Brazil, and a short research trip to New Zealand. The Internship Program was in contact with HRDC (Human Resources Development Canada) once again for funds for ten internships (\$150,000), however, HRDC's Youth International (international internship program) was discontinued indefinitely.

IRES and the Internship Program were awarded HRDC Summer Career Placement (SCP) funding through the Faculty of Graduate Studies and UBC Career Services to hire a summer assistant for twelve weeks in 2003 at \$15/hour.

Those who were selected attended a weeklong orientation and pre-departure preparation session in the first week of October 2003 and all five CIDA interns left for their overseas posts immediately following the orientation session. The interns submit monthly reports to the Program Coordinator. The five interns who left in October are scheduled to return to Canada in the spring and summer of 2004 for debriefing and job placement support.

We are currently seeking funding from CIDA again and for the first time from Environment Canada's Science Horizons Youth Internship Program for the next round of internships.

We have just been awarded \$105,000 from CIDA for seven internships (\$15,000 each) for the 2004-2005 Internship year. The interns this year will travel to India, Brazil (two), Mozambique, and South Africa. We were also awarded two \$10,000 internships from Environment Canada's Science Horizons Internship Program (total \$20,000). We are currently awaiting funding from HRDC's Career Focus program for domestic internships.

III. Collaborators and Affiliations

A. AIRG

Who are we?

The Adaptation & Impacts Research Group (AIRG) is part of the Atmospheric & Climate Science Directorate of the Meteorological Service of Canada, Environment Canada. AIRG's mission is "to provide scientific expertise and leadership to Canadians on the environmental, social, and economic risks, vulnerabilities, impacts and adaptations associated with atmospheric variability and change."

Partnership with IRES

AIRG's co-location partnership with the Institute for Resources, Environment & Sustainability at UBC has provided many opportunities to advance research on climate change vulnerability, impacts and adaptation (VIA). This research is highly interdisciplinary, requiring collaboration between the natural and social sciences to understand the interaction between human and climate systems. AIRG staff at UBC work to form partnerships with the university research community and other research organizations to collaborate on multi-disciplinary studies.

AIRG's Activities at UBC during 2003-2004

In 2003-2004, AIRG contributed to the University community in a variety of ways including collaborating with UBC faculty and researchers on a number of research initiatives and providing opportunities for students to participate in ongoing climate change research.

AIRG Staff and Research at UBC

Dr. Stewart Cohen

The main focus of Stewart Cohen's research activities during 2003-04 was on a collaborative study on climate change and water management in the Okanagan region, supported by the Climate Change Action Fund (CCAF). Total funding is \$235K, shared with the Pacific Agricultural Research Centre (PARC) in Summerland. The goal of this 2.5-year study is to develop scenarios to stimulate a stakeholder dialogue on water management options for adapting to climate change within the regional context of ongoing development pressures. IRES participants are James Tansey, Philippa Shepherd, Stacy Langsdale, Jeff Carmichael, Tina Neale and Rachel Welbourn. The study team also includes Prof. Younes Alila from Forest Resources Management, post-doctoral fellow Wendy Merritt (now at Australian National University), and staff from Environment Canada--Pacific & Yukon Region, PARC, and the BC Ministry of Water Land & Air Protection. Funding is being sought from CCAF for 2004-06 to move this work to a new phase, focusing on adaptation policy and the development of a systems model that could support a policy dialogue.

Stewart is also participating in a study on climate change implications for the Northwest Passage, led by the Canadian Ice Service, and in planning exercises for the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report, due to begin in the fall of 2004. He has continued to offer his graduate course, Climate Change in the 21st Century (RMES520/GEOG539), and this year, he also did presentations on climate change topics at ApSci 262 and the Geography graduate colloquium, as well as at other venues in Canada and the U.S. He serves on two graduate student committees. He also continues to serve as advisor for the BC branch of the Canadian Climate Impacts and Adaptation

Research Network (C-CIARN BC), hosted by IRES. He will continue in that role as C-CIARN BC shifts to Sociology in April 2004.

Bing Rong

During the fiscal year of 2003-04, Bing Rong worked as a program coordinator and researcher on the Adaptation and Impacts (A&I) component of the Canada-China Cooperation in Climate Change Project (C5). The main objective of the A&I component of C5 is to strengthen China's research capacity to identify the vulnerabilities and impacts of climate change and to develop adaptation strategies to minimize its negative impacts and maximize positive impacts.

Two back-to-back workshops were held in China in September 2003 to enhance knowledge through Canadian expertises in APF and climate models for Impact and Adaptation Assessment. About 50 participants from various Chinese organizations presented their works, and it increased the awareness of government officers to the linkage between adaptation and sustainable development. The workshop presentation can be accessed at <u>http://www.ami.ac.cn/C5/index.htm</u>

In November 2003, two Chinese scientists from the Chinese Academy of Agricultural Sciences were invited to stay at AIRG-IRES, UBC on a practical attachment. They were working in close collaboration with AIRG researchers, to build capacity in the context of adaptive research methodologies by undertaking a case study project.

Dr. Yongyuan Yin

Yongyuan Yin is the PI of the AIACC AS25 project funded by UNEP/GEF to study climate vulnerability and adaptation in Western China (2002-2005). He is also leading the IA component of a CIDA funded project on carbon sequestration in China. As the PI of the UNEP/GEF funded project of the Assessments of Impacts of and Adaptation to Climate Change (AIACC) in Western China, he has been leading the AS25 project to assess climate vulnerability and adaptation in Western China. The main goal of AIACC is to enhance the scientific and technical capacities in many countries to assess the impacts of climate change, and to design cost-effective adaptation response measures, which are needed to formulate national policy options and prepare national communications. Many North American and Chinese institutes are partners of the project including UBC, AIRG/EC, UC Berkeley, Michigan U., Michigan State U., U. of Regina, Chinese Meteorological Administration, Nanjing U. and Chinese Academy of Science.

Recently, Yin has been involved in two projects funded by CIDA Canadian Climate Change Development Fund on carbon sequestration and adaptation in China. The objectives of the two projects are to: 1) contribute to the reduction in growth of greenhouse gas emissions; 2) contribute to carbon sequestration in sinks; 3) assist China to reduce their vulnerability and adapt to climate change; and 4) contribute to strengthening the capacity of China to participate in global efforts to combat climate change. A graduate research assistant was hired at UBC to do some economic analysis for the carbon sequestration project.

Yin has also been in graduate supervising committees for 2 PhD students and 3 Master students at UBC. In addition, he has been supervising several visiting scientists from other universities and institutes.

Rachel Welbourn

Rachel is currently acting as the AIRG coordinator at UBC while Tina Neale is on maternity leave. Since her arrival in October 2003, Rachel has been assisting Stewart Cohen with the climate change and water management study in the Okanagan, particularly with the stakeholder dialogue component of the project. During 2003-2004, Rachel helped organize three workshops in the Okanagan. The workshops were held in an attempt to stimulate a dialogue on climate change impacts and adaptations with regards to water management in the Okanagan Basin. Two of the workshops were held at the local level, one in Oliver and one in the Trepanier Landscape Unit (an unincorporated area west of Kelowna). A larger, basin-wide workshop was held in Kelowna. Attendees at the workshops included water managers, regional planners, fruit growers, vineyard operators, engineers, First Nations and environmentalists, as well as representatives from municipal, regional, provincial and federal governments.

In addition to her involvement with the Okanagan study, Rachel has also been assisting C-CIARN BC with an ongoing assessment (gap analysis) of the state of knowledge of climate impacts and adaptations in British Columbia.

Students supported in 2003-2004

Graduate Research Assistants supported in 2003-2004

- Meng Sun
- Stacy Langsdale

Post-Doctoral Fellows supported in 2003-2004

• Dr. Wendy Merritt

More Information

For more information on AIRG's projects and activities at UBC, please contact:

Rachel Welbourn Coordinator, AIRG Institute for Resources, Environment & Sustainability Phone: 604-822-6899 Email: <u>rwelbourn@sdri.ubc.ca</u>

B. C-CIARN-BC

The Committee – Canadian Impact and Adaptation Research Network for BC had a most productive year followed by a major restructuring. As in the past, C-CIARN-BC organized and co-sponsored several community meetings. The meetings in the various regions of the province or focusing on forests have received good reception and comment from the regional/commodity-based stakeholders. The themes and outcomes are best reviewed by examination of the website (http://c-ciarn-bc.ires.ubc.ca/).

A major project, supported by the C-CIARN-BC Advisory Committee was the preparation of an information "research gap" analyses and report. The project spear-headed by Leslie Stephenson with assistance from students Christine Leduc and Ione Smith along with our AIRG researcher Rachel Welbourn took on the task of evaluating the BC Climate Change database and interview comments from experts in the field of climate change and adaptation to develop an analysis of major deficiencies in our understanding of the influences of climate change. By this analysis it will be possible for stakeholders, researchers and decision makers to identify and direct research efforts to significant and important information gaps in BC. It is most ambitious and challenging task. Preliminary analyses have been completed and the first report is in draft. It is anticipated that the final report will be available for distribution and discussion in late 2004.

Late in 2003, Julia James, the C-CIARN-BC coordinator took leave from her position, and in January 2003 resigned. This left a vacuum in the continuation and connectedness of the programs that had been initiated over the past few years. This event lead to a re-evaluation of the C-CIARN-BC office and its' functions. In discussions with the National Coordinator of C-CIARN, Dr. Eric Taylor, it was decided that the C-CIARN-BC office would be served better, at least as an experiment, if there was a greater focus on the social capital building facing issues of climate change, impact and especially adaptation. Dr. Ralph Matthews, Professor of Sociology at UBC was offered the position of Manager, C-CIARN-BC. He accepted the exciting challenge and the office was transferred to his care. We at IRES, including Dr. Stewart Cohen from AIRG, were asked to remain as resource people.

IV. Service

A. UBC

- Chang, S.
- Admissions committee, SCARP
- Admissions committee, IRES

Cohen, S.

- Acting Director, National Headquarters, Toronto Adaptations and Impacts Research Group (AIRG) (July – October 2002)
- Member, Adaptation and Impact Research Group (AIRG) UBC
- Research Awareness Week organized panel on Climate Impacts and Adaptation Research at UBC (February 2003)
- Dorcey, A.H.J.
- Director, School of Community and Regional Planning; Acting Chair Centre for Human Settlements
- Member, UBC Executive Committee for Research
- Member, Ad Hoc Committee to advise VP Dennis Pavlich on Planning for University Town
- Member, CN Chair Search Committee
- Member, Search Committee for Director, IRES
- Dowlatabadi, H.
- Member, Merit Review Committee, FoGS.
- Chair, PhD Examination (M. Hawke), FoGS.
- Member, Recruitment Committee, IRES.
- Member, IT Committee, IRES.
- Member, St John's College junior fellowship selection committee
- Hall, K.
- Chair, Environmental Programs Advisory Committee
- Member, Stormwater Sub-committee, in EPAC
- Member, Safety Committee, LPC Building

Healey, M.

- Chair, RMES program review committee, IRES
- Member, Graduate Student Selection Committee, RMES
- University Examiner for L. Dyck, PhD

Hinch, S. G.

- Director/ Advisor, Undergraduate Program in Natural Resources Conservation
- Member, Image Committee, Faculty of Forestry 2004
- Faculty representative, Forestry Undergraduate Society -2003
- Member, Co-operative Education Committee, Faculty of Forestry 2002-present
- Member, Undergraduate Recruitment Committee Faculty of Forestry 2002-present
- Chair, Natural Resources Conservation Program Advisory Committee, Faculty of Forestry 1999present
- Member, Adjudication, Advancement and Scholarship Committee, Faculty of Forestry 1999present
- Member, Undergraduate Programs Curriculum Committee, Faculty of Forestry 1999-present
- Chair, Vehicle Committee, Institute for Resources and Environment 1998-present
- Chair, M.Sc. Thesis Defence (Paula Calvert, Forestry) 2003 Jul.
- University Examiner, Ph.D. Defence (Patrick Carrier, Zoology) 2003 Jun

• Kandlikar, M.

- Chair, Admissions Committee, RMES Program
- Member, Admissions Committee, Bridge Program
- Member, Executive Committee, CISAR
- Member, Safety Committee, IRES
- Member, AERL Building Space Committee
- Lavkulich, L.M.
- Member, Dean's Committee, St. John's College, Membership and Academic Programs Committees, Faculty of Graduate Studies (2003 2004)
- Member, Canada, BC Ministry of Air, Water and Land Protection and UBC, Coordinating committee (2001+)
- Member, Vice President Academic (Academic Planning) Planning Liaison Committee Aquatic Ecosystem Research Laboratory – CFI (2002+).

- Member, Vice President Administration and Finance (Campus Planning and Development) UBC Technical Advisory Committee for Neighbourhood Plans (2000+).
- Chair, Adaptation Impact Research Group (AIRG Environment Canada UBC) Advisory Council (2001+)
- Manager, BC Canada Climate Impact Adaptation Research Network (BC CCIARN), Natural Resources (2002+)
- Chair, Academic Project Manager AERL Building
- Chair, Resource Management and Environmental Studies (Faculty of Graduate Studies) (1994+)
- Director, Institute for Resources and Environment (Faculty of Graduate Studies) (1995-2002)
- Director, Institute for Resources, Environment and Sustainability (2002+)
- Chair, Faculty Curriculum and New Programs Committee, Faculty of Graduate Studies (2002+)
- Member, Fisheries Centre Management Committee (2000+).
- Reviewer, Vice President Research Canada Foundation for Innovation Proposals -UBC (2000-2001) (2003-2004)
- Member, Fisheries Centre Advisory Board (2001-2003)
- Member, Student Selection Committee Roundtable Discussion April 2004, Institute for Asian Research
- Member, Search Committee, Director Fisheries Centre
- Member, BRIDGES Program SOEH
- Member, CHER Program SOEH

McDaniels, T.L.

- Director, Eco-Risk Research Unit, SCARP and IRES
- Member, Admissions committees for SCARP, IRES, Bridge program
- Member, ongoing strategic planning efforts in SCARP and IRES
- Chair, ad hoc committee on "greening of business "; author of committee report
- Member, Dean's advisory committee on promotion and tenure
- Member, CN chair search committee
- Robinson, J.
- Member, Weyerhaeuser Committee on US Environment and Resource Policy, Faculty of Arts, 2004 International Committee, Institute of Resources, Environment and Sustainability 2003-
- Member, International Committee, Institute of Resources, Environment and Sustainability 2003-
- Chair, PhD Defense, Sam Cao, Faculty of Forestry, Mar 16, 2004
- Member, IT Committee, Institute of Resources, Environment and Sustainability 2003

• Satterfield, T.

- Member, Search Committee Director for IRES
- Member, RMES Curriculum Review Committee
- Member, Trudeau Fellowship Adjudication Committee
- Member, Space Committee for AERL building
- Bridge Program Student Mentor

Schreier, H.E.

- Member, University Environmental Program Advisory Committee -1996-present
- Member, AERL Building IT Committee 2003-2004
- Member, Graduate Student Admission Committee in IRES
- Organized 7th annual IRES Workshop, 16 presentations by IRES Graduate Students to the Public (60 participants). February 16, 2004
- Continuing Studies in Science (Simon Fraser University) and Walter and Duncan Gordon Foundation. Moving the Water Agenda Forward Building a Canadian Water Council?
- Member of Advisory Committee M.J. Wosh Centre for Dialogue, SFU, March 15-16, 2004-03-05

• Vertinsky, I.B.

- Director, Centre for International Business Studies
- Director, W. Maurice Young Entrepreneurship & Venture Capital Research Capital
- Director, The Forest Economics and Policy Analysis Research Unit
- Chair, Institute of Asian Research (IAR Research Committee.
- Director, IAR The Asian Economics and Business Research Unit (Director)
- Member, Peter Wall Institute of Advanced Studies: Adjudication Committee Early Career and Post Doc.Awards
- Member, UBC-KIBT Project Curriculum Committee
- Lead, UBC-KIBT Project Research Committee
- Member, St. John's College Academic Committee
- Member, Centre for Japanese Research Management Committee
- Member, The Forest Economics and Policy Forum Advisory Committee
- Member, Faculty of Forestry Search Committee
- Yongyuan, Y.
- Member, AERL Space Committee

B. Community/ National/ International

Chang, S.

- Committee member, Committee on Disaster Research in the Social Sciences, The National Academies, USA
- Committee chair, Social Science Research Technical Committee, Earthquake Engineering Research Institute (EERI)
- Editorial board member, Earthquake Spectra
- Review panel member, Social Science Panel for Hazards Proposals, U.S. National Science Foundation (NSF)
- Reviewer, U.S. National Academies, Collaboration in Basic Science and Engineering (COBASE) grant proposal
- Reviewer, Earthquake Spectra
- Reviewer, Environmental Hazards
- Reviewer, Journal of Regional Science
- Reviewer, Planning and Markets
- Consultant (member of Applied Technology Council team), Independent Study to Assess Future Savings from Mitigation, for the U.S. Congress

Cohen, S.

- Science Adviser, Canadian Climate Impacts and Adaptation Research Network
- Co-Principal Investigator, Okanagan Water Management & Climate Change
- Member, IPCC participate in the planning for upcoming IPCC Fourth Assessment Report, Working Group II
- Panellist for debate on Kyoto Protocol ratification, BCIT School of Journalism (November 1, 2002)
- Dorcey, A.H.J.
- Member, Canadian Institute of Planners (CIP)
- Member, CIP Accreditation Review Team for UNBC Planning Program
- Member, Planning Institute of British Columbia (PIBC)
- Member, PIBC Education Committee
- Member, PIBC Task Force on Continuing Professional Development Policy
- Member, Canadian Water Resources Association
- Member, Society of Professionals in Dispute Resolution

Dowlatabadi, H.

- Chief Editor, Integrated Assessment, Sweitz and Zeitlinger.
- Editorial Board, *Energy and Environment*, Interscience.
- Editorial Board, *Environmental Science and Policy*, Elsevier Press.
- Editorial Board, *Climate Policy*, Elsevier Press.
- Editorial Board, Global Environmental Change: human and policy dimensions, Elsevier Press.
- Advisory Board, UNU/RIVM global change integrated assessment initiative.
- Steering Committee, BIOCAP, Canada.
- Business Advisory Committee, David Suzuki Foundation.
- Advisory Committee, Tyndall Center for Climate Change, UK.
- Lead Author, Millennium Assessment.
- Lead Author, WG II, Fourth Assessment Report of the IPCC
- Expert panel, WGI, Fourth Assessment Report of the IPCC.
- Expert panel, WGII, Fourth Assessment Report of the IPCC.

Frank, L.

- Member, Advisory Board, Smart Growth BC
- Member, Editorial Board of the Journal of the American Planning Association
- Member, Editorial Board of the American Journal of Preventive Medicine
- Consultation, U.S. National Institutes of Health National Hearth Heart Blood and Lung Association
- Consultation, Washington State Department of Transportation
- Consultation, King County Washington
- Consultation, Robert Wood Johnson Foundation
- Member, U.S. National Academy of Sciences Transportation Research Board's Transportation and Land Development Subcommittee
- Participated and filmed in the Canadian Broadcasting Corporation's / National Film Board's, "The Weight of the World" as part of the <u>Nature of Things</u>. Moderated by David Suzuki.

- Hall, K.J.
- Member, GVRD, Liquid Waste Management Plan
- Member, GVRD, Environmental Programs Committee
- Member, GVRD, Brunette Basin Coordinating Committee
- Director, B.C. Waterfowl Society Operate the Reifel Migratory Bird Sanctuary
- Member, Science Advisory Committee for the Cruise Ship Industry
- Associate Editor, J. Environ. Engr. And Science
- Associate Editor, Can. J. Water Qual. Research
- Member, Science Advisory Committee, Ekati Damond Mine, Lake Restoration
- Honorary Member, UBC Coin and Stamp Club

• Healey, M.C.

- Grant Reviewer, University of Oregon Sea Grant Program
- Reviewer, manuscripts for Journal of Fisheries Biology, Transactions of the American Fisheries Society, Canadian Journal of Fisheries and Aquatic Sciences, Society and Natural Resources
- Talk to Rotary Club, Kingston, RI.- Salmon wars (May 1, 2003)
- Interview with Knowledge Network on salmon aquaculture (Nov 26, 2003)
- Member, Board of Directors, Canadian Water Network
- Member, Science Advisory Board, Ecosystem Restoration Program, CALFED Bay-Delta Program, California
- Chair, Adaptive Management Forum, Anadromous Fish Restoration Program and CALFED Bay-Delta program, California
- Hinch, S.G.
- External Examiner, Ph.D. defence, (Nicholas Jone, University of Alberta, Edmonton, AB) 2004 Dec.
- Member, American Fisheries Society 1991-present
- Member, Canadian Aquatic Resource Section of the American Fisheries Society 1994-present
- Member, Cultus Sockeye Recovery Team (formed under Species at Risk Act) 2004
- Reviewer, Journal of Aquaculture Research, Fisheries Oceanography, Journal of Fish Biology, Canadian Journal of Fisheries and Aquatic Sciences, NSERC Discovery Program
- Evaluated DFO research on habitat compensation
- Radio and Television Interviews: Knowledge Network 'Innovation in BC', a documentary on my research program (2004 March), CBC Television (2003 Sept), CTV (2003 Aug)
• Printed press interviews: UBC University Affairs, and front page main UBC web page (Apr 2004), New Scientist Magazine (Jan 2004), Canadian Press (2003 August), Chilliwack Times (2003 Aug), Vancouver Sun (2003 July), Intrafish.com (2003 July)

• Kandlikar, M.

- Member, California Energy Commission Grant Review Committee
- Manuscript Reviewer, Global Environmental Change
- Member, Intergovernmental Panel on Climate Change Expert Panel

• Lavkulich, L.M.

- Member, SHASTRI International Council (1993+)
- Canadian Representative, NATO/CCMS- European Union on Integrated Water Resources Development (2002 +)
- NSERC Industry Partnership Review and Site Evaluation Saskatoon Syncrude
- Member, Scientific Liaison, European Union IRES exchange Water Resources (Brussels UBC)
- Manuscript Reviewer, Can. J. Soil Science, Soil Science Soc. Amer. J., J of Environ Eng., J. Environ. Assess, Policy and Mangt
- Pacific Regional Society, Honorary Awards
- Chair, 3 Ph.D. Orals
- External Examiner, Civil Engineering/ Forestry

McDaniels, T.L.

- Chair, Education Committee, Society for Risk Analysis
- Member, Ad hoc committee on by law changes, Society for Risk Analysis
- Decision sciences area editor for Risk Analysis, handling all editing duties for 60 manuscripts yearly
- Advice on sustainable forest resource management framework, Slocan Forest Products
- Consultant, Alberta Environment regarding citizen involvement for carbon storage projects
- Consultant, Métis settlements in Alberta regarding compensation for energy developments on their lands
- Invited participant, Canada-European Union workshop on harmonizing environmental regulation. Brussels, EU headquarters conference centre, June, 2003
- Invited member, US National Academy of Sciences Panel on Improving Environmental Decision-making. Attended two workshops in Washington DC (May and November, 2003) for the panel, and gave presentation on decision sciences as an area of emphasis for future research
- Co-author, NAS panel report, June, 2004
- Robinson, J.

- Member, Minster's Advisory Panel on Sustainability, Public Works and Government Services Canada 2004-
- Member, BC Region Environmental Technology Round Table, Western Diversification Canada 2004-
- Member, Board of Directors, Panos Canada 2003-
- Member, Steering Committee, Canadian Sustainability Indicators Network, Environment Canada 2003-
- Member, Board of Directors, Sustainable Cities Foundation 2003-
- Member, COOL Vancouver Task Force, City of Vancouver 2003-
- Member, Editorial Advisory Board, Alternatives, Faculty of Environmental Studies, University of Waterloo 2002-
- Member, International Advisory Board for the Centre for Global Studies, University of Victoria 2001-
- Member, Board of Directors, Westcoast Environmental Law, Vancouver, 2001-
- Member, Steering Group, HELIO International, Paris, 1999-
- Member, Advisory Committee, Envision Sustainability Tools, Inc., 1998-
- Member, Advisory Council, David Suzuki Foundation, 1995-
- Member, Sustainable Region Initiative Energy Issues Task Group, Greater Vancouver Regional District, 2002-3
- Member, BC Climate Change Economic Impacts Panel, Government of British Columbia, 2002-3
- Member, Ecosystem-Based Management Framework Specialist Group, Coast Information Team, established by the Provincial Government of British Columbia, First Nations, and environmental NGOs, forest products companies, and other stakeholder groups under agreements announced in April 2001, 2002-3
- Member, Editorial Board, *Integrated Assessment* Journal, Baltzer Science Publishers, Amsterdam, the Netherlands 2001-
- Reviewer, paper for Climatic Change
- Reviewer, two papers for the Journal of Industrial Ecology
- Satterfield, T.
- Member, Grant Review Committee Health Canada: Risk Communication
- Member, Grant Review Committee US National Science Program Advisory Panel for "Biocomplexity in the Environment: Dynamics of Coupled Natural and Human Systems"
- Grant Reviewer, National Science Foundation
- Manuscript reviewer, Environmental Values, Human Ecology Review and Risk Analysis
- Reviewer, book manuscript for University of British Columbia Press
- Member of Proposal Review Panel, Health Canada's Health Policy Research Program,

- Manuscript reviews for the journals: Environmental Values, Ecological Economics, Risk Analysis, Journal of Anthropological Research, Women & Health, Human Ecology Review.
- Member of the American Anthropological Association, Canadian Anthropology Society, Environmental Studies Association of Canada, Society and the Environment, Society for Psychological Anthropology, Society for Cultural Anthropology, Society for Applied Anthropology, Society for Risk Analysis
- Grant Reviews for National Science Foundation, Ethics and Values Program

Schreier, H.E.

- Committee member, GVRD Advisory Panel on Regional Water Issues: Recommendations presented to the GVRD Sewerage and Sanitation Committee, June 18, 2003
- Committee Member, Sustainable Region Initiative Workshop: GVRD July 3, 2002: Review of GVRD's new Regional Strategy for sustainable development. Critiques of overall strategy. GVRD, Burnaby, July 3, 3003
- Presentation to Provincial Committee, Schreier, H. 2003. Agricultural nutrient trends in the Lower Fraser Valley 1991-2001 presentation to the Provincial Nutrient Management Committee. B.C. Ministry of Agriculture and food. Abbotsford, September 8, 2003
- Committee Member, Groundwater Steering Committee, Township of Langley, B.C. Developing a long term management strategy for groundwater use in the Township
- Member, Columbia Basin Trust (CBT Water Initiatives), Water Advisory Panel. Addressing strategic water issues in the Columbia River Basin in preparation of Columbia Treaty renegotiation between Canada and the USA. Columbia Basin Trust, Castlegar, B.C. Dec. 1-4, 2003 and UBC Feb 13, 2004
- Papers/ Research Proposals Reviewer, Journal of Hydrology May 2003, Environmental Management June 2003, Mountain Research & Development, April-August (Guest editor for special Issue of GIS applications in Mountains) January 15- September 1. (reviewed and edited 10 papers), Mountain Research & Development March 7, 2004, Canadian Journ. Development Studies August 12, 2003, Feb. 23, 2004, Mountain Research & Development Journal, July 2003, Review of NSERC Proposal June 2003 and Strategic NSERC, Aug. 12, 2003, Review of NSERC Proposal January 29, JHAP Program
- Guest Editor, Mountain Research and Development: Special Issue on GIS and Mountains (Dec. 2003)
- CKNW Radio: Global Water Conflicts. In the World Today Show, Sept.3, 2003
- Vertinsky, I.B.
- Canada Research Chairs: Member of the College of Referees
- Expert witness, Transport Canada on acceptable risk
- Editorial Boards, Journal of Cross cultural Management, Journal of International Business, The International Public Management Journal
- Search Presentations to the Canadian Forest Service

Research

I. Faculty

Chang, Stephanie

Stephanie Chang joined UBC in January 2004. She has a joint appointment in IRES and the School of Community and Regional Planning (SCARP), and is a Canada Research Chair (Tier 2) in Disaster Management and Urban Sustainability. Previously, she was at the University of Washington.

In this last year, Stephanie was engaged in several projects related to disasters and strategies for reducing disaster losses. In a continuing study on "Comprehensive Community Recovery Modeling," supported by the Multi-disciplinary Center for Earthquake Engineering Research (MCEER), she has been developing a model of how cities recover from earthquakes and other disasters. This is an agent-based simulation model that is innovative in capturing interactions between households, businesses, infrastructure systems, neighbourhoods and communities in the disaster recovery process. This work was reported in an MCEER technical report (Miles and Chang, 2003).

In another multi-year MCEER project on "Direct Losses, Social Impacts, and Community Resilience," Stephanie has been working on a model of communities' resilience to disasters. This work emphasizes the role of critical infrastructure systems (e.g, water and electric power networks) in urban and regional societies and economies. Together with other MCEER investigators, Stephanie has been developing a conceptual framework to quantitatively assess and enhance the seismic resilience of communities. This framework was recently published in *Earthquake Spectra* (Bruneau et al., 2003, Vol.19, No.4, pp.733-752), and an application to the case of the Memphis, Tennessee, water delivery system is forthcoming in the same journal (Chang and Shinozuka, 2004). Current work is focusing on major model enhancements and an application to electric power and water systems in Los Angeles.

As a result of current and previous research, Stephanie also published several other papers this last year. An article in *Natural Hazards Review* (Vol.4, No.4, pp.186-196) discussed "Evaluating Disaster Mitigations: A Methodology for Urban Infrastructure Systems." This paper presents an analytical method for guiding the strengthening of infrastructure systems against disasters, with application to the Portland (Oregon) water delivery system. An article on "Transportation Planning for Disasters: An Accessibility Approach" appeared in *Environment and Planning A* (Vol.35, pp.1051-1072). This paper develops a method for evaluating alternative strategies for transportation restoration in disasters, with application to the 1995 Kobe (Japan) earthquake and a hypothetical earthquake disaster striking Seattle, Washington. A book on *Modeling Spatial and Economic Impacts of Disasters*, co-edited with Yasuhide Okuyama, is in press with Springer-Verlag.

Most recently, Stephanie was awarded a highly competitive 3-year grant from the U.S. National Science Foundation (US\$428,000 total). Together with Tim McDaniels (IRES/SCARP, UBC) and Dorothy Reed (University of Washington), she will be conducting a study on strategies for reducing the risk of extreme event disasters. This study will focus on mitigations for the cascading impacts of electric power outage onto other critical infrastructure systems.

Stephanie also made several invited presentations at professional meetings this year. These included presentations to the annual meeting of the Earthquake Engineering Research Institute (EERI) on social science progress in the 10 years since the Northridge (Los Angeles) earthquake, to the Emergency Preparedness Conference on business vulnerability to airport closures in disasters (reporting on a study done for the Canadian Office of Critical Infrastructure Protection and Emergency Management), and to

the Oregon Seismic Safety Policy Advisory Committee on her study of disaster mitigation strategies for the Portland urban water system.

Stephanie continues to be active in consulting and service activities for the disaster research community. She is participating as a consultant in a major study to assess future savings from disaster reduction investments for the U.S. Congress. She serves as an editorial board member of the journal *Earthquake Spectra* and as the chair of the Social Science Research Technical Committee of the Earthquake Engineering Research Institute (EERI). She is also a member of the Committee on Disaster Research in the Social Sciences, an *ad hoc* committee of the National Academies (USA).

Cohen, Stewart

The main focus of Stewart Cohen's research activities during 2003-04 was on a collaborative study on climate change and water management in the Okanagan region, supported by the Climate Change Action Fund (CCAF). The total funding is \$235K, shared with the Pacific Agricultural Research Centre (PARC) in Summerland. The goal of this 2.5-year study is to develop scenarios to stimulate a stakeholder dialogue on water management options for adapting to climate change within the regional context of ongoing development pressures. IRES participants are James Tansey, Philippa Shepherd, Stacy Langsdale, Jeff Carmichael, Tina Neale and Rachel Welbourn. The study team also includes Prof. Younes Alila from Forest Resources Management, post-doctoral fellow Wendy Merritt (now at Australian National University), and staff from Environment Canada--Pacific & Yukon Region, PARC, and the BC Ministry of Water Land & Air Protection. Funding is being sought from CCAF for 2004-06 to move this work to a new phase, focusing on adaptation policy and the development of a systems model that could support a policy dialogue.

Stewart is also participating in a study on climate change implications for the Northwest Passage, led by the Canadian Ice Service, and in planning exercises for the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report, due to begin in the fall of 2004. He has continued to offer his graduate course, Climate Change in the 21st Century (RMES520/GEOG539), and this year, he also did presentations on climate change topics at ApSci 262 and the Geography graduate colloquium, as well as at other venues in Canada and the U.S. He serves on two graduate student committees. He also continues to serve as advisor for the BC branch of the Canadian Climate Impacts and Adaptation Research Network (C-CIARN BC), hosted by IRES. He will continue in that role as C-CIARN BC shifts to Sociology in April 2004.

Dorcey, Anthony

The year has been hectic. We are pleased that the School (SCARP) received a positive review by the US Planning Accreditation Board. The preparation of a three volume submission was both taxing and challenging.

In addition to administrative duties, I offered 5 graduate courses, supervised 4 Ph.D. students and 17 Master's students. Of the total, 2 Ph.D. students completed their programs and both have obtained meaningful employment. Of the 17 Masters students, 6 completed their programs this year.

I was involved in two successful "Committees". As a member of the Canadian Institute of Planners accreditation review team, the UNBC received additional financial resources to achieve their much needed accreditation. And, as a member of the Planning Institute of BC Task Force, the Institute adopted a policy on "continuing professional development", a major innovation in the context of the planning profession in North America.

Dowlatabadi, Hadi

Anticipatory adaptation to water supply shortages in the Okanagan Region (Funded by US NSF, with Philippa Shepherd and James Tansey)

The Okanagan region of British Columbia is dry and enjoys warm summers. It has long been a productive agricultural region and has become a haven for new retirement communities. It suffers from severe water supply constraints that climate change is expected exacerbate. A number of urban and rural initiatives have been taken in the past two decades to assure adequacy of water supply. Shepherd has chosen four of these initiatives for a comparative case study. She has conducted numerous interviews and examined archival material on the details of the decision-making processes and outcomes of these initiatives. The findings suggest weak networks of learning even among decision-makers located in a small region facing the same or very similar challenges. Such observations of lost opportunities to learn through comparative policy analysis are discouraging of our ability to effectively implement adaptive management strategies in the current institutional decision-making milieu.

Water quality management (Funded by US NSF, with Negar Elmieh)

Between 1980 and 2002, British Columbia experienced 29 waterborne disease outbreaks resulting in thousands of waterborne illnesses in 25 different communities. Many of these events were associated with extreme weather such as floods and first run-off after prolonged droughts. There have been a number of simplistic studies of how water-borne illnesses might be impacted by climate change.

A more systematic perspective should also consider the changing demographics of the region's population – it is the retirement haven of Canadians. It should also consider how diseases (e.g. HIV) and medical interventions (e.g., chemotherapy) have affected the immune status of various subgroups of the population. We have not been able to find any prior studies exploring if there are more vulnerable sub-populations in the event of water quality failures and the consequent health impacts they might suffer. To the best of our knowledge there has not been any systematic attempt to consider safe-fail approaches to risk reduction from water-borne pathogens.

The purpose of this research is to determine the prevalence of waterborne illnesses among various subpopulations, and develop risk reduction strategies that take into account institutional, and personal behaviors. We hope to be able to use the data in British Columbia, which permits us to examine each patient visit to hospitals and physicians and their possible connection to weather events and boil water advisories. We will also be administering a survey (after each new boil water advisory) in order to develop a more complete picture of unreported ailments as well as those that have been recorded by the health-care system. Armed with this data and self-reported behaviors related to risk reduction during boil water advisories we plan to develop a systematic approach to water quality management which is contextually sensitive and can be used as a template for water quality management in other regions of the world.

Air pollution (Funded by US NSF2, with Eric Mazzi)

The challenges facing poorer nations are hardly represented by the body of science used to compile IPCC reports. For example, the proposed air quality gains as ancillary benefits of climate policy are entirely based on environmental conditions, exposure patterns and epidemiology of the US. These are hardly representative of the conditions prevailing for the majority of world's population. An Integrated Assessment will be developed to answer the question: how will climate policy influence residential energy choices, air quality, exposure, and health effects in developing countries? Specifically how might climate policy retard (or accelerate) the transition from traditional, higher-polluting, non-commercial

biofuels to commercial, relatively clean fossil fuels and or clean renewables? Differences in rural versus urban populations and indoor versus outdoor air pollution sources and exposure, and gender and age (i.e. women and children) will be critical. A new model will be developed (we do not know if it has been attempted before) to characterize the determinants of the transition from non-commercial to commercial fuels. This model will have to take into account a number of economic, social and environmental factors. It will be an integrated assessment in its own right. The response of this model to global change in general and climate policy in particular will drive our findings. The findings will include emissions from fuel use, modeling of indoor air quality, exposure by activity, gender and age, and expected health impacts.

Emergent Ethics/Norms of Applied Genomics (Funded by GELS4, with Peter Danielson and Zosia Bornik)

We are developing models of democracy and interactive experiments aimed at understanding the dynamics of norm formation with respect to novel technologies such as applied genomics. We are examining context and path dependencies using three cases: bio-informatics, genetically modified fish and stem cell therapy.

Bridging the Gap Between Project Assessments and Regional Development Dynamics in the Canadian Arctic (Funded by CEAA₅, with Michelle Boyle, Milind Kandlikar and Susan Rowley)

Major development projects in northern Canada are often initiated with the hope of attracting follow-on development. For example, roads to mineral properties in remote areas open access and can attract mines, support services and communities. The economic benefits are welcome, but other environmental and social effects will occur. External influences (e.g. climate change, global mercury deposition) add to the uncertainty of assessing impacts. Development in this area must proceed wisely and remain simultaneously cognisant of dynamics at local and regional scales, and balance both positive and negative outcomes. The overall objective is to provide a set of tools to estimate the cumulative impacts of a development project based on its power as an "attractor" to subsequent development. The methodology involves an analysis (derived from publicly available data) of past projects, historical development patterns and the socio-economic and demographic impacts to northern communities. Insights from the analysis can then be used to anticipate future development outcomes in a given context.

Community Adaptation in a Changing Arctic Environment (Funded by US-NSF₂, with Michelle Boyle)

Communities in the Arctic are experiencing significant and rapid change on several fronts. Climate change is shifting seasons and fundamentally altering ecosystems. Technology and sea ice melt are creating new opportunities for the extraction and transport of minerals. Trans-boundary pollution poses a health risk. New institutions and models of self-governance are on trial, while efforts to address persistent social and economic challenges continue. The outcome of these changes on communities and traditional lifestyles is uncertain, but will be profound.

The ultimate aim of this research is to assist communities in devising adaptation strategies appropriate for more sustainable development. The main objectives are:

• To conduct an integrated assessment of the magnitude, rate and likelihood of expected changes (environmental, economic, social, institutional and technological) and their effects on development in Arctic communities.

- To determine the extent to which historical lessons of development and response can inform decisions about future options. This objective involves testing past determinants of development (through a sensitivity analysis) to anticipate how they will be affected by expected future changes.
- To synthesize and apply the results of the above by working in partnership with two communities in Nunavut to devise an adaptive management plan. The participation of the community is critical, in expressing their concerns and information needs, in conveying their knowledge of local impacts and in defining options and thresholds for future development.

Industrial Ecology of New Materials (Funded by Auto-21 NCE6, with Milind Kandlikar and Yasuhiko Ogushi)

New materials are being employed in the design of automobiles. Simultaneously, new regulations are being promulgated requiring manufacturers to take back their products at the end of the useful life. Take-back regulations for specific products have been in place in Japan and Europe for some time. We are examining the responses to the regulation at the design, material selection, consumer purchasing/leasing behavior, diversion and disposal stages of products.

Barriers to greening of SMEs (Funded by US-NSF2 with Jamie MacDonald)

This project aims to explore methods to accelerate the diffusion of best practices in purchasing among the clients of a local cooperative known for its own sustainable and ethical business management practices – VanCity. An initial survey will identify motivations, barriers and capacity for more sustainable procurement decisions among consumers. We will then use mailings, websites and personal contacts to introduce SME managers to a range of products already certified as being environmentally and socially acceptable by a federally funded institution. Follow-up surveys and tracking (using unique id vouchers) will be used to determine motivations, barriers and results of participating SMEs. The data gathered will be analyzed to explore whether response patterns are attributable to particular firm or product characteristics.

Hall, Ken

Non-Point Sources of Pollution

In cooperation with Dr. H. Schreier, I have been conducting research in the Lower Fraser Valley entitled "Non-point sources of pollution, cumulative effects and mitigation in the urban/rural fringe watersheds" which is funded through the National Centres of Excellence/Clean Water Network. A MASc thesis (J. Addah) has been completed on the impact of land use activities on the surface water quality conditions in the Agassiz area (District of Kent). This research is continuing with an investigation of the dynamics and quality of the groundwater in this area (MSc, C. Francis). Research has just been completed and a thesis is in preparation (H. Goble, MSc) on the impacts of small sewage treatment facilities (septic systems) on the ground- and surface- water conditions in the Brookswood aquifer area of south Langley. This project is a also a component of the NCE/CWN program and is funded by a partner (Greater Vancouver Regional District). A similar project (G. Solano, MSc) that will study the Abbotsford/Aldergrove aquifer area, that provides flow to Bertrand and Pepin creeks in SE Langley, is underway. Both of the Langley projects will provide environmental data that will be useful in the health study that the Bridge program is conducting in Langley.

In the highly urbanized Brunette river watershed, a thesis (M. Muraro, MSc) has just been completed on the temporal and spatial mercury contamination in aquatic sediments. The main source of this contamination, which saw mercury levels in the sediments increase 300% between 1973 and 1993, was

apparently the Burnaby incinerator. Better contaminant removal at the incinerator has resulted in a drop in mercury sediment values in 2003 as the contaminants are flushed out of the watershed.

Environmental Engineering, Constructed Wetland

Following our field studies in Mission B.C. on the treatment of woodwaste leachate by constructed wetlands (K. Frankowski, MASc; A. Masbough, MASc), a mesocosm wetland, consisting of four small wetland cells, was constructed at South Campus. The woodwaste leachate is transported to campus and carefully metered into the wetland for better control. We are investigating the microbial dynamics (ATP, bacterial heterotrophic activity, bacterial production) in the water, sediment and biofilm compartments of the wetland as the leachate moves through the wetland under different conditions of leachate strength, hydraulic retention time, and addition of nutrients and electron acceptors (W.Tao, PhD).

Agricultural Antibiotics, Environmental and Health Impacts

Research is underway on the determination of veterinary and food additive antibiotics used in animal husbandry. These substances end up in animal manure and after land application could have impacts on the terrestrial and aquatic environments as well as human health. With the cooperation of Health Canada (Dr. D. Shang) we have use of LC/MS/MS electrospray technology and the analytical methods that Health Canada has developed to monitor over 20 antibiotics. The methodology is being adapted to environmental samples and is being applied to the poultry industry as a case study to track antibiotic residues and study their dynamics and impacts in the Sumas River watershed (P. Keen, PhD).

Healey, Michael

During 2003-2004 my research focused on three projects, a book on ecosystem based coastal zone management, empirical research on the ecological energetics of migration and spawning in Pacific salmon, and a book on invader species. Each of these projects is broadly collaborative, involving researchers at UBC and other universities. Each is also interdisciplinary, between natural and social sciences, between different branches of natural science and between natural science and the humanities. In addition to these projects, I have students completing graduate projects in aquaculture, water policy and management of endangered species and I continue to serve in an advisory capacity for research and policy concerning water resources in Canada and ecological restoration in California.

Until September 2003, I was on sabbatical at University of Rhode Island where I was collaborating with Prof. Tim Hennessey (Political Science) on a book on ecosystem-based management of coastal resources. The intent of this book is to synthesize research that Prof. Hennessey and I have conducted independently and jointly over the past two decades on problems of science and policy in management of coastal resources. The first part of the book builds a theoretical framework for ecosystem based coastal resources management from a consideration of ecological theory (physical processes, energy flow and landscape processes that shape the character and productivity of coastal ecosystems) and theory of public policy (political agenda setting, issue attention cycles, institutional analysis and design, and international regimes that shape the governance structure for coastal resources). This framework provides a basis for the examination of four case studies in coastal resources management (Chesapeake Bay, San Francisco Bay, Georgia Basin and Bay of Fundy/Gulf of Maine). Each of the case studies is dominated by a different and relatively narrow set of Environmental and Policy issues (Coastal pollution in Chesapeake Bay, freshwater inflow in San Francisco Bay, coastal fisheries in Bay of Fundy/Gulf of Maine, and growth management in the Georgia Basin). The particular resource management issues highlighted in each case study, however, are nested within a broader set of problems that is common to all the cases. The ms for this book is about half completed. Progress was slowed considerably following my return from sabbatical. However, Prof. Hennessey and I will be attending both the Coastal Zone

Canada conference in St. John's in June 2004 and the Coastal Zone Asia Pacific conference in Brisbane in September 2004 to deliver papers based on some of the research conducted for the book. We hope to have the completed ms ready for submission to a publisher by summer 2005.

The empirical research on the ecological energetics of migration and spawning in Pacific salmon is continuation of collaborative research I have had under way for over a decade. Since 1996 the research has been supported by NSERC strategic grants on which Scott Hinch (Forest Sciences) and Tony Farrell (SFU) were co-investigators. In November 2003, we obtained a new Strategic Grant to continue the work on which Scott Hinch took the role of PI. Other collaborators over the years have included David Higgs and Steve MacDonald of DFO and Jim Woodey and Mike LaPointe of the Pacific Salmon Commission. Throughout this research, our focus has been on understanding the interplay between behavioural motivation and physiological capability in directing migration and spawning of Pacific salmon. The freshwater migrations and spawning of salmon provide an excellent model system for investigating the interplay of behaviour and physiology because the physical environment with which the fish must contend is extreme and variable, they must complete migration and spawn within a relatively narrow time window and they are working with a limited and rapidly declining energy reserve. The behavioural and physiological decisions that each fish makes during this phase of life are critical to its contribution to future generations and there is the very real possibility of failure (In recent years, high proportions of sockeye salmon returning to the Fraser River have perished without spawning.) Our research has confirmed that salmon may well die before spawning because of energy exhaustion, although recently infection with a parasite, Parvicapsula, is also associated with pre-spawning mortality. Research to date has focused on Sockeye salmon, although some research has also been done on pink, chum and coho. Some key findings include: 1) sockeye in recent years returned to the river with lower energy reserves than those that returned in the 1950's (the only other existing measurements); 2) sockeye with longer and more difficult upstream migrations entered the river with more energy reserves than those with shorter, easier migrations; 3) upstream migration costs were similar in the 1950's and in recent years, so that reserves for spawning have been lower in recent years; 4) female salmon migrate in a more energetically efficient manner than male salmon and pink salmon are more efficient migrators than sockeye; and 5) On the spawning grounds, sockeye spend most energy in routine maintenance activities, however, displays to establish dominance in males and nest digging in females are energetically very costly. Results of this research have assisted regulatory agencies with decisions about how much to restrict salmon fisheries so as to ensure adequate spawning and have provided explanations for unanticipated mortality rates of salmon during upstream migration. We are continuing with fundamental research on physiological ecology of sockeye and other species, however, the recent strategic grant proposal also refocused the research toward understanding how Parvicapsula infection is contracted and how it contributes to pres-pawning mortality.

The book on invader species grew out of my involvement with a senior undergraduate class in English taught by Laurie Ricou. Each year Laurie challenges his class to read scientific literature on a particular topic and write commentaries on what they have learned. Over the past two years, at my suggestion, Laurie has had both his undergraduate and his graduate classes explore the literature on invasive species in the Pacific Northwest. The students unearthed an eclectic assortment of tremendously interesting stories of invasion and they have agreed that we can use the material they gathered as well as parts of their essays in a book on invader species. The book will explore seven themes of invasion that emerged from the student essays (meanings of alienness, the language of invasion, connections with the sensual and sexual, the transformation metaphor, the global context of invasions, the control of nature metaphor, and accidental vs deliberate invasion). We envision the structure of the book as a series of conversations among the three of us (Travis Mason, a graduate student, Laurie and I) structured within these themes. At present we have extracted and collated the material from student essays and have drafted three of the seven chapters.

Hinch, Scott

Salmon Migration Research

In recent years in the Fraser River, adult Pacific salmon have begun entering rivers earlier than normal, and associated with this is extremely high mortality (>90%) prior to spawning. This unusual and unexplained recent change in migration behaviour has pushed some stocks to the point of collapse and the sustainability of others is severely threatened. Our current research program brings together several scientists from academic and government laboratories with backgrounds in salmon ecology, behaviour, physiology, molecular biology and parasitology. Our general aim is to identify why this phenomenon is happening and determine its immediate and long-term consequences to the sustainability of salmon. The relevant issues are discussed below.

The Mystery of the Disappearing Sockeye Salmon

(taken from UBC Reports | Vol. 50 | No. 4 Apr. 1, 2004 - Story by Michelle Cook)

Fraser River sockeye salmon have been acting strangely of late. Their odd behavior has experts puzzled -- and worried -- because millions of the fish are dying before they reach their spawning grounds. It's a mystery that could spell the end of the river's salmon fishery, but UBC and SFU scientists studying the phenomenon think they are close to solving the case of the disappearing fish. In a project funded by the Natural Sciences and Engineering Research Council of Canada with support from the Pacific Salmon Commission and Fisheries and Oceans Canada, researchers have been examining why some late-run sockeye are migrating up the Fraser more than a month ahead of schedule. Normally, the salmon migrate down the coast of British Columbia and mill about in the Strait of Georgia for several weeks before heading up river in late September.

"In 1995, we started noticing a large group had started to change their behaviour in terms of when they returned," says Scott Hinch, the forestry sciences professor leading the investigation. "This wouldn't have been a big problem except that they seemed to be dying in really high numbers. We didn't realize how high until the phenomenon continued for the next few years. What we saw was fish entering the river four to six weeks earlier than usual and those early migrants died before spawning -- up to 95 per cent of the total run in some years. The mortality rate for sockeye arriving on schedule is about 10 per cent."

This has had catastrophic effects on the fishery and fish conservation, Hinch adds. Since 1996, close to four million late-run sockeye in total have died during their upstream migration. In 2002, the fishery lost more than \$70 million. Some small stocks, like the Cultus Lake sockeye, which were emergency, listed endangered more than a year ago, have been pushed to the point of collapse. At first, the researchers were at a loss to explain either the early migration or the high mortality. They formulated several hypotheses before identifying a prime suspect in the high mortality rates: Parvicapsula, a natural kidney parasite that latches onto fish at the mouth of the Fraser. Since Parvicapsula hitches a ride on all salmon heading up river -- early or otherwise -- the researchers weren't sure why it only seemed to be having an adverse affect on the fish migrating ahead of schedule. What they did know was that the water temperature in the river is several degrees higher in mid-August than in late September when late-run sockeye normally come in from the ocean. Hinch's team suspected that the higher river temperatures were affecting the speed of the parasite's infection and the early migrants' kidney functions, which play a vital role in helping fish to adjust from salt to fresh water. Then, by accident, the team discovered a key piece of evidence. While surgically inserting small radio transmitters into a test group of late-run sockeye, researchers noticed that the early arrivals bled profusely during the short operation.

"We'd not seen anything like it before when we've inserted transmitters, nor had we anticipated it," says Hinch. "Blood samples from these fish also showed that the early migrants had poor clotting ability and abnormally high levels of ions. There was clear physiological evidence that the kidneys were malfunctioning and this may be the cause of the high mortality. What it also means is that fish could be bleeding to death during their migration if they get any small nick or cut, which can be common."

This still didn't explain why sockeye were starting their long journey up the Fraser so early. Although Parvicapsula was doing a lot of damage to the early migrants in the river, it didn't appear to be responsible for driving them into the river ahead of schedule. The UBC team had several theories but it was colleagues from the Institute of Ocean Sciences on Vancouver Island who revealed the clues, which may crack the case. Researchers from the Institute told them that recent CTD (conductivity temperature depth) surveys of the Strait along with some historical data they dug up, shows low salinity pockets in some coastal areas that weren't there before. Piecing the evidence together, the UBC team determined that some late-run sockeye might be hitting these low salinity pockets of water in the Strait. Thinking that they are in fresh water, the salmon prematurely activate their kidneys and ozmoregulatory systems -- the function they use to adjust to fresh water -- and head straight into the Fraser River instead of milling. Once in the river, they pick up the parasite earlier than normal. The higher water temperatures limit their ability to fight off the infection. The longer they are in higher temperature water, the more damage the parasite does until, eventually, the sockeyes' kidneys malfunction.

"Any one of these factors alone probably doesn't kill them outright," says Hinch. "It's the combination of all these things that we think causes them to die. Early migrants probably get two thirds of the way to their spawning grounds, but many just don't make it. The early fish that do reach the spawning grounds seem to die before spawning."

Hinch says the team is still a long way from closing the investigation. They still have several hypotheses to examine over the next few summers but the theory, if proven correct, leaves Hinch cautiously hopeful for the future of the Fraser River sockeye.

"Over the last couple of years, there seems to be a segment of the late-run sockeye that are acting normal and now that we understand a bit more of the problem, I'm somewhat relieved and optimistic for these fish," Hinch says.

Fish/Forestry Research on Stream Dwelling Salmonids

Another component of the research conducted in my laboratory is to study how natural and anthropogenically derived variability in habitat (as caused primarily by forestry practices) affects behaviour, stress, growth and survival of stream-dwelling trout and juvenile salmon.

Over the past 6 years, we have examined headwater populations of coastal cutthroat trout (O. clarki) in the UBC Malcolm Knapp Research Forest locate 50 km east of Vancouver. We have investigated the effects of second-growth logging on trout densities, body condition and habitat and explored the characteristics of winter trout movement. Summer densities of trout in logged streams showed no decline for the 4 years following harvest, nor were there any large changes evident to physical habitat. However, among years, mean summer trout densities were higher in streams with deeper pools. Though summer trout densities remained unchanged in logged streams, trout densities in control streams declined. This suggests that trout density may actually have benefited from logging, potentially due to enhanced levels of primary productivity arising from the removal of riparian canopy. Mean summer trout densities in the logged streams did not decline like those observed in the control streams in the years following harvests. Winter trout densities were similar to summer values, indicating that these headwater streams provided suitable conditions for trout populations year-round.

Little is known about responses of fish and habitat to forestry practices in non-coastal regions. One of our projects, carried out in the central interior region of British Columbia, focused on: a) an examination of the physiological stress responses of rainbow trout (Oncorhynchus mykiss) to clear-cut logging; and b) an evaluation of the impacts of clear-cut logging on stream temperatures and their consequences to fish growth. In part (a), acute and chronic stress indicators, comprising plasma cortisol, glucose and chloride concentrations, as well as interrenal nuclear diameters and fish condition indices, were used to assess the health of fish in response to clear-cut logging using a synoptic survey approach. Streams were grouped into three logging categories: unlogged (controls), "newly logged" (clear-cut within 5-10 years), and "older logged" (harvested over 25 years ago). Newly logged streams had the greatest potential for sediment and temperature related impacts, while older logged streams had the greatest potential for impacts related to habitat degradation. None of our physiological indicators exhibited a biologically significant response to any of the logging treatments. In part (b), we examined stream temperature and fish growth and movement responses to clear-cut logging using a case study experimental approach. whereby four small streams (two treatments and two controls) were monitored prior to and following harvesting within the riparian zones. We found that our lake-headed streams did not exhibit increases in summer stream temperatures after logging took place despite the removal of >50% of the riparian vegetation. Furthermore, rainbow trout in the "naturally warm" lake-fed treatment streams were larger and heavier across all size classes than trout in the "naturally cool" control streams. Mass movements of fish, which occurred largely in the spring, through study streams seemed unaffected by logging treatments. Overall, these results suggest that logging related impacts in the central interior of British Columbia may be more benign and consequently less harmful to stream dwelling fish when compared to coastal systems, especially if many of these streams are fed by small lakes.

Lavkulich, Leslie

My research activities during the past year may be categorized into three areas:

Aquaculture Sedimnets and Environment

The project on the environmental effects of aquacultural activities, as found in the water column and in sediments immediately adjacent to and beneath fish farms in the Strait of Georgia, has been completed. In addition to Susanne Nordstrom (M.Sc at Upsalla), and Alison Freeman (B.Sc. Thesis at UBC), the project was completed by Kate Schendel (Research Associate). The major findings, published in Aquacultural Research, found that excess feed and metals did in fact accumulate from these enterprises. However, the accumulation of excess feed was soon dissapated with distance from the farm. Trace elements were found to accumulate not at the immediate surface of the marine sediments, but somewhat below at 2 - 5 cm depth. The in situ formation of "flocs" lead to wider dispersal of sediments away from the site of the fin-fish farm.

Formation of Amorphous Materials and Water Quality

It is recognized that land use activities such as agriculture and forest harvesting have an impact on the drainage waters from these terrestrial activities. Two major issues are under investigation by two Ph.D. students. The first (Rash Maal – Bared) is examining the formation and role of "biofilms" in river systems as potential mechanisms to (a) reduce the negative environmental effects of organic contaminants to the water system, or (b) coat and preserve the potential deleterious effects of these organic contaminants (pesticides) and (c) do biofilms contribute to the movement of contaminants within the aquatic system.

Another facet of impacts on the aquatic system is based on the observation that often in river systems and drainage waters, amorphous ochres and gels are found commonly. Observations indicate that these amorphous materials are more commonly identified following land disturbance (harvesting). The organic

matter dynamics (chelation) affects the solubility and mobility of aluminium and iron and their reaction with silicon. The reaction change with silicon is the primary process for the formation of these amorphous compounds. The amorphous compounds release large quantities of aluminium (3), which is toxic to many aquatic species, and the material may clog gills of fish as they do water-filters. This project is the focus of research for Ms. Stephanie Grand.

Environmental Sustainability Indicators

A project lead by Kate Schendel has focused on the definition and identification of indicators that may be related to environmental vulnerabilities and issues of sustainability. The project had two foci. The first was an extensive literature/ interview program to assess the business communities concerns and practices regarding sustainability indicators. These reviews served as the background papers for the Corporate Sustainability conference held in Vancouver in November 2003.

A similar project that is on going is the articulation of environmental indicators for human impacts on water quality management in the European Union. To date two workshops have been held with counties of the European Union, including those that are now becoming member States.

McDaniels, Tim

During 2003-04 Tim McDaniels, along with his colleagues and students, had underway three major research projects and two small ones.

The largest and longest running project, which has been active since 1997, involves out collaboration with the Center for the Integrated Study of the Human Dimensions of Global Change (CISHDGC) at Carnegie Mellon University in Pittsburgh. This project has focused on issues of values, valuation, decision making, learning and stakeholder involvement in issues of global environmental change. Students working on this project this year included Jamil Bundalli, who worked with village groups in Kenya for five weeks, developing rural energy plans. Another project in this context included the work of Charlie Wilson, who, with support from our project and from the GBFP, has been working with the Georgia Basin Futures Project on workshops with agencies to bring concepts of decision analysis to backcasting exercises. In addition, Robin Gregory and Tim McDaniels made further progress on a series of studies linking learning and decision processes for global change. Their paper on this topic was published by Environmental Science and Technology. Another new research output is a submitted paper on valuation of First Nations resource losses due to energy developments on their lands. Still other projects included the work of Martin Bazylewich on the scientific basis of scenario planning as a means of characterizing uncertainties. Beyond that several of the projects outlined below were jointly supported by the CISHDGC.

A second major project, (which comprises two separate projects that have run for over two years) has been supported by Aquanet. The first of these sub-projects, which technically ended in April 2003, but on which work continued through the year, involves developing aspects of a risk management framework for salmon aquaculture. One of the most interesting aspects of this work has been development of a framework regarding regulatory gaps and mismatches in global change issues that involve several levels of governance and decision making. This project is summarized in a paper undertaken with Hadi Dowlatabadi and Sara Stevens. That work was presented at a meeting of the CISHDGC in June, then as an invited talk at the US National science Foundation, and finally at the Human Dimensions of Global Change biannual open meetings in Montreal on October. Another aspect has been the work of Daniel Galland, who developed a conceptual framework and then tested it in an examination of the evolution of criteria for siting salmon farms. Still another aspect has been the exciting work of Holly Longstaff, who has completed a risk communication experiment regarding genetically modified feed for farmed salmon, and the implications for consumer decisions. Both Daniel and Holly presented their work at the Society for Risk Analysis annual meeting in December. Still other projects conducted under this topic included the work of Patricia Keen, who presented a study of expert rankings of the riskiness of various salmon farming activities at the Aquanet annual meeting. At that meeting, held in October, two of our students (Holly and Patricia) gave plenary addresses about their work, while three other students (Daniel, Kira Gerwing, and Nara Mehlenbacher) all received awards for their posters. Nara was the project manager for our work to design an adaptive management plan for salmon aquaculture in BC. That project involved a major stakeholder workshop in December, which was attended by 35 people from coastal communities and organizations or agencies concerned with salmon farming.

The third major project is one that got underway during the year, in conjunction with Stephanie Chang and another colleague from the University of Washington.

It is concerned with mitigating the effects of "extreme events" (e.g., earthquake, severe storms, terrorism, component failure) that lead to electrical blackouts, and which then lead to failures in other infrastructure systems. This project has three components, the being to try to characterize infrastructure interdependencies that lead to major social disruption. This project is supported by the US National Science Foundation, through a sub-grant from the University of Washington.

The final project involved a trip to Mexico to visit former student Ricardo Torres, who is now a professor at the University of Quintana Roo. The purpose of the trip was to plan a major proposal concerned with coastal resources planning, tourism, ecological risk, and sustainable development, which we hope to pursue in coming months.

One last small project over the winter months involved helping to develop an approach to decision making for sustainable forest management. The result was participation in preparing a report by the research team for Slocan Forest Products.

Robinson, John

The three main activities I was involved in were acting as the Principal Investigator I in (i) the final year of the Georgia Basin Futures Project, (ii) the new Geocognito project (successor to the Georgia Basin Digital Library project), and (iii) of the CIRS CFI proposal.

Georgia Basin Futures Project

The final year of the GBFP has been spent in finishing the work of the Culture and Cognition, Teaching and Learning, and Case Study teams, and in starting the work of the Strategies team. Close to 30 QUEST workshops have been held and we have started an active process of publishing in each of the project teams.

In addition we have begun the process of applying for a successor to the GBFP. A team of 18 coinvestigators, and about the same number of partner organizations in the community, has been assembled, and a letter of intent submitted to SSHRC. We will get a response to the LOI in April 2004 and, if it is successful, we will submit a full proposal by September 1.

Geocognito

With regard to Geocognito, we assembled our team of 10 co-investigators and began several streams of work, including information visualization in QUEST, landscape visualization in Bowen Island and the

beginnings of some work on adaptive interface design. In work that overlaps with the GBFP, we have begun collaboration with film students from UBC on an update to Science World QUEST, and design students at Emily Carr on the QUEST interface.

Centre of Interactive Research on Sustainability (CIRS)

Work on the CIRS project has been extremely time consuming. I raised \$245,000 for a CIRS Feasibility study and to that end have had two consultants preparing a business plan/governance strategy and a more detailed technical design of CIRS. Our CFI proposal was successful and we are very actively working with GVRD, the City of Vancouver, BC Hydro, Fuel Cells Canada, and other organizations in moving this proposal along.

Satterfield, Terre

SSRCH/CURA Resilience and Local Capacity Development in B.C.'s Coastal Communities

This project is a partnership between a multi-disciplinary research team based at The University of British Columbia (UBC), the Coastal Community Network of B. C. (CCN), and six coastal communities in British Columbia: Sechelt, Port Alberni, Port Hardy, Bella Coola, Prince Rupert, and Masset. Partners include both the 'civic' community and one or more neighbouring First Nation (FN) bands. This work grows out of our SSHRC funded 'Resilient Communities Project' (RCP), that has conducted extensive research into levels and types of social capital throughout coastal B.C. The CURA initiative, takes the RCP research as its starting point, and is an opportunity to further develop social capital resources on the coast. It will engage partner communities directly in all aspects of research on issues and problems identified by communities themselves. By basing research in community issues and by working with community expertise to address them, we enhance the long-term capacities of our partners for resilience, or the ability to address present and future questions of community development. With our community partners we have developed four research themes and associated research projects that take this as both their starting point and ultimate goal: 1) Sustainability and Environment; 2) Local Governance in a Global World; 3) Local Social and Economic Development, and; 4) Education, Skills, and Knowledge.

World Health Organization: A Cross National Study of Health and Environmental Risks

This project works to test the principle findings from perceived risk studies of environmental technologies in a non-North American context (most of the extant literature was developed in US, Canada, and Europe). Pilot surveys are being conducted in western China (samples comprise approximately 400 'lay' and 400 'expert' respondents) and urban Chile (Santiago). The data for the Chinese study has been collected and is currently being analyzed. The data for the Chilean sample is being collected at this writing.

Foundation for Research Science and Technology: New Zealand Maori Perceptions of the Risks of Genetically Modified Organisms

This project examines Maori perceptions of genetic engineering in the context of specific applications in medicine in agriculture. The goal is to understand the conditions under which different segments of New Zealand's Aboriginal Maori population both accept and reject genetic engineering [e.g., when they do or do not have some control over patent rights, when human genetic material is used, when core cultural principles such as whakapapa (genealogy), mauri (the spiritual essence of life force), and kaupapa (the purpose of an action) are violated, when the benefits are local versus non local, when native or *toanga*/scared species are involved, etcetera). Both a qualitative phase and quantitative phase are included.

US National Science Foundation: The Experience of Risk in an African American Community

The data from this research enabled the project team to develop a survey instrument that more fully captures the experience (as opposed to perception) of risk events and to document the experience of one rural African American community's exposure to sustained arsenic contamination. Theoretically, the results were important because they linked two previously independent literatures: qualitatively researched depictions of contaminated communities and quantitatively defined perceptions of health risks.

US National Science Foundation: Distinguishing Values from Valuation and Narrative Valuation in a Policy Judgment Context

These two linked studies have worked to develop new methods to better incorporate the philosophical and nonutilitarian values that underpin much thinking about the environment. Ideas about the intrinsic value of salmon or the nonutilitarian or existence value of a remote wilderness territories are not necessarily well represented in conventional studies of environmental values as these [conventional] studies are largely driven by posing hypothetical markets in which survey respondents are asked to 'value,' in dollars, an environmental good or service. Ultimately, we developed (and are continuing to develop) considerable evidence to uphold the premise that the values held by lay stakeholders are articulated discursively via the morally rich stories and conversations through which people define themselves and their actions in relation to natural systems. More specifically, we find that valuation problems that are framed, discursively, in narrative form are more effective than those presented using a strictly utilitarian, 'rationalist' or cost-benefit frame.

Hampton Fund Reseaerch Grant in the Humanities and Social Sciences: Seeking Socio-Cultural Justice in the Management of Protected Areas

The purpose of this project is to examine the conditions necessary to ensure socio-cultural justice in the management of protected areas with the end goal being a better balance between biological and social objectives at all sites. Using international case studies we aim to develop a more comprehensive understanding of the social and cultural implications of protected areas across diverse national contexts. We are looking at the conditions of protected area siting, decision control, and distribution of impacts in protected areas in Canada, Mexico, Chile and Ethiopia. The proposed research will lay the critical foundation for the establishment of a UBC-based research program on sustaining cultural justice in the management of protected areas (e.g., national parks, biological reserves, national monuments, habitat conservation areas, etc.).

Schreier, Hans

National Centre for Excellence on Clean Water (NCE): Nonpoint sources of pollution and cumulative effects in local watersheds

This is a collaborative project between municipalities, regional districts, the Centre for Disease Control (CDC), Joule Microsystems Ltd and IRES and is sponsored by the National Centre of Excellence on Clean Water (NCE-Canadian Water Network). It involved five watersheds and two groundwater aquifers and the aim is to develop new techniques to examine non-point sources of pollution and cumulative effects from different urban and agricultural land uses on water quality and aquatic and human health. Surface and groundwater are being monitored and land use activities are incorporated into a GIS database for modelling and scenario development. Linkages between land use, water chemistry, sediment transport and microbial dynamics are being investigated in a collaborative manner and the

impact of metals, organic pollutants and metals is being investigated using chelex resins and SPMD's (In collaboration with Ken Hall and 6 graduate students).

PARDYP Project in the Himalayan Region:

Integrated watershed research is carried out in this collaborative project between IRES and research teams in China, Nepal, India, and Pakistan. The focus of the research is to address water resource issues, land use impacts on water resource, land degradation, and food security. Examining land degradation and sediment transport processes, improving drinking water supplies, testing innovative water harvesting and low cost drip irrigation techniques, and determining ways to improve fodder production and soil fertility are the key research topics addressed in this project. This is the long term study sponsored by the International Development Research Centre (IDRC) and the Swiss Agency for Development and Cooperation (SDC) and is aimed at sharing research results within the Himalayan Region. Scaling effects are addressed within and between watersheds, and WEB-based multi-media tools are used to share successes and to conduct collaborative research experiments.

Innovations in watershed management: Comparisons between New Zealand and Canada

This collaborative project addresses two water resources management issues: How to improve urban stormwater management, and how to develop a comprehensive integrated information systems for watershed protection. The stormwater project focuses on: water and sediment detention in urban areas, reduction of contaminant and pollution loadings to local streams, testing the impacts of metals on the ecosystem, detaining contaminated sediments in wetlands and ponds and using plants as phytoremediation tools. The same methodology is being used in experiments in Auckland, N.Z. and Vancouver, Canada and the results will then be compared. The watershed project sites range from simple water detention systems to complete wetland systems and the experiments are done in a coordinated manner in the two cities using the same methodology and assessment techniques. As part of the watershed project we are developing a multi-media-GIS based information system for a research watershed in New Zealand and in British Columbia. This is to become a model for watershed management in the two countries and will help us to do comparative research and develop innovating analytical tools that can be used in other watersheds. This project is in collaboration with Landcare Research Ltd in Auckland, and Auckland University.

Youth Environmental Education in Honduras

This CIDA sponsored project involved 30 youth (12-18 years of age) in the mountain community of Yorito, Honduras and has as a focus to teach the kids to become aware of environmental issues associated with water resources management. It involved the mapping of stream buffer zones, monitoring of water quality using macro-invertebrates, developing wetlands to partially treat sewage, and improving waste management practices in the village. At the same time the students are being trained to develop multimedia computer skills so that they can communicate their research skills in a more effective manner. This is a collaborative project between CIAT (International Centre for Tropical Agriculture) and IRES and is in its second year.

Nutrient Modelling in Agriculture

A detailed nutrient mass-balance method was developed to quantify surplus nutrients that are being applied to agricultural land in the most intensively used agricultural area in Canada (Lower Fraser Valley). The focus is on trying to determine where excessive nutrients are applied to the land, determine the nutrient movement through the soil and its impact on water quality and biota. This is done at a watershed and regional scale and provides a risk assessment of the potential for eutrophication of

surface water and contamination of groundwater. The focus is on linking nutrient land inputs to stream and groundwater quality and ways to mitigate the input. This project is sponsored by Environment Canada and NCE_CWN.

Ilan Vertinsky

The past year saw the FEPA Research Unit continuing its various studies on sustainable forest management (SFM). One study explored the role of the forest in creating sustainable communities for the Little Red River and Tall Cree Nations. A variety of land use options were explored. The study showed that the existing land base cannot provide for a sustainable forest dependent community given the projected growth of the nations. Funding for a new three-year study focusing on First Nations governance was received in the beginning of the year. In this study a sequence of in-depth studies explores how alternative organizational structures affect economic, social and environmental performance of First Nation enterprises given the distinct characteristics of the bands involved (e.g. social capital) and their forest environments.

The International Forest Regime project moved to its final stage. The focus was on research concerning trade relations with the US and the persistence of conflicts. Several publications derived from the study articulated the reasons for the persistence of the dispute and the likely outcomes of alternative proposed solutions. The project also published an NCE report on the evolving Canadian forest sector response to the Kyoto Protocol and the potential strategies the forest industry may choose. The project also explored the relationship of trade and environment. The conclusion was that a balanced free trade supports in Canada SFM (this may not be the case however in developing countries which lack strong social institutions. The third major project focused on development of optimization models for SFM. These models are being applied to Tembec operations in Ontario. In particular the role that intensive silviculture may play is being explored.

The end of the year saw the unit working on a major proposal exploring new regulatory and institutional designs for the forests of Canada. A large grant (about 0.75 million dollars) was approved for the coming year by the SFM Network and a team of about 10 researchers across the country will be exploring the consequences and implementation of bold experimental designs for new regulatory systems, which can promote SFM.

Yongyuan, Yin

Yongyuan Yin is the PI of the AIACC AS25 project funded by UNEP/GEF to study climate vulnerability and adaptation in Western China (2002-2005). He is also leading the IA component of a CIDA funded project on carbon sequestration in China. As the PI of the UNEP/GEF funded project of the Assessments of Impacts of and Adaptation to Climate Change (AIACC) in Western China, he has been leading the AS25 project to assess climate vulnerability and adaptation in Western China. The main goal of AIACC is to enhance the scientific and technical capacities in many countries to assess the impacts of climate change, and to design cost-effective adaptation response measures, which are needed to formulate national policy options and prepare national communications. Many North American and Chinese institutes are partners of the project including UBC, AIRG/EC, UC Berkeley, Michigan U., Michigan State U., U. of Regina, Chinese Meteorological Administration, Nanjing U. and Chinese Academy of Science.

Recently, Yin has been involved in two projects funded by CIDA Canadian Climate Change Development Fund on carbon sequestration and adaptation in China. The objectives of the two projects are to: 1) contribute to the reduction in growth of greenhouse gas emissions; 2) contribute to carbon sequestration in sinks; 3) assist China to reduce their vulnerability and adapt to climate change; and 4) contribute to

strengthening the capacity of China to participate in global efforts to combat climate change. A graduate research assistant was hired at UBC to do some economic analysis for the carbon sequestration project.

Yin has also been in graduate supervising committees for 2 PhD students and 3 Master students at UBC. In addition, he has been supervising several visiting scientists from other universities and institutes.

II. Research Funding

Total Research Funds for 2003 - 2004		\$1,370,595
External Research Funds		\$944,853
NSERC	\$31,000	
SSHRC	\$477,920	
Research Other	\$435,933	
Federal Government Funds		\$369,342
Fisheries and Oceans Canada	\$5,000	
Natural Resources Canada	\$100,000	
Environment Canada	\$82,500	
Western Economic Diversification Canada	\$75,000	
Federation of Canadian Municipalities	\$100,000	
Canadian International Development Agency	\$6,842	
Provincial Government Funds		\$10,000
BC Ministry of Water, Land and Air Protection	\$10,000	
Municipal Funds		\$46,400
Greater Vancouver Regional District	\$46,400	
Total Capital Funds for 2003 - 2004		\$10,375,000
CFI: Innovation Projects	\$4,250,000	
BC Knowledge Development Fund	\$4,208,407	
UBC Blusson Fund	\$1,916,593	

Invited Presentations & Workshops

I. UBC

Dowlatabadi, H. UBC, "What is green chemistry?" February 2, 2003

Dowlatabadi, H. UBC, "Health research, and the North-South divide." September 15, 2003

Dowlatabadi, H. UBC, "Climate change, climate policy and human health." October 29, 2003

- Dowlatabadi, H.: UBC, "Complex systems, decisions and value of information." November 18, 2003
- Dowlatabadi, H. The 4th UBC Sustainability Conference, "Health and public policy," January 30, 2004
- Hinch, S. Energetics, behaviour and survival of upriver migrating adult salmon. Comparative Physiology Seminar Series, Dept Zoology, University of BC, Vancouver, BC. Jan. 2004
- Hinch, S. Energetics, behaviour and survival of upriver migrating adult salmon. Ecology Seminar Series, Dept Zoology, University of BC, Vancouver, BC. Jan. 2004
- Kandlikar M. Limits and Possibilities of Socially Responsible Investing, Liu Institute of Global Issues seminar series on Corporate Social Responsibility, May 7, 2003.
- **Kandlikar, M**. Risk, Regulation and Agricultural Biotechnology: The Indian Case, Institute for Resources, Environment and Sustainability, IRES, University of British Columbia, Vancouver, January 6, 2004.
- Robinson, J. Organizer, Joint SDRI(UBC)/ERS (University of Waterloo) Workshop on Complex Systems, UBC, April 3-4, 2003
- Robinson, J., "Interactive Science in the Georgia Basin", Geography Colloquium, UBC, Oct 8, 2003
- Robinson, J., "Making it Work: Energy, Climate Change and Sustainable Development", UBC Continuing Studies Public Lecture Series, "Sustainability: The Way Forward, UBC Robson Square, Oct 22, 2003
- Robinson, J., "QUEST Overview", presentation at Energy Paths Analysis/Methods Training Workshop, sponsored by the East Asia Energy Futures/Asia Energy Security Project, Liu Institute for Global Issues, UBC, Nov 6, 2003
- Robinson, J. Invited participant, "Interdisciplinary Engineering Education", SDRI, UBC, Jan 23, 2004
- **Robinson, J.**, "Energy, Climate Change and Sustainable Development: Realizing the Opportunity", presentation at "Building Livable Communities: the 4th Annual Sustainability Conference at UBC", sponsored by the UBC Campus Sustainability Office, Jan 30, 2004

Robinson, J. Organizer, "GBFP Renewal Workshop", UBC, Mar 3, 2004

II. National

- Chang, S. 2003 Business Vulnerability to Airport Closures, invited presentation at Emergency Preparedness Conference, Vancouver, B.C., October 2003
- Cohen, S. 2003. Adaptations. In Abdel-Hay, K., B. Harrison, S. Turriff, and C. van Rosmalen (eds.), Climate Change & Transportation in Manitoba—Proceedings of the 2003 Workshop, University of Manitoba, Winnipeg, 47-61, & 95-96.
- **Dowlatabadi, H.** U of Ohio "Climate change, climate policy and adaptive management." October 30, 2003
- **Dowlatabadi, H.**: U of the Arctic, (with Michelle Boyle) "Seeking development patterns across the circumpolar region." November 10, 2003
- Dowlatabadi, H. The CIS-HDGC session at the 5th Open Meeting of the IHDP, Montreal, Canada
- Dowlatabadi, H.: CMU, "Adaptive regulation." April 9, 2003
- Dowlatabadi, H.: Exxon-Mobil Education Foundation, "Health and climate change." April 15, 2003
- **Dowlatabadi, H.** Kamloops Canadian Legion and UBC Alumni, "Climate change and Kyoto." April 17, 2003
- **Dowlatabadi, H.** Ottawa, Social Science and Humanities Research Council, "Bio-fuels and Systematic Assessment of a Green Economy (SAGE)." June 24, 2003.
- Dowlatabadi, H. U. Victoria. "Are GCMs useful in policy analysis?" October 1, 2003
- Dowlatabadi, H. U. Victoria. "Climate change, climate policy and human health." October 1, 2003
- Dowlatabadi, H. Ottawa, OECD Economics workshop, "Technological change." 09-10-2003
- **Dowlatabadi, H.** Montreal IHDP Open meeting, (with Michelle Boyle) "Incorporating cross-scale dynamics into environmental assessments" October 16, 2003
- **Dowlatabadi, H.** Montreal IHDP Open meeting, (with Eric Mazzi) "Let them breathe smoke." October 16, 2003
- **Dowlatabadi, H.** Montreal IHDP Open meeting, (with Tim McDaniels) "Linking scales of regulations to scales of environmental change processes." October 16, 2003
- **Dowlatabadi, H.** Vancouver, (With Raul Pacheco), "New economic spaces, new restructuring drivers: Environmental regulation in the Mexican leather and footwear industrial districts." October 25, 2003
- **Dowlatabadi, H.** CMU, (With Zosia Bornik) "Explorations in regime change: -Thalassaemia and the interplay of technological change & social norms." January 14, 2004

Dowlatabadi, H. Globe 2004, session chair "Sustainable material management." March 31, 2004

Healey, M. 2003, AquaNet III conference, paper on competitive ability of wild vs farmed salmon. (Oct 28)

- Healey, M. 2003 Talk about Adaptive Management at AquaNet Workshop on using adaptive management in aquaculture (Dec 4)
- Lapointe, M., S.J. Cooke, S.G. Hinch, A. P. Farrell, S. Jones, S. MacDonald, D. Patterson, M.C. Healey, and G. Van Der Kraak. March 2003. Early upstream migration and mortality of Late-run sockeye salmon in the Fraser River, British Columbia. Georgia Basin/Puget Sound Research Conference, Vancouver, BC.
- McDaniels, T. October 2003, "Multiple Scales and Regulatory Gaps in global change: the case of salmon aquaculture" Human Dimensions of Global Change Open Meeting, Montreal, October. This was a talk in a whole session concerned with work supported by the CISHDGC through researchers at UBC.
- **McDaniels, T.** March, 2004, "Decision aiding for sustainable forest management decisions" workshop on valuation and sustainable forest management planning, Vancouver, BC
- McDaniels T., March, 2004, "The Role of Best Available Science (and Science Advice) In Environmental Policy Decisions by Governments, Invited keynote address, Ministry of Water Land and Air Protection, Workshop on the role of the best available science, University of Victoria,
- Richardson, J.S., and **S.G. Hinch**. March 2003. Monitoring of the lower Fraser River using fish assemblages: can it be done without reference conditions? Georgia Basin/Puget Sound Research Conference, Vancouver, British Columbia.
- Robinson, J., "Energy, Climate Change and Sustainable Development: the BC opportunity", presentation at Vancouver Chapter of the US Green Buildings Council Annual General Meeting, Vancouver, May 14, 2003
- **Robinson, J.**, "Energy, Climate Change and Sustainable Development", presentation to Annual Convention of the Green Party of BC, North Vancouver, June 6, 2003
- Robinson, J., "Energy, Climate Change and Sustainable Development: the BC Opportunity", presentation at National Research Council, Vancouver, June 19, 2003
- Robinson, J. Invited participant, Greater Vancouver Regional District, Workshop on Integration in GVRD's Sustainable Regions Initiative, Burnaby, July 3, 2003
- Robinson, J., "Integrating Citizen Science" presentation at Canadian Institute of Advanced Research Workshop on Ecosystem Management, Montreal, Aug 25, 2003
- **Robinson, J.**, "Interactive Science in the Georgia Basin: building models, engaging stakeholders and influencing behaviours", Panel on The Georgia Basin Futures Project: Participatory Integrated Assessment at a regional scale, International Human Dimensions Program Open Meeting, Montreal, Oct 16-18, 2003. (I chaired this panel, which presented 5 papers on the GBFP.)
- Robinson, J., "QUEST for Planning", Sustainable Enterprise Academy Business Leaders' Seminar, Vancouver, Oct 22, 2003

- Robinson, J. Invited participant, "Environmental Technologies Conference", sponsored by Western Diversification Canada, Dec 5, 2003
- Robinson, J. Invited participant, Workshop on BC Hydro's Integrated Electricity Plan, Vancouver, Jan 20, 2004
- Robinson, J and Randi Kruse-Ferdinands, "QUEST and Ethics", AHIS 333, Interdisciplinary Forum, Emily Carr Institute of Art + Design, Vancouver, Feb 12, 2004
- **Robinson, J.**, "Talking about Green Buildings", Workshop sponsored by Greater Vancouver Regional District, Mar 4, 2004 (Invited participant)
- Robinson, J. Organizer, "GBFP Renewal Partner Workshop", Science World, Mar 8, 2004
- Robinson, J., "An Introduction to QUEST", presented at "Connections: Sustainable Development Forum", sponsored by the Pacific Federal Council, Mar 9, 2004. We ran a QUEST session for 40 federal civil servants in the Science World Weyerhaeuser Theatre on Mar 10
- Robinson, J., "The Centre for Interactive Research on Sustainability", presentation to the Sustainability Sponsor Group, City of Vancouver, Mar 15, 2004
- Robinson, J. Invited Participant, "BC Hydro Stakeholder Dinner", Mar 16, 2004
- Robinson, J., "GBFP, Geocognito and CIRS" invited presentation at SDKI-PATHWAYS Year-end Workshop, Natural Resources Canada, Vancouver, Mar 24, 2004
- **Robinson, J.** "Backcasting and QUEST', presentation at Planning for Long-term Urban Sustainability: Network Invitational Conference, Mar 30, 2004 (+30)
- Schreier, H. 2003. Innovation in Stormwater Management. One day Workshop on Alternative Stormwater Design Criteria. Township of Langley, June 2, 2003 (20 Participants)
- Schreier, H. 2003 Water and Health: How safe are we? National Council of Jewish Women, Vancouver, B.C. June 11, 2003.
- Schreier, H. and K. Hall. 2003: Agricultural trends and impacts on surface and groundwater in Agassiz. Evening presentation to the Agricultural Committee and District Councillors in Agassiz. July 8, 2003
- Schreier, H. 2003. Land use impacts on watersheds. Biology Seminary, Department of Botany, Guest lecture, University of Alberta. Invited Guest Lecture, October 8. 2003
- Schreier, H. 2003. Using Nutrient budgets to evaluate agricultural impacts on streamwater. Biological Sciences, Guest lecture in Graduate course. University of Alberta, Biological Sciences. October 8, 2003
- **Schreier, H**. 2003. Water for Food: Are we heading for a crisis? Environmental Research and Studies Centre, Lecture Series, University of Alberta, Invited presentation, October 9th 2003.

- Schreier, H. and K. Hall. 2003. Results of surface and groundwater study. Public presentation to the Agassiz community. District of Kent. November 4, 2003
- Schreier, H. 2003. Mountain Water Ecosystems: Conservation and Restoration. Banff Mountain Summit 2003. Mountains as Water Towers, Banff Centre for Mountains and Culture, Part of Canada's contribution to UN Year of Fresh Water, Alberta, Invited Keynote Address, November 22-25, 2003 (150 People)
- Schreier, H. 2003 Global Water Issues. Community Splash. Three public community presentations in Cranbrook Dec. 1, 2003, Kimberly Dec. 2, Revelstoke, Public Education program in preparation of renegotiations on the Columbia Basin Treaty. Dec, 1-3, 2003
- Schreier, H. 2004. Innovations in watershed management. Battle River Community Foundation Workshop and Alberta Environment, Camrose, Alberta, invited address, March 17, 2004 (80 participants)
- Schreier, H. 2004. A global need for watershed innovations, and Basic elements of a watershed management plan. Conference on Watershed Management on Prince Edward Island. Dept. of Environment & Energy. Charlottetown, PEI, Invited Keynote Address, March 27, 2004. (100 participants)
- Schreier, H., R. Bestbier, G. Derksen 2003. Land Use Impacts in the Elk Creek Watershed in Chilliwack; A multi-media public information system. Georgia Basin/Puget Sound Research Conference. USA/Canada Collaboration, Vancouver, March 31- April 4, 2003.
- Schreier, H., R.Bestbier, and G.Derksen 2003. A quantitative assessment of agricultural intensification and associated waste management challenges in the Lower Fraser Valley Georgia Basin/Puget Sound Research Conference. USA/Canada Collaboration, Vancouver, March 31- April 4, 2003 Session 1 C (Extended. Abstract).
- Vertinsky, I. Intra and Inter-cultural Collaborations: The Impact of Contracts and Personal Ties on Partner Credibility and Initial Trust. *The Administrative Sciences Association of Canada, International Business*, Halifax, Nova Scotia. 2003 (with Branzei and Camp)

III. International

- **Chang, S**. 2004 Developments in Earthquake Engineering and Science Since the Northridge Earthquake: Social Sciences, invited presentation at annual meeting of Earthquake Engineering Research Institute (EERI), Los Angeles, February 2004.
- **Chang, S** 2003 Evaluating Disaster Mitigations: Case Study of the Portland Water System, invited presentation to the Oregon Seismic Safety Policy Advisory Committee, September 2003.
- **Chang, S** 2003 Transportation Planning for Natural Disasters: An Accessibility Approach," colloquium presentation, Department of Geography, University of Washington, May 2003.

Dowlatabadi, H. Essen, Germany "Integrating mitigation and adaptation." May 16, 2003

- Frank, L.D, Leary, L.E., Saelens, B.E., Auffrey, C., Whitaker, R., & Burdette, H.L. March 2004. "Environmental assessment of public recreation spaces (EAPRS): measurement development." <u>Annals of Behavioral Medicine</u>, 27, S027.
- Frank, L. March, 2004. "Environment, Transportation, and Public Health" Greenprints. Atlanta, GA.
- Frank, L. January 2004. "Linking Objective Physical Activity Data With Objectively Measured Urban Form." Active Living Research Conference. Del Mar, CA.
- Frank, L. January 2004. "Measuring How We Move Through Space." Active Living Research Conference. Del Mar, CA.
- **Frank, L**. January 2004. "Greenhouse Gas Formation and Urban Sprawl: Findings from the Seattle LUTAQH Study." Transportation Research Board Conference. Washington,DC.
- Frank, L. September 2003 "Findings on Travel Choice and Transit Use From SMARTRAQ" *Railvolution Conference*. Atlanta, GA.
- Frank, L. July 2003. "Urban Form Impacts on Greenhouse Gas Formation." Association of the Collegiate Schools of Planning. Brussels Belgium.
- Frank L, Levine, Jonathan. July 2003. "Residential Location Choice and the Sufficiency of Smart Growth in Atlanta." Association of the Collegiate Schools of Planning. Brussels Belgium
- Frank, L. April 2003. "The King County Land Use, Transportation, Air Quality, and Health Study." American Planning Association National Conference. Denver, Colorado.
- Frank, L. April 2003. "Obesity and Urban Form Relationships in Atlanta." American Planning Association National Conference. Denver, Colorado.
- Frank, L. June 2003. "Urban Design Implications on Public Health." Transport Chicago" Chicago, III.
- Frank, L. January 2004. "Synergies Between Public Health and Transportation Decision Making and Investment." U.S. Congressional Briefing Senate Banking Committee. Washington DC.
- He, Y.Q., Yin, Y.Y. and Zhang, D. 2004. Changing Features of the Climate and Glaciers in China's Monsoonal Temperature-glacier Region. Invited Speaker. Bridging Scales and Epistemologies: Linking Local Knowledge with Global Science in Multi-Scale Assessments, 17 ~ 20 March 2004, Alexandria, Egypt.
- Hinch, S.G. June 2003. Aquatic ecosystem structure and function in sub-boreal British Columbia: Effects of riparian logging and road crossings on benthic invertebrates, fish access, and habitat. Swedish University of Agricultural Sciences Boreal Watershed Workshop. Umea, Sweden.
- Hinch, S.G. June 2003. Salmon abundance in British Columbia: trends, patterns and threats. Swedish University of Agricultural Sciences Boreal Watershed Workshop. Umea, Sweden.
- Hinch, S.G., S.J. Cooke, A.P. Farrell, M. Lapointe, S. Jones, M.C. Healey, S. MacDonald, D. Patterson, and G.van der Kraak. April 2003. Abnormal migration timing and early mortality of Fraser River sockeye salmon. Annual Western Division Conference, American Fisheries Society, San Diego, CA

- Kandlikar, M. Can Information Technology Promote Human Development: Evidence from India. Invited talk at the South-Asia Middle East Conference, University of California, Santa Barbara, CA, June 19, 2003.
- Kandlikar, M .Expert Assessment of the Uncertainties in the Detection and Attribution of Climate Change, Humphrey Institute, University of Minnesota.
- Lavkulich, L.M. 2003. Integrated water management in Canada. Keynote Address European Union Integrated Water Basin Management – NATO/CCMS. Antwerp, Belguim, May 21 – 24. 2003.
- Lavkulich, L.M. 2004. Environmental and Health Indicators for water management. European Union. Integrated Water Basin Management – NATO/ CCMS. Genoa, Italy, January 26 – 28, 2004.
- McDaniels, T. and H. Dowlatabadi, May, 2003 "A conceptual framework for regulation across scales in global change issues: the salmon aquaculture example" Center for the Integrated Study of the Human Dimensions of global change, Annual Meeting, Pittsburgh, PA.
- McDaniels, T. June, 2003, "Multiple Scales and Regulatory Gaps in global environmental change: the case of salmon aquaculture", US National Science Foundation, presentation to senior science advisors and program officers in environment, engineering and social and decision sciences, Washington, DC.
- McDaniels, T. June 2003, "Decision Analysis and Stakeholder Involvement in Risk Management" 1.,5 hour invited conference symposium, World Congress on Risk, Society for Risk Analysis, Brussels.
- McDaniels, T. December, 2003, "Developing hierarchies of objectives for risk management decisions" Society for Risk Analysis Annual Meeting, Baltimore, MD
- **McDaniels, T**. January, 2004. "Resource and regional planning issues in British Columbia: Implications for Mexico" University of Quintana Roo, Chetumal, Mexico
- Mellina, E., **S.G. Hinch**, R.D. Moore. June 2003. Impacts of clear-cut logging on streams and fish in the central interior of British Columbia, Canada. Swedish University of Agricultural Sciences Boreal Watershed Workshop. Umea, Sweden.
- **Robinson, J.**, "Climate Change and Sustainable Development, Part 1 New Partnerships" and "Climate Change and Sustainable Development, Part 2 – Public Acceptance", invited presentations to the Global Climate Change and Society Program, University of Colorado, Boulder, Colorado, July 14 and 15, 2003
- Robinson, J. Invited participant, Intergovernmental Panel on Climate Change, Scoping Session for IPCC Fourth Assessment Report, Potsdam, Germany, Sept 1-4, 2003
- Robinson, J., "Energy, Climate Change and Sustainable Development: Realizing the Opportunity", invited keynote paper, World Climate Change Conference, Moscow, Sept 30 Oct 3, 2003
- **Robinson, J.** and Jeff Carmichael, Program Leaders, Urban Futures and QUEST module, START Summer Study Program on Urbanization, Emissions and the Global Carbon Cycle, National Centre for Atmospheric Research, Boulder Colorado, Aug 18-22, 2003

- Satterfield, T. Oregon Graduate Institute, Oregon Health Science University (2003)
- Satterfield, T. US National Science Foundation, Qualitative Research Symposia (July 2003)
- **Satterfield, T.** National Science Foundation Special Meeting on The Scientific Foundations of Qualitative Research, Arlington, Virginia, July 11 12.
- Satterfield, T. Visiting Guest Lecturer at the University of East Anglia Centre for Environmental Risk; School of Environmental Sciences, July 2003.
- Satterfield, T. Guest Panellist at University of California-Santa Barbara, Meeting on Health Risk Perception and Spatial Analysis, October 2003.
- Satterfield, T. Organized double panel session for 2004 Society for Applied Anthropology Meetings entitled "Risk and Culture: Intersections in Health and Environment".
- Satterfield, T. Society for Applied Anthropology Annual Meeting in Dallas, TX.
- Satterfield, T. American Association for the Advancement of Science (AAAS) Annual Meeting.
- Schreier, H. 2003. Innovations in watershed Management. Lecture at PUC Campinas University, Campinas-Sao Paulo, Brazil, Invited Guest Lecture, May 14, 2003.
- Schreier, H. 2003. How much land use in drinking water supply watersheds. Workshop on "Novos Rumos para a Pesca No ABC. Sao Paulo Municipalities. Ibeirao Pires, Sao Paulo, Brazil, Invited presentation, May 15, 2003. (50 participants).
- Schreier, H. 2003 New Issues in Himalayan watershed Management. Department of Environmental Sciences, Kathmandu University, Invited Guest Lecture, Aug, 7, 2003.
- Schreier, H. 2003. Innovations in Integrated Watershed Management. International Conference on Integrated Watershed Management: Water Resources for the Future. Food and Agricultural Organization, UN (FAO) Porto Cervo, Sardinia, Italy. Invited Plenary Address, October 22-25, 2003.
- Schreier, H. 2003. Comparing Himalayan Andean Watersheds: A Framework for Building a Global Network of Mountain Biosphere Reserves. Integrated Global Change Programs. Global Change Research in Mountain Biosphere Reserves. The Mountain Research Initiative (MRI), UNESCO's Man and Biosphere Program (MAB), UNESCO's Inern. Hydrological Program (IHI). Entlebuch Biophere Reserve, Switzerland. Invited Keynote Address, Nov. 10-13. (100 people). Proceedings, UNESCO, Paris 12 pp
- Schreier, H. 2003. Challenges in Water Resources Management in the Himalayas. PARDYP Technical Workshop. International Centre for Integrated Mountain Development (ICIMOD). Kathmandu, Nepal, Dec. 9, 2003.
- Schreier, H. 2003. Innovations in Watershed Management and its application to China. College of Environmental Science, Peking University, Beijing, China, Invited Guest Lecture, December 19, 2003.

- Schreier, H. 2004. Innovations in urban stormwater management. Urban Watershed Management Workshop. Landcare Research, Auckland New Zealand, Invited Presentation, March 8, 2004
- Schreier, H. 2004 Integrated catchment management. Innovations and challenges, Landcare Research, Nelson, New Zealand, Invited keynote Presentation, March 10-11, 2004. (50 participants)
- **Vertinsky, I.** Enterprise Failure as a Determinant of Entrepreneurial Entry: The Chinese University of Hong Kong, December, 2003.
- Vertinsky, I. How Small Firms Can Compete Successfully: The Choice of Generic and Innovation Strategies and Firm Performance. *The 23rd Babson Kauffman Entrepreneurship Research Conference*, Wellesley, MA. 2003
- Vertinsky, I. Initial Trust in Cross-cultural Collaborations: Formal and Informal Assurances in Canada and Japan. Academy of Management, Seattle. 2003 (with Branzei, and Camp)
- Vertinsky, I. The Formation of Green Strategies in Chinese Firms. *The Academy of Management Conference*, Seattle (Business, Policy and Strategy). 2003 (with Branzei)
- Vertinsky, I. Outcomes of Innovation Strategies for Small Firms: Paths to Exploration and Exploitation, *First West Coast Research Symposium on Technology Entrepreneurship*, University of Washington, September 25, 2003 (with Branzei)
- Vertinsky, I. Collaboration Portfolio Designs for Small Manufacturing Firms: Impacts on Absorptive Capacity and Innovation Performance, *First West Coast Research Symposium on Technology Entrepreneurship*, University of Washington, September 25, 2003 (with Branzei)
- Vertinsky, I. Modeling biodiversity Euro XX Istanbul, 2003 (with Krcmar)
- Vertinsky, I. The US Canada Softwood Lumber Dispute, *North American Economic & Financial Integration*, Bloomington, Indiana 2003 (with Nelson).
- Vertinsky, I. The Geographic Nature of Entrepreneurship: Location Choice of New Establishments, *The 23rd Babson Kauffman Entrepreneurship Research Conference*, Wellesley, MA. 2003 (with Peer)
- Vertinsky, I. Enterprise Failure as a Determinant of Entrepreneurial Entry. *First West Coast Research Symposium on Technology Entrepreneurship*, University of Washington, 2003 (with Peer)
- Yin, Y.Y. 2003. Designing Adaptation Evaluation Tools to Reduce Climate Change Vulnerability in Western China. Invited Speaker. The International Symposium on Climate Change (ISCC), 1 ~ 3 April 2003, Beijing, China.
- Yin, Y.Y. 2004. Designing Evaluation Tools to Identify the Implications of Climate Change and Economic Development for Sustainability in Lijiang and Yulong Mountain Region, China. Invited Speaker. Bridging Scales and Epistemologies: Linking Local Knowledge with Global Science in Multi-Scale Assessments, 17 ~ 20 March 2004, Alexandria, Egypt.
- Yin, Y.Y. 2003. Sustainable Development and Air Quality. Invited Speaker. Canada-China Experience Sharing Symposium on Regional Airshed Planning and Management, September 9-10, 2003 Shenzhen, China.

Yin, Y.Y. 2003. Vulnerability Assessment Methods. Invited Speaker. The Canada-China Cooperation on Climate Change (C5) Training Workshop, 12 ~ 14 Sept. 2003, Huangshan, China.

Publications

I. Refereed

- Beamish, R.J., I.A. Pearsall, and **M.C. Healey**. 2003. A history of the research on the early marine life of Pacific salmon off Canada's Pacific coast. P 1-40 In: P. Symons (ed.), A review of the research on the early marine period of Pacific salmon by Canada, Japan, Russia and the United States. North Pacific Anadromous Fish Commission Bulletin 3, Vancouver, BC.\\
- Bruneau, M., **S.E. Chang**, R.T. Eguchi, G.C. Lee, T.D. O'Rourke, A.M. Reinhorn, M. Shinozuka, K. Tierney, W.A. Wallace, and D. von Winterfeldt. 2003. "A Framework to Quantitatively Assess and Enhance the Seismic Resilience of Communities," *Earthquake Spectra*, Vol.19, No.4, pp.733-752.
- **Carmichael, J., J. Tansey** and **J. Robinson**, (accepted) "Georgia Basin QUEST: An Integrated Assessment Modeling Tool", forthcoming in *Global Environmental ChangeJournal of Environmental Informatics*, 2(2): in press.
- Chang, S.E. 2003. "Evaluating Disaster Mitigations: A Methodology for Urban Infrastructure Systems," *Natural Hazards Review*, Vol.4, No.4, pp.186-196.
- Chang, S.E. 2003. "Transportation Planning for Disasters: An Accessibility Approach," *Environment and Planning A*, Vol.35, pp.1051-1072.
- Cooke, S.J, E.B., Thorstad, and **S.G. Hinch**. 2004. Activity and energetics of free-swimming fish: insights from electromyogram telemetry. Fish and Fisheries. 5: 21-52
- Cooke, S.J., S.G. Hinch, A.P. Farrell, M.F. Lapointe, S.R.M. Jones, J.S.Macdonald, D.A.Patterson, M.C. Healey. 2004. Abnormal migration timing and high en route mortality of sockeye salmon in the Fraser River, British Columbia. Fisheries. 29:22-33.
- Cooke, S.J., **S.G. Hinch**, M. Wikelski, R.D. Andrews, L.J. Kuchel, T.G. Wolcott, and P.J. Butler. 2004. Biotelemetry: a mechanistic approach to ecology. Trends in Ecology and Evolution. 19: 334-343.
- Crossin G.T., **S.G. Hinch**, A.P. Farrell, D.A. Higgs, and **M.C. Healey**. 2004. Somatic energy of sockeye salmon at the onset of upriver migration: a comparison among ocean climate regimes. Fisheries Oceanography. In press
- **Dowlatabadi, H.** (2003). "Risk and responsibility in foreign investment and international trade." *Canadian Competitive Record* **21**(2): 72-78.
- **Dowlatabadi, H.** (2003). Scale and Scope In Integrated Assessment: lessons from ten years with ICAM. Scaling in Integrated Assessment. J. Rotmans and D. S. Rothman. Lisse, Swetz & Zeitlinger: 55-72.
- Farrell, A.P., C.G. Lee, K. Tierney, A. Hodaly, S. Clutterham, M. Healey, S.G. Hinch, and A. Lotto. 2003. Field-based measurements of oxygen uptake and swimming performance with adult Pacific salmon using a mobile respirometer swim tunnel. Journal of Fish Biology. 62:64-84.

- Finucane, M. and **T. Satterfield**. (in press) Risk as Narrative Values: A Theoretical Framework for Facilitating the Biotechnology Debate. International Journal of Biotechnology.
- Frank, L., M.Andresen, T.Schmid, 2004. Body Mass Index and Urban Form: An Empirical Evaluation of the Built Environment's Influence on Obesity. <u>American Journal of</u> <u>Preventive</u> <u>Medicine.</u>
- Frank, L. 2004. An Assessment Of Economic Factors That Shape Transportation Investments, Land Use Decisions, And Influence Physical Activity. <u>American Journal of Preventive Medicine</u>.
- Frank, L. and P.Engelke, 2004. "Multiple Impacts Of Urban Form On Public Health." International Regional Science Review.
- Fuchs, S.A., S.G. Hinch, and E. Mellina. 2003. Effects of streamside logging on stream macroinvertebrate communities and habitat in the sub-boreal forests of British Columbia, Canada. Canadian Journal of Forest Research. 33:1408-1415.
- Giannico, G. R., and **S.G. Hinch**. 2003. Juvenile coho salmon seasonal movement in artificial sidechannels. River Research and Applications. 19:219-231
- Healey, M.C., R. Lake, and S.G. Hinch. 2003. Energy expenditures during reproduction by sockeye salmon (Oncorhynchus nerka). Behaviour 140:161-182.
- Hinch, S.G., E.M. Standen, M.C. Healey and A.P. Farrell. 2003. Swimming patterns and behaviour of upriver migrating adult pink (*Oncorhynchus gorbuscha*) and sockeye (*O. nerka*) salmon as assessed by EMG telemetry in the Fraser River, British Columbia, Canada. *Developments in Hydrobiologia.* 165:147-160.
- Johnston, N.T., E.A. MacIsaac, P.J. Tschaplinsik, and **K.J. Hall.** Effects of the Abundance of Spawning Sockeye Salmon (*Oncorhynchus nerka*) on Nutrients and Algal Biomass in Forested Streams. Can. J. Fish. Aquat. Sci. 61: 384-403
- Kalikoski, D. and **Satterfield, T**. (in press) On Crafting a Fisheries Co-Management Arrangement in the Patos Lagoon (Brazil). Marine Policy
- Kandlikar, M and Risbey, J. Detection and Attribution of Climate Change using GCMs, *Geophysical Research Letters*
- Kandlikar, M and Risbey, J. Are models more confident than experts? Climatic Change.
- Lee, C.G., Farrell, A.P., Lotto, A., Hinch, S.G., and Healey, M.C. 2003. Excess post-exercise oxygen consumption in adult sockeye (Oncorhynchus nerka) and coho (O. kisutch) salmon following critical speed swimming. J. Exp. Biol.206:3253-3260.
- Lee, C.G., Farrell, A.P., Lotto, A., MacNutt, M.J., Hinch, S.G., and Healey, M.C. 2003. The effect of temperature on swimming performance and oxygen consumption in adult sockeye (Oncorhynchus nerka) and coho (O. kisutch) salmon stocks. *Journal of Experimental Biology*206:3239-3251.

- Leslie, E., Saelens, B, **Frank, L**, Owen N, Bauman, A. Coffee, N, Hugo, G. *In Press.* Residents' Perceptions of Walkability Attributes in Objectively Different Neighbourhoods: A Pilot Study. <u>Place</u>
- Luo, B., Maqsood, I., Yin, Y.Y., Huang, G.H. and Cohen, S. 2003. "Adaptation to climate change through water trading under uncertainty – an inexact two-stage nonlinear programming approach. Robinson, J. "Future Subjunctive: Backcasting as Social Learning", <u>Futures</u> 35 (2003) 839-856.
- MacNutt, M. J., S.G. Hinch, A. P. Farrell and S. Topp. 2004. Effects of thermal acclimation period on the repeat swimming performance of cutthroat trout (*Oncorhynchus clarki clarki*). Journal of Fish Biology. In press.
- Mahendraker, V., D.S. Mavinic, and **K.J. Hall.** Comparative Evaluation of Mass Transfer of Oxygen in Three Activated Sludge Processes Operating Under Uniform Conditions., J. of Environ. Engr. & Sci. (Accepted Mar. 2004.)
- McDaniels, T., R. Gregory, J. Arvai and R. Chuenpagdee , 2003, "Decision structuring to alleviate embedding in environmental valuation", *Ecological Economics*, 46, 33-46. June.
- **McDaniels, T.** and R. Gregory, 2004, "Learning as an objective within structured decision processes for managing environmental risks," *Environmental Science and Technology,* 38, 7, 1921-1926.
- Moore, J. P., F., Quayle, **M., Robinson**, J., Sawada, B., Spiegelman, G., VanWynsberghe, R., (accepted). "Recreating the university from within: Collaborative reflections on the University of British Columbia's engagement with sustainability." <u>International Journal of Sustainability in</u> <u>Higher Education</u>.
- Patterson, D.A., J.S. Macdonald, **S.G. Hinch**, **M.C. Healey**, and A.P. Farrell. 2004. The effect of exercise and captivity on energy partitioning, reproductive maturation, and fertilization success in adult sockeye salmon. Journal of Fish Biology 64:1-21
- Pearson, M, and **M.C. Healey**. 2003. Life History Characteristics of the Endangered Salish Sucker (*Catostomus sp.*) and their Implications for Management. *Copeia* 2003(4):759-768.
- Roberts, M., Haami, B., Benton, R., **Satterfield, T.**, and Henare, M. 2004. Whakapapa as a classificatory construct of Maori and its implications for genetic engineering. Journal of Pacific Studies, 16, 1-28.
- Robinson, J. "Future Subjunctive: Backcasting as Social Learning", Futures 35 (2003) 839-856.
- Robinson, J. (in press) "Squaring the Circle: On the Very Idea of Sustainable Development", forthcoming in *Ecological Economics*.
- Saelens, B., J. Sallis, and **L. Frank**, 2003 "Environmental Correlates of Walking and Cycling: How Findings from Transportation, Urban Design, and City Planning Literature Can Inform Physical Activity Research" <u>Annals of Behavioral Medicine</u>. 24, 3
- Sallis, J.F., Frank, L.D., Saelens, B.E., and Kraft, M.K. (2004). Active transportation and physical activity: Opportunities for collaboration on transportation and public health research. <u>Transportation Research Part A</u>: Policy and Practice, 38, 249-268.

- **Satterfield, T**. (in press) Emotional Agency and Contentious Practices: Activist Disputes in Old Growth Forests. Ethos: Journal of Psychological Anthropology.
- Satterfield, T. (2004) Discrimination, Vulnerability, and Justice in the Face of Risk. Risk Analysis: 24(1): 113-127.
- Satterfield, T. "The Culture of Risk: Contested Terrain within the Academy and Beyond" Human Organization [Special Issue on Risk and Culture: Intersections in Health and Environmental Risk].
- Schendel, E.K. and **L.M. Lavkulich** 2003. Integrated water policy in Canada. Integr. Water Magmt. IWM – NATO – CCMS pp 45-60; Brussels.
- Schendel, E.K., S.E. Nordstrum and **L.M. Lavkulich**. 2004. Floc and sediment properties and their environmental distribution from a marine fish farm. Aquaculture Res. 35(5): 483-493
- Schendel, E.K., **H. Schreier**, and **L.M. Lavkulich**. 2004. Linkages between phosphorus index estimates and environmental quality variables. Soil and Water Conservation Journ. (in Press, Accepted March 27, 2004)
- Schreier, H. and S. Brown. 2004. Multiscale approaches to water management: land-use impacts on nutrient and sediment dynamics. Scales in Hydrology and Water Management. Intern. Assoc. Hydrol. Sci. IAHS Publ. Vol. 287: 61-75
- Senbel, M., **T. McDaniels** and **H. Dowlatabadi** (2003). "The ecological footprint: a nonmonetary metric of human consumption, as applied to North America." *Global Environmental Change: human and policy dimensions* 13(2): 83-100.
- Shui, B. and **H. Dowlatabadi** (2004). "Consumer lifestyle approach to US energy use and the related CO₂ emissions." *Energy Policy* in press.
- Standen, E.M., **S.G. Hinch**, and P.S. Rand. 2004 Influence of river currents on path selection and swimming efficiency of migrating adult sockeye salmon. Canadian Journal of Fisheries and Aquatic Sciences. In press.
- Strachan, N., H. Zerriffi and H. Dowlatabadi (2003). System Implications of distributed generation. Critical infrastructures - state of the art in research and applications. W. Thiessen. Boston, Dortrecht, London, Kluwer Academic Publishers. 65.
- Swart, R.J., P. Raskin, **J. Robinson**, (in press) "The Problem of the Future: Sustainability Science and Scenario Analysis", *Global Environmental Change*
- Swart, R., J. Robinson, S. Cohen, "Climate change and sustainable development: expanding the options", *Climate Policy* 3: Supplement 1 (2003) S19-S40 (special supplement on climate change and sustainable development)
- Tao, W. and K.J. Hall. Dynamics and Influencing Factors of Heterotrophic Bacterial Utilization of Acetate in Constructed Wetlands Treating Woodwaste Leachate. Water Research. (Accepted Mar. 2004)

- Vertinsky, I. The Formation of Green Strategies in Chinese Firms: Matching Corporate Environmental Responses to Individual Values and Principles, *Strategic Management Journal*, forthcoming. (with O.Branzei, T.Ursacki and W.Zang),
- **Vertinsky, I.** Modelling Alternative Zoning Strategies in Forest Management, *International Transactions of Operations Research,* (forthcoming). (with Krcmar and Van Kooten),
- Vertinsky, I. Certification of Sustainable Forest Management Practices: A Global Perspective of Why Countries Certify. *Forest Policy and Economics* (with Van Kooten and Nelson)
- Vertinsky, I. Why Might Forest Companies Certify? Results from a Canadian Survey. *The International Forestry Review*. (with Takahashi and Van Kooten)
- Vertinsky, I. Initial Trust in Cross-cultural Collaborations: Formal and Informal Assurances in Canada and Japan. In D. Nagao (Ed.), Academy of Management Best Paper Proceedings. Seattle, WA: Academy of Management, IM G6. Nominee for the Carolyn Dexter Award. 2003 (with Branzei, and Camp)
- Vertinsky, I. The Geographic Nature of Entrepreneurship: Location Choice of New Establishments, Frontiers of Entrepreneurship Research, Wellesley, MA, 2004 (with A. Pe'er),
- Vertinsky, I. How Can Small Firms Compete Successfully? Relative Position, the Choice of Innovation Strategies and Innovation Performance, *Frontiers of Entrepreneurship Research*, Wellesley, MA, 2004.
- Vertinsky, I. Intra and Inter-cultural Collaborations: The Impact of Contracts and Personal Ties on Partner Credibility and Initial Trust. *Administrative Sciences Association of Canada* (International Business), Halifax, Nova Scotia. 2003 (with Branzei and Camp)
- Vertinsky, I. The US Canada Softwood Lumber Dispute in Rugman, Alan M. (Editor) North American Economic and Financial Integration Volume 10 of Research in Global Strategic Management (Oxford: Elsevier, 2004) with Nelson.
- Vertinsky, I. The Economics, Demography and Cultural Implications of Globalization: The Canadian Paradox , Management International Review (with Stanbury), forthcoming
- Vertinsky, I. Private or Self Regulation: A Comparative Study of Forest Certification Choices in Canada, the U.S. and Germany, *Forest Policy and Economics* (with Cashore, Van Kooten, Auld and Affolderbach), forthcoming
- Vertinsky, I. Institutional Change: The Emergence of Private Ownership in China Journal of Business Research (with Li and Zhou) forthcoming
- Vertinsky, I. Globalization and the Cultural Industries in Canada; Far from a Borderless World Culture of Economy; Economics of Culture, Bavarian American Academy, Munich (with Stanbury), in Press.
- Von Westarp, S. S. Chieng, and **H. Schreier** 2003. Comparing low-cost drip irrigation, conventional drip irrigation, and hand watering in Nepal. Agricultural Water Management, Vol. 64(2): 143-160
- Wust, R.A.J., **L.M. Lavkulich** and R.M. Bustin. 2003. A new classification system for tropical organicrich deposits based on the Tasek Bera Basin, Malaysia. Catena 53 (2): 133-163
- Xu, Z.M., Cheng, G.D., Zhang, Z.Q. Templet, P.H. and Yin, Y.Y. 2003. "The calculation and analysis of ecological footprints, diversity and development capacity of China" J. of Geographical Sciences 13(1): 19-26.
- Yin, Y.Y. 2004. "Methods to link climate impacts and regional sustainability" *J. of Environmental Informatics* 2(1): 1-10.
- Zeng, G.M., Yuan, X.Z., **Yin, Y.Y.** Hu, T.J. and Yan. G. 2003. "Manufacture of liquid fuel by catalytic cracking waste plastics in fluidized bed" *Energy Sources* 15(6): 577-590.

II. Non-Refereed

- **Chang, S.E.** and S.B. Miles. 2003. "Resilient Community Recovery: Improving Recovery Through Comprehensive Modeling," *Research Progress and Accomplishments 2001-2003*. Multidisciplinary Center for Earthquake Engineering Research, Buffalo, NY, pp.139-148.
- Chapman, J., L. Frank, C. Leerssen, A. Carpenter. 2004. <u>Modeling the Air Quality Benefits of the Atlanta</u> <u>Regional Commissions Livable Centers Initiative</u>. Georgia Regional Transportation Authority.
- Davies, T.D., J.S. Pickard, and K.J. Hall. Sulphate Toxicity to Freshwater Organisms and Molybdenum Toxicity to Rainbow Trout Embryos/Alevins. Presented at the British Columbia Mine Reclamation Symposium, "Reclamation at Closed Mines and at Mines where Molybdenum is an Issue". Kamloops, B.C. Sept. 15-18, 2003.
- **Dowlatabadi, H.** (2003). "Review of: Learning to manage global environmental risks." Climate Policy 3: 315-7.
- **Dowlatabadi, H**. (2003). "Review of: Society, behaviour and climate change mitigation." Climate Policy 3(1): 95-7.
- **Dowlatabadi, H.** (2003). "Review of: The Earth's Biosphere: evolution, dynamics and change." Environmental Science and Policy 6(6): 549-50.
- **Dowlatabadi, H.** (2003). "Review of: The international climate policy to combat global warming: an analysis of the ancillary benefits of reducing carbon emissions." Climate Policy 3: 465-7.
- Dowlatabadi, H., M. Bazylewich, D. Boyd, M. Boyle, A. Elias, E. Fraser, Z. Harkin, M.
 Kandlikar, J. Krzyzanowski, W. Mabee, J. MacDonald, E. Mazzi, R. Pacheco, N. Rivers, K.Roberts, J. Robinson, A. Russell, P. Shepherd and R. Van Wynsberghe (2003). A sustainable climate policy. Vancouver, Liu Institute for Global Issues: 18.
- Frank, L. 2003. "Planning With Health in Mind." <u>Planners Network Magazine</u>. American Planning Association.
- Frank, L., J. Chapman, S. McMillan, A. Carpenter. 2004. <u>Performance Measures for Regional</u> <u>Monitoring</u>. Georgia Regional Transportation Authority.

- Frank, L, J. Levine, D. J. Chapman, S. McMillan, A. Carpenter. 2004. <u>Transportation and Land Use</u> <u>Preferences and Atlanta's Neighborhood Choices</u>. Georgia Regional Transportation Authority.
- Frank, L., J. Wolf, J. Chapman, A. Carpenter. 2004. <u>Measuring How We Move Through Space:</u> <u>Application of GPS Technology to Non-Motorized Travel</u>. Georgia Department of Transportation.
- Frank, L., M. Andresen, J. Chapman, A. Carpenter. 2004. <u>Mode Choice and Urban form in Metropolitan</u> <u>Atlanta</u>. Georgia Department of Transportation.
- Lapointe, M., S.J. Cooke, **S.G. Hinch**, A. P. Farrell, S. Jones, S. MacDonald, D. Patterson, **M.C. Healey**, and G. Van Der Kraak. 2003. Early upstream migration and mortality of Late-run sockeye salmon in the Fraser River, British Columbia. in Droscher, Toni and David A. Fraser (eds.) 2003 Georgia Basin/Puget Sound Research Conference, March 31-April 3, 2003, Vancouver, British Columbia -Proceedings (December 2003)
- Li, K, and **H. Schreier**. 2004. Evaluation of long-term groundwater monitoring data in the Lower Fraser Valley. For: B.C. Ministry of Water, Air, and Land Protection, March 31, 2004, Vol. I, 104 pp, Vol II, 78 pp.
- Mearns, A., M. Stekoll, K.J. Hall, C.J.B. Krause, M. Watson, M. Atkinson. Biological and Ecological Effects of Wastewater Discharges from Cruise Ships in Alaska. Presented at Oceans 2003, San Diego, CA. Sept. 22-26, 2003. pp. 737-747.
- Richardson, J.S., and **S.G. Hinch**. 2003. Monitoring of the lower Fraser River using fish assemblages: can it be done without reference conditions? in Droscher, Toni and David A. Fraser (eds.) 2003 Georgia Basin/Puget Sound Research Conference, March 31-April 3, 2003, Vancouver, British Columbia -Proceedings (December 2003)
- Shinozuka, M., M. Feng, X. Dong, S. Chang, T.C. Cheng, X. Jin, and M.A. Saadeghvaziri. 2003. "Advances in Seismic Performance Evaluation of Power Systems," *Research Progress and Accomplishments 2001-2003*. Multidisciplinary Center for Earthquake Engineering Research, Buffalo, NY, pp.1-16.
- Smith, I. and **H. Schreier**. 2004. Recent trends in urban and agricultural land use practices. Sumas River Watershed, Abbotsfors, B.C. For Environment Canada, Environmental Protection Branch. March 25, 24pp.

III. Books and Chapters in books

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Highlights

The Institute had a very productive year as may be gleamed from this report. It may be noted that over \$1.3 Million was obtained by members to support the relevant and exciting research endeavours of the faculty. Of note is the successful NSERC research initiative by Scott Hinch on a topic that is British Columbia – Sockeye Salmon!

In addition, members of the Institute and their collaborators published over 75 refereed publications, more than 20 contributions to books and numerous presentations at invitational meetings and conferences; both nationally and internationally.

The activities attest to the contributions that the members of IRES/RMES make to both the academic community and to the non-academic community, which it serves.

A milestone was accomplished this academic session in that the RMES students formed a RMES Graduate Society. This will provide a more focused channel of communication among students, the UBC Graduate Society, and all Faculty and Staff. Special thanks go to Laura Lapp for taking the initiative and to all those who volunteered to develop this significant and important communication and social group. The Society will go along way to strengthen the cohesiveness of RMES.

Future Directions

I. AERL

The Aquatic Ecosystem Research Laboratory project has "broken the sod". Building is under way at 2204 Main Mall. The building design is set; our next challenge is to make the interior "user friendly", and of course to stay within budget.

II. Review of Programs

Dr. M.C. Healey chaired a committee of Faculty (IRES), students (RMES) and a representative from the University community, Dr. Laurie Ricoh, on the alternate futures and challenges that are available for the IRES/ RMES as it moves forward under a new administration. This document coupled with several others, including two student-derived surveys will be instrumental in developing innovative paths to pursue.

III. New Director

The search for a new Director is underway. Applications and nominations are being accepted. It is a most exciting time.

Epilogue

The year 2003 – 2004 was a historic year. Twenty-five years will have elapsed since the inception of the Interdisciplinary Graduate program focused on Natural Resources. I am glad that I had no foresight of how the program would evolve. I am proud of the accomplishments that our students have achieved – both past and present. I am confident our new students will continue to excel. I am indebted to all those faculty who shared the excitement of doing something different! The drive, energy, curiosity and pursuit of knowledge that will change the world is a cherished gift, given to the University – not the physical university but the people university. I have been fortunate with the dedicated support staff that makes it all happen!

Enrolment in the graduate program remains high and continues to increase. Words of caution from the external review committee, from the administrative staff and from colleagues suggest strongly that this growth is not "sustainable". This is a serious challenge but a welcomed challenge! Far better than no interest! Graduates continue to acquire meaningful employment upon graduation. And, it is heartening to realize that one of the ways to contribute to the "lesser-developed world" is by providing knowledge!

Research has been essential to the learning process. The enquiring minds, the academic debates, the sharing of ideas, the evolution of norms, the conversion of facts and data to information and knowledge continues at the IRES, and notably in those areas of endeavour that are essential to human existence – exploitation of natural resources and maintenance of a healthy and productive environment. A brief glance at the research publications, the presentation by faculty and students and the interactions with communities attest to the contributions IRES/RMES make to life long learning.

The IRES/RMES has set itself an ambitious agenda, has set goals to address real and emerging issues related to the health of ecosystems, of institutions that attempt to govern them and of people and communities. Together with our collaborators, on campus, other institutions and international agencies and colleagues, we do make a difference.

Staff Directory

AIREY, ADELLE

Project Assistant - Georgia Basin Futures Project Address: 1924 West Mall, Room 209, V6T 1Z2 Phone: 604-822- 8830 E-mail: gbfpassistant@sdri.ubc.ca

BESTBIER, GINA

Research Associate - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 466, V6T 1Z3 Phone: 604-822-9245 E-mail: bestbier@interchange.ubc.ca

BROWN, SANDRA

Research Associate - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 466, V6T 1Z3 Phone: 604-822-0437 E-mail: sjbrown@interchange.ubc.ca

CARMICHAEL, DR JEFF

Research Associate - Sustainable Development Research Initiative/ IRES Address: 1924 West Mall, Room 207, V6T 1Z2 Phone: 604-822-0078 E-mail: jcarmichael@sdri.ubc.ca

CHANG, DR. STEPHANIE

Associate Professor - Centre for Human Settlements Address: 1933 West Mall, Room 247, V6T 1Z2 Phone: 604-827-5054 E-mail: stephanie.chang@ubc.ca

COHEN, DR. STEWART

Adjunct Professor - Adaptation and Impacts Research Group/ IRES Address: 2029 West Mall, Room 221, V6T 1Z2 Phone: 604-822-1635 E-mail: scohen@sdri.ubc.ca

DICKSON, JAIMIE

Clerical Assistant - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 462, V6T 1Z3 Phone: 604-822-0067 E-mail: jdickson@ires.ubc.ca

DORCEY, DR. ANTHONY

Professor /Director – School of Community & Regional Planning/IRES Address: Lasserre, 6333 Memorial Road, Room 433 V6T 1Z2 Phone: 604-822-5725 E-Mail: dorcey@interchange.ubc.ca

DOWLATABADI, DR. HADI

Professor SDRI/ IRES/ Lui Institute for Global Issues Address: 1924 West Mall, Room 216, V6T 1Z2 Phone: 604-822-0008 E-mail: hadi@sdri.ubc.ca

FRANK, DR. LARRY

Associate Professor - School of Community & Regional Planning/IRES Address: 1933 West Mall, Room 231, V6T 1Z2 Phone: 604-822-5387 E-mail: Idfrank@interchange.ubc.ca

GAUTHIER, TROY

Information Systems - Sustainable Development Research Initiative/ IRES Address: 1924 West Mall, Room 200, V6T 1Z2 Phone: 604-822-9566 E-mail: tgauthier@ires.ubc.ca

HEALEY, DR MICHAEL

Professor - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 470, V6T 1Z3 Phone: 604-822-4705 E-mail: healey@interchange.ubc.ca

HERBERT, DEBORAH

Project Manager - Georgia Basin Futures Project Address: 1924 West Mall, Room 208, V6T 1Z2 Phone: 604-822-9376 E-mail: dherbert@sdri.ubc.ca

HINCH, DR SCOTT

Associate Professor - Forest Sciences/ IRES Address: Forest Science Centre 3022, V6T 1Z4 Phone: 604-822-9377 Phone Forestry Lab: 604-822-1969 E-mail: shinch@interchange.ubc.ca

KANDLIKAR, Dr. MILIND

Assistant Professor - Institute for Resources, Environment and Sustainability/SDRI Lui Institute for Global Issues Address: 1924 West Mall, Room 213, V6T 1Z2 Phone: 604-822-6722 E-mail: mkandlikar@sdri.ubc.ca

KO, KARA

Internship Program Coordinator - Sustainable Development Research Initiative/IRES Address: LPC, 2206 East Mall, Room 436A, V6T 1Z3 Phone: 604-822-0546 E-mail: interns@sdri.ubc.ca

KRUSE, RANDI

Community Engagement Coordinator - Sustainable Development Research Initiative/ IRES Address: 1924 West Mall, Room 205, V6T 1Z2 Phone: 604-822-8354 E-mail: rkruse@sdri.ubc.ca

LAVKULICH, LES

Director and Professor - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 436D, V6T 1Z3 Phone: 604-822-3487 Laboratory: MacMillan Building #127 Phone Laboratory: 604-822-3477 E-mail: Iml@ires.ubc.ca

LOCKHART, MISTY

Project Assistant - Sustainable Development Research Initiative/ IRES Address: 1924 West Mall, Room 206, V6T 1Z2 Phone: 604-822-6817 E-mail: misty@sdri.ubc.ca

MAH, DIANE

Financial Assistant - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 468, V6T 1Z3 Phone: 604-822-0027 E-mail: dmah@ires.ubc.ca

MCDANIELS, TIM

Professor School of Community and Regional Planning/ IRES Address: Lasserre 428, 6333 Memorial Road, V6T 1Z2 Phone: 604-822-9288 E-mail: timmcd@interchange.ubc.ca

NEALE, TINA (On leave)

Research Coordinator Adaptation and Impacts Research Group/ IRES Address: 2029 West Mall V6T 1Z2 Phone: 604-822-6899 E-mail: tneale@sdri.ubc.ca

ROBINSON, JOHN

Professor - Sustainable Development Research Initiative/ IRES/GEOG Address: 1924 West Mall, Room 217, V6T 1Z2 Phone: 604-822-9188 E-mail: johnr@sdri.ubc.ca

RONG, BING

Researcher - Adaptation and Impacts Research Group/ IRES Address: 2029 West Mall, V6T 1Z2 Phone: 604-822-6157 E-mail: brong@sdri.ubc.ca

SATTERFIELD, TERRE

Assistant Professor - Institute for Resources, Environment and Sustainability/ SDRI Address: LPC, 2206 East Mall, Room 472, V6T 1Z3 Phone: 604-822-2333 E-mail: satterfd@interchange.ubc.ca

SCHREIER, DR. HANS

Professor - Institute for Resources, Environment and Sustainability/ Agsci Address: LPC, 2206 East Mall, Room 436C, V6T 1Z3 Phone: 604-822-4401 E-mail: star@interchange.ubc.ca

SHANKAR, RAKESH

Academic Fellow - Sustainable Development Research Initiative/ IRES Address: 218, 1924 West Mall, V6T 1Z2 Phone: 604-822-7725 E-mail: rshankar@sdri.ubc.ca

SHAW, JENNIFER

Graduate Secretary - Institute for Resources, Environment and Sustainability Address: LPC, 2206 East Mall, Room 464 V6T 1Z3 Phone: 604-822-9249 E-mail: rmesgrad@ires.ubc.ca

STEPHENSON, LESLIE

Assistant Director - Institute for Resources, Environment and Sustainability Address: LPC 2206 East Mall Room 436E, V6T 1Z3 Phone: 604-822-1482 E-mail: lstephenson@ires.ubc.ca

TANSEY, JAMES

Senior Research Associate/ Adjunct Professor Sustainable Development Research Initiative/ IRES Address: 1924 West Mall, Room 215, V6T 1Z2 Phone: 604-822-0400 E-mail: jtansey@sdri.ubc.ca

VERTINSKY, ILAN

Professor Commerce & Business Administration/ Director Centre for International Business Studies/ IRES/ Dir FEPA Research Unit Address: David Lam Mgmt Research Ctr 522 Phone: 604-822-9406 E-mail: ilan.vertinsky@commerce.ubc.ca

WANG, ELENA

Secretary Institute for Resources, Environment and Sustainability Address: 1924 West Mall, Room 219, V6T 1Z2 Phone: 604-822-8198 E-mail: ewang@sdri.ubc.ca

WELBOURN, RACHEL

Research Coordinator Adaptation and Impacts Research Group/ IRES Address: 2029 West Mall V6T 1Z2 Phone: 604-822-6899 E-mail: rwelbourn@sdri.ubc.ca

YIN, YONGYUAN

Adjunct Professor - Adaptation and Impacts Research Group/ IRES Address: 2029 West Mall, Room 219, V6T 1Z2 Phone: 604-822-1620 E-mail: yongyuan.yin@sdri.ubc.ca

Appendix A



Appendix B IRES Committee Structure – AERL Planning and Design

IRES – AERL COMMITTEE AND WORKING GROUPS

Academic Advisory Committee

- L. Lavkulich Chair
- J. Alder Fisheries Centre
- L. Stephenson IRES
- R. Brown UBC Properties
- D. Pauly ex officio
- J. Dickson co-ordinating secretary

AERL Planning Committee

- L. Stephenson Chair
- J. Alder Fisheries Centre
- Ting (Patty) Pan Student Rep
- D. Pauly ex officio
- L. Lavkulich ex officio
- J. Dickson co-ordinating secretary