RYERSON UNIVERSITY

ENVIRONMENTAL APPLIED SCIENCE AND MANAGEMENT AT RYERSON: A Ten Year Retrospective

ENSCIMAN OCCASIONAL PAPER 10-01

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In the year 2000 the Masters of Applied Science (MASc) program in Environmental Applied Science and Management (ENSCIMAN) began offering a multi-disciplinary degree in the areas of applied environmental science and environmental management as Ryerson's first independent graduate program. It was established through the combined efforts of faculty members in schools and departments across Ryerson University with teaching and on-going research in the two core environmental areas of concentration. At that time, faculty members in eight schools and departments (three engineering departments, chemistry and biology, geography, public health, urban and regional planning, and economics) collaborated in developing the MASc program as a cooperative and multi-disciplinary degree.

The program was a response to a clear societal need for graduates at the Masters level with expertise in core areas of practice in the Canadian environment industry. It was developed to clearly link the environmental sciences and the management and decision-making disciplines in order to provide students the opportunity to integrate the two areas of study in the classroom and in their research. The emphasis was focused on applied research for resolving problems in environmental protection, conservation and sustainable development.

The strengths exhibited by the faculty and students of the ENSCIMAN MASc program, in published research and successful completion of degrees, were translated into the approval in 2008 of a Ph.D. program in environmental applied science and management. The first cohort of doctoral students arrived at the University in Fall 2009.

Since its founding, the ENSCIMAN programs have continued to foster research and training in the environmental sciences and in environmental management and have been successful in preparing graduates for professional careers in the environment industry, as well as for doctoral studies. As of October 2010, 145 MASc students have graduated, and we anticipate that the first of the PhD students will graduate in 2012.

The Canadian Environmental Industry

Since the beginning of the ENSCIMAN program in 2000, Canada and Ontario have continued to experience considerable growth in the environment industry, and a demand for highly-trained professional personnel. Expanding activities in environmental technology, services and management have increased demands for individuals trained to pursue research in environmental applied science and management, and to develop and apply management systems to air, water and waste problems to improve human health and promote the sustainability of environmental systems.

The Canadian environmental industry has grown at a relatively constant pace of over the last few years, in part because of increases in demand for environmental services and technologies, but also because a number of pressures have been exerted on industry to achieve higher levels of environmental performance. Governments have continued to regulate the environmental practices of industry. New regulations in Ontario to provide 'green energy' and to protect key environmental resources including the Lake Simcoe watershed, the Oak Ridges Moraine and Greenbelt have stimulated the demand for professionals with environmental management expertise, and there have been similar developments in provinces across Canada. Recent corporate policy requirements have called for improved environmental technologies and environmentally-responsive management from suppliers and associated businesses. Moreover, industries have experienced pressures from clients and investors to develop and implement environmental policies, as well as from consumers and employees for environmentally-acceptable products and production methods. These include considerations of ethical investment, the introduction of recognized environmental management systems and emissions trading schemes, and changing interpretations of environmental liability. The International Organization for Standardization (ISO) 14000 requirements for audited environmental management systems have now been in place in Canada for thirteen years requiring companies to implement, monitor and improve the performance of their environmental management systems by applying international standards. In 1999, there

were 90 companies certified under ISO 14001;[1] by December 2004, there were 1,492 certified industries in Canada.[2] Recent industry responses suggest the proportion of firms seeking certification is higher, approximately 25 percent of firms sampled.[3]

Eco Canada's assessment in 2005 was that, "Overall, it is anticipated that growth in environmental employment in Canada will be slightly above the projected increase in total employment".[4] They projected a growth of 34,900 new jobs nationally in the environmental sector from 2005 to 2010, building on 45,900 new jobs created in 2001 to 2005.[5] That growth in the environment industry has met predictions is now clear. Eco Canada data suggest approximately 2 million workers in the Canadian economy now spend some of their work time on environmental activities. At last report, the environmental sector is one of the five top industry sectors in the Canadian economy and includes 7,414 companies, many of which are small to medium-sized enterprises. It includes an expanding number of environmental service industries providing consulting, planning, management and engineering services. In 2009, there were more than 682,000 people employed in the environment industry, a considerable increase from the 530,414 reported in 2007 and three times the 221,000 in 1998 when the ENSCIMAN program was being developed.[6] In 2007, roughly 3.2 percent of the Canadian workforce was engaged in environmentally-related work and currently 17 percent of all organizations in Canada have one or more environmental employees.[7] With the continued growth in the environment industry, there is some concern at the national level and in Ontario that skilled human resources will not be available to meet present and future needs.[8] In a recent survey of industries attempting to reduce greenhouse gas emissions, 31 percent

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[1] Corbyn, P. 1999. Raising the Bar: Environmental Performance in the Auto Parts Industry. Engineering Dimensions, March/April 1999; 34-37

[2] Industry Canada, 2005. The Sustainability Report: Sustainability Context for Canadian Industry. On-line http://strategis.ic.gc.ca/epic/site/sd-dd.nsf.html

[3] Statistics Canada. 2007. Use of Environmental Management Practices by Businesses: 2004. Environmental Accounts and Statistics Division, Statistics Canada.

[4] Eco-Canada. 2007. Profile of Canadian Environmental Employment. Calgary, Environmental Careers Organization, Canada. p. 25

[5] Ibid.

[6] Eco Canada, Sectoral Report, 2010 (on-line) and CCHREI. 1999. Human Resources in the Canadian Environmental Sectors. Calgary, Canadian Council for Human Resources in the Environment Industry. Profile of Canadian Environmental Employment. Calgary, Environmental Careers Organization, Canada.

[7] Eco-Canada, Sectoral Report, 2010 (on-line)

[8] CCHREI. 1999. Environmental Certification for Competitiveness; Conference Proceedings. Calgary, Canadian Council for Human Resources in the Environment Industry, p.23

reported lack of information as an obstacle, and 15 percent cited a lack of skilled personnel.[9]

While studies have identified shortages in technical skill areas such as hydrogeology, toxicology, environmental science and air quality analysis, many employers have also pointed to a significant shortage in environmental management skills including project management, environmental assessment, risk assessment, legal compliance and environmental auditing and management systems. Currently, Eco Canada suggest that for the environment industry, the work is clearly multi-disciplinary and multi-sectoral, with 91% of environmental employers having workers in more than one skill category, which highlights the interdisciplinary nature of work in the environmental sector.[10] Clearly, training in several disciplines has become a necessity for employment, and consistent with that observation, the 2010 Sectoral Report for Canadian environmental practitioners suggests that the field continues to be strongly multi-disciplinary with practitioners engaged in three main areas: environmental protection, resource management and environmental sustainability. Within those areas, the most common skill categories of workers in the environmental sector are:

- Environmental health and safety (40% of environmental employees)
- Waste management (28%)
- Site assessment, remediation, and reclamation (20%)
- Environmental communication and public awareness (19%)
- Environmental education and training (18%)
- Water quality (17%)
- Environmental policy and legislation (15%)
- Energy (including alternative / renewable energy or eco-efficiency) (10%).[11]

Internationally, since the ENSCIMAN program began, there has been substantial growth in the environment field. Globally, there continues to be a growing demand for clean technologies, green resource management, and green energy (biomass, solar, wind, water, and methane recovery). As a result, Canada will continue to participate nationally and

[9] Statistics Canada. 2006. Proportion of Establishments in Fossil Fuel-related Industries that Reported Green House Gas Reductions, 2004. Environmental Accounts and Statistics Division, Statistics Canada.
[10] Eco Canada, Sectoral Report, 2010 (on-line), and Andre Rollin, Insights From Universities, Environmental Certification for Competitiveness, CCHREI Conference Proceedings, 1996, p.164
[11] Eco-Canada. 2010. Sectoral Report. Calgary, Environmental Careers Organization, (on-line)

internationally to meet increasing demands for leading-edge environmental technologies.[12]

The ENSCIMAN PhD Student

The ENSCIMAN PhD program is based on expertise in two areas of competence: applied environmental science and environmental management. Admission to the ENSCIMAN PhD program requires a master's degree in a discipline broadly related to the environment. Masters degree holders in other academic disciplines will be considered on an individual basis. As with the MASc program, current students have come from a wide range of academic backgrounds (Table 1).

Table 1: Academic Background of ENSCMAN PhD Students

Molecular Science: MSc (3)
Environmental Applied Science and Management (MASc) (2)
Psychology (MA)
Business Administration (MBA)
Spatial Analysis (MSA)
Environment and Resource Studies (MES)
Rural and Extension Studies (MSc)
Process Engineering (MSc)

The ENSCIMAN MASc Student

Admission to the ENSCIMAN MASc program requires an honours undergraduate degree in a discipline broadly related to the environment. Purposefully, students have come from a wide range of academic backgrounds (Table 2; Table 3). Philosophically, the program has been based on a multi-disciplinary approach that integrates the two areas of competence: applied environmental science and environmental management. The range of students' backgrounds has added to the program and allowed all to be exposed to a

[12] Eco-Canada. 2010. Sectoral Report. Calgary, Environmental Careers Organization, (on-line)

variety of perspectives, not only through the faculty and the structure of the curriculum, but also from the diversity among fellow students. In additional to conventional environmental undergraduate programs, students have also entered the program with degrees in Nursing, Agriculture, Fashion, Laboratory Science, Water Management, Forestry, and Education.

The largest group of ENSCIMAN Masters students come into the program with a BSc degree (Table 4). Eleven students have entered the MASc program with a graduate degree (masters or doctorate).

Table 2: Academic Background of ENSCIMAN MASc Students

	N	
Sciences	87	39.4%
Environmental Specializations	57	25.8%
Engineering	33	14.9%
Social Sciences	32	14.5%
Resource Studies (Forestry, Water Mgt.)	5	2.3%
Others (Commerce, Education, Nursing)	7	3.2%

Table 3: Top 10 Previous Areas of Study Among ENSCIMAN MASc Students

1. Biology
2. Environmental Science
3. Environmental Studies
4. Geography
5. Chemical Engineering
6. Applied Chemistry and Biology
7. Urban Planning
8. Occupational and Public Health
9. Civil Engineering
10. Chemistry

Table 4: Previous Degree Earned by ENSCIMAN MASc Students

	Female	Male	Total
BSc	85	37	**122**
BASc	16	7	**23**
BES	11	7	**18**
BEng	7	10	**17**
BA	8	6	**14**
BAA	2	5	**7**
BComm	2	2	**4**
Other undergraduate	7	0	**7**
MSc	3	4	**7**
MASc	0	1	**1**
MEng	0	1	**1**
MAgric	0	1	**1**
PhD	0	1	**1**
Total	**141**	**82**	**223**

Although most ENSCIMAN MASc students undertook their undergraduate education in Ontario, almost one in six received their undergraduate degree from a university outside Canada (Table 5; Table 6). All told, graduates of ENSCIMAN and current students had graduated from universities in 22 different countries.

Table 5: Location of Prior University Education

Ontario	71.6%
Other Canada	12.2%
Other Countries	16.2%

Table 6: Country of Previous Degree: Top Five

1. Iran
2. China
3. United States
4. Columbia
5. Japan/Lebanon/Romania

ENSCIMAN MASc students have come from a wide range of universities. Ryerson has provided the greatest number of students: typically each year 4-5 incoming students, from a variety of programs, have chosen to remain at the university for their Master's studies in ENSCIMAN. Ontario universities dominate the "top ten" list (Table 7).

Table 7: Top Ten "Feeder" Universities for ENSCIMAN MASc Program

1. Ryerson University
2. University of Toronto
3. University of Waterloo
4. University of Guelph
5. York University
6. McMaster University
7. Queen's University
8. University of Ottawa
9. McGill University
10. Dalhousie University

The data indicate that the program has been a strong choice for female applicants, particularly those with undergraduate backgrounds in the sciences, as well as those from environmental studies and related disciplines (Table 4).

Less than 40 percent of incoming ENSCIMAN students have come directly from their undergraduate studies; a further 30 percent spent 1-2 years away from school; but 14 percent entered ENSCIMAN five or more years after completing their degree (Table 8).

Table 8: Time Between Last Degree and ENSCIMAN MASc Entry

Less than 1 year	38.1%
1 academic year	18.4%
2 academic years	12.1%
3 academic years	9.4%
4 academic years	3.6%
5 academic years	4.0%
Between 5 and 10 academic years	11.2%
Over 10 academic years	3.1%

The PhD Program

Candidates may study in either or both of two broad fields: Environmental Science and Policy, and Environmental Management and Decision Making. Doctoral candidates must complete two required courses: a doctoral level research methods course (ES9002 Research Methods in Environmental Applied Science and Management), a doctoral level course in environmental policy and management (ES9001 Advanced Studies in Environmental Policy and Management). In addition, candidates must complete a minimum of one course in each of the two fields. At the recommendation of the candidate's supervising committee and with the approval of the Program Director, one or more additional courses may be required for students with a broader disciplinary background who need additional graduate preparation. Students are also required to participate in the doctoral seminar. A candidacy examination directed toward the candidate's area of research specialization is required. Successful completion of the candidacy examination is a pre-requisite for continuing with the candidate's research.

The candidate is required to conduct advanced research on a topic related to one (or more) of the fields. The topic is chosen in consultation with the student's supervisor, the candidate presents the research plan in writing, and the research is carried out under the direction of the supervisor and monitored by a supervisory committee. The research must lead to an original contribution of knowledge in the specialty fields(s). The completed research in submitted in dissertation format to Program and School of Graduate Studies examination committees and the candidate makes oral presentations to these committees. Through the dissertation, the candidate is expected to furnish evidence of competence in research and a sound understanding of the chosen specialty area(s).

The minimum residency requirement of the doctoral program is two years (or six consecutive terms). Full-time attendance at the university is expected of PhD candidates due to course and research requirements of the doctoral program. A part-time doctoral program is not available.

The MASc Program

To earn the MASc degree, students must complete a total of 12 course credits, including credits for either a thesis or a professional research project. All program students must complete three required courses; ES8901, ES8921 or ES8920, and ES8930. In addition, students who elect the professional project option must complete a minimum of two environmental applied science courses, a minimum of two environmental management courses, three electives and a research project (ES8080) for two course credits. Students in the thesis option, in addition to the three required courses, must complete a minimum of one environmental applied science course, a minimum of one environmental management course, two electives and a research thesis (ES8090) for five course credits.

To enable students with related science and non-science backgrounds to take courses in the applied science area of competence, the program provides a number of platform courses in the environmental applied science area. Five platform courses are designed to expand, broaden and provide more in-depth information beyond the student's initial

discipline. Platform courses include sufficient introductory information to allow basic understanding of the course material and, as in all graduate courses, instruction is given at an advanced level. For students entering the program without sufficient science background, preparatory undergraduate course work or independent study can be required.

Before admission to the program, each student is assigned a graduate faculty supervisor who advises the student on the balance of courses from both areas of competence to be taken by entering students, and who approves the Program of Study that is reported to the Director in the student's first month in the program. Students are advised to take courses in either the environmental applied science or management areas that complement their undergraduate training, and that advance the student's thesis or research project objectives.

The program does strive to accommodate both full and part-time students—most notably in offering core and elective courses in alternating day and evening sessions each semester to permit part-time students to complete the program in a timely manner. Over the years the ENSCIMAN program has attracted a growing number of full-time applicants and has experienced a modest increase in full-time admissions, whereas the number of part-time admissions has declined somewhat. The number of full-time admissions for Fall 2010 was 21 with 6 part-time admissions, and 22 of 72 current students (as of October 2010) are enrolled on a part-time basis.

Not surprisingly, there is a relationship between the number of years between a student's last degree and enrolling at Ryerson and the choice of whether to study full- or part-time. Full-time students have spent an average of 2.2 years between their studies; part-time students, 3.6 years. Withdrawals have been limited, albeit somewhat higher among part-time students.

The level of financial support for full-time graduate students in the Environmental Applied Science and Management program has increased gradually as the number of students enrolled in the program has more than doubled from its initial entry class. Part-

time students are assumed to be self-supporting through their employment and do not receive financial support.

The average level of support for each student in 2007-08 was $14,230 with approximately 5.5 percent of student funding from external scholarships and 17.3 percent from faculty stipends and research grants (Table 9). A significant level of student funding (37.6 percent) has come from teaching and research assistantships, with the reminder funded through the university's scholarship and awards. The funding goal for the program has been to support full-time program students at an average level greater than $12,000 a year over two years of study through a combination of external and internal scholarships, teaching assistantships and research stipends.

Table 9: Financial Support for ENSCIMAN MASc Full-Time Students

	$ Amount of Support from						**Students Funded**	
Year	**External Scholarship (#)**	**University Scholarship/ Grant (#)**	**TAs (#)**	**RAs (#)**	**Other[1] (#)**	**Total**	**N (%)[2]**	**Mean[3]**
2000-01	$5,000 (1)	$35,300 (4)	$27,300 (6)	$4,200 (1)	$88,000 (7)	$159,800	12 (100%)	$13,317
2001-02	$20,000 (2)	$64,703 (9)	$78,064 (18)	$16,866 (2)	$122,835 (16)	$302,468	26 (100%)	$11,633
2002-03	$35,000 (2)	$80,400 (12)	$49,200 (9)	$4,200 (1)	$128,326 (11)	$297,126	25 (96%)	$11,885
2003-04	$59,750 (4)	$132,500 (20)	$57,068 (14)	$10,947 (4)	$72,000 (9)	$332,265	26 (96%)	$12,779
2004-05	$62,171 (5)	$123,501 (23)	$110,687 (24)	$0	$61,087 (12)	$357,446	31 (100%)	$11,531
2005-06	$78,452 (6)	$125,033 (20)	$112,003 (19)	$6,525 (2)	$83,215 (12)	$405,228	29 (100%)	$13,973
2006-07	$35,000 (3)	$185,333 (25)	$144,603 (20)	$21,618 (3)	$82,576 (9)	$469,130	32 (100%)	$14,660
2007-08	$30,000 (2)	$213,833 (36)	$155,702 (25)	$47,786 (9)	$93,549 (15)	$540,870	38 (100%)	$14,230

[1] Includes research stipends, faculty research grants, etc.
[2] % = number of funded students divided by the number of full-time students eligible to receive funding in the year.
[3] Amount of funding in the 'Total' column divided by the # of full-time students eligible to receive funding in the year.

Given the multi-disciplinary nature of the program, the involvement of participating schools and departments continues to be substantial including the offering of graduate courses in several areas of study, a large commitment to the supervision of graduate students, and in some cases the development of joint research projects.

ENSCIMAN has supported a substantial number of Masters' thesis and project co-supervisions across disciplines. Of the 145 students that have graduated, 37 have been co-supervised by faculty members with many co-supervisions bridging departments and faculties: e.g., biology and public health, engineering and geography, biology and planning, and economics and public health. The number of co-supervisions points to the success of multi-disciplinary research in the program. In addition, the collaborations have given rise to areas of cooperative multi-disciplinary research among faculty members including green roof technology and policy, policy analysis for Greenbelt environmental protection, the implementation of a multi-species early warning biomonitoring technology for water supplies, research in source water protection policy, and pathogen contamination control in water.

ENSCIMAN and Student Research

One of the specific objectives of the programs is to offer students an opportunity to engage in research and critical analysis through independent thesis research and professional project studies.

Laboratory resources to support graduate research Environmental Applied Science and Management are located in several of the participating departments: Civil and Chemical Engineering, Chemistry and Biology, Geographic Analysis, and the School of Occupational and Public Health. Masters students in Environmental Applied Science and Management have been supported in their research in these laboratories together with students from other graduate programs (e.g., Molecular Biology, Chemical Engineering, Spatial Analysis).

As of September 2008, 145 ENSCIMAN MASc students have completed their studies (Appendix A).

As a result of their research at Ryerson ENSCIMAN MASc students have produced a significant number of scholarly publications (Table 10).

Table 10: Papers Authored and Co-Authored by ENSCIMAN Students

Allen, B., J. Wu and H. Doan 2003 "Inactivation of fungi associated with barley grain by gaseous ozone" *Journal of Environmental Science and Health. Part B. Pesticides, Food Contaminants, and Agricultural Wastes* B38(5) 617-630

Botticelli, L. and M.J. Bardecki 2010 "Planning the waterfront: an examination of diversity in newspaper content and coverage" in E. Seitz, T.P. Wagner and L. Lindenfeld (eds) *Environmental Communication as a Nexus* (Orono, ME: Department of Communication and Journalism, University of Maine) 28-46

Bykova, O., A. Laursen, V. Bostan, J. Bautista and L. McCarthy 2006 "Do zebra mussels (*Driessena polymorpha*) alter lake water chemistry in a way that favours *Microcystis* growth?" *Science of the Total Environment* 371(1-3), 362-372

Cheng, I., J. Lu and X. Song 2009 "Studies of potential sources that contributed to atmospheric mercury in Toronto, Canada" *Atmospheric Environment* 43, 6145-6158

Daiz, R. and M.A. Warith 2005 "Life cycle assessment of municipal solid waste: development of WASTED model" *Waste Management Journal* 25, 1-8

Des Lauriers, A., J. Li, K. Sze, S.L. Baker, G. Gris and J. Chan 2006 "A field study of the use of methoprine for West Nile Virus mosquito control" *Journal of Environmental Engineering and Science* 5(6): 517-527

Di Poce, V., E. Goarley and B. Mausberg 2009 *Greenbelt Grown: A Profile of Agriculture in Ontario's Greenbelt* Occasional Paper Series (Toronto: Friends of the Greenbelt Foundation)

Dinca-Panaitescu, M., J. Li and S. Dinca-Panaitescu 2007 "Simulation of the cumulative effects of chemical spills using a spatial-temporal dynamics analysis algorithm" *Journal of Hazardous Materials* 149, 707-719

Gilbride, K. and L. Levinson 2008 "Waste water management and emerging pollutants in the environment" in L.N. Robinson ed *Water Resources Research Progress* (Commack, NY: Nova Science) 127-148

Greenbaum, A., A. Wellington and C. Burley 2010 "Environmental case summaries" in A. Greenbaum and A. Wellington eds *Environmental Law and Policy in the Canadian Context* (Toronto: Captus Press) 539-593-324

Greenbaum, A., A. Wellington and M. Rollinson-Lorimer 2010 "Issues in enforcement and regulatory reform" in A. Greenbaum and A. Wellington eds *Environmental Law and Policy in the Canadian Context* (Captus Press) 250-323

Haffar, M and K.A. Gilbride 2010 "The utility of RT-PCR and FISH application for the detection of single

copy gene targets in E.coli 0157:H7 and Salmonella typhimurium" *Canadian Journal of Microbiology* 56, 254-262

Khan, N., M.A. Warith and G. Luk 2007 "A comparison of acute toxicity of biodiesel, biodiesel blends, and diesel on aquatic organisms" *Journal of the Air and Waste Management Association* 57(3) 286-96

King, S. and R. Pushchak 2008 "Incorporating cumulative effects into environmental assessments of mariculture: limitations and failures of current siting methods" *Environmental Impact Assessment Review* 572-586

Laskarzewska, B. and M. Mehrvar 2009 "Atmospheric chemistry in existing air atmospheric dispersion models and their applications: trends, advances and future in urban areas in Ontario, Canada and in other areas of the world" *International Journal of Engineering* 3(1) 21-57

Liao, B.Q., D.M. Bagley, H.E. Kraemer, G.G. Leppard and S.N. Liss 2004 "A Review of biofouling and its control in membrane separation bioreactors" *Water Environment Research* 76(5) 425-38

Lim, J. and P. Missios 2007 "Does size really matter? Landfill scale impacts on property values" *Applied Economic Letters* 14, 719-723

Luk G.K. and W.C. Au-Yeung 2006 "Modeling human exposure of methyl mercury from fish consumption" *Water Quality Research Journal of Cana*da 41(1) 1-15

Luk, G.K. and W.C. Au-Yeung 2002 "Experimental investigation on the chemical reduction of nitrate from groundwater" *Journal of Advances in Environmental Research* 6, 441-453

Magness, V. and N. Tang Kai 2007 "Study evaluates link between environmental performance, profits of Canadian refiners" *Oil & Gas Journal* 105(4), 45-49

Martil, A. 2009 "Stocking the shelves: despite the recession, all signs point to a high demand for POU/POE devices" *Canadian Water Treatment* (Jan./Feb.) 8

Millward, A.A. and S. Sabir, 2010"Structure of a forested urban park: implications for strategic management" *Journal of Environmental Management* 91(11) 2215-2224

Muscalu, A.M., E.J. Reiner, S.N. Liss and T. Chen 2010 "Determination of polychlorinated biphenyls, organochlorine pesticides, chlorobenzenes in sludge and sediment samples by GCxGC-μECD" *International Journal of Environmental Analytical Chemistry* 90(1) 1-13

Nicholson, J. and A. Martil 2008 "Overcoming greenwashing. Environmental leadership in the water industry: how do you measure up?" *Canadian Water Treatment* (July/Aug.) 12-13

Pogue, A. and K.A. Gilbride 2007 "Impact of protozoan grazing on nutrification and the ammonia and nitrite-oxidizing bacterial communities in activated sludge" *Canadian Journal of Microbiology* 53, 559-571

Pushchak, R and A.M. Farrugia 2005 "Social impact assessment and high level radioactive waste disposal: the Canadian concept and aboriginal responses" in K. Hanna ed *Environmental Impact Assessment: Practice and Participation* (Toronto, Oxford) 118-144

Torok, A. and Pushchak, R. 2009 "A source water protection law in Ontario: the Clean Water Act 2006, watershed planning and risk management" in A. Greenbaum, R. Pushchak and A. Wellington eds *Canadian Issues in Environmental Law and Policy* (Toronto: Captus Press)

Venhuis, S.H. and M. Mehrvar 2005 "Photolytic treatment of aqueous linear alkylbenzene sulfonate" *Journal of Environmental Science & Health, Part A: Toxic/Hazardous Substances & Environmental Engineering* 40(9) 1731-1739,

Venhuis, S.H. and M. Mehrvar 2005 “Photocatalytic Treatment of Linear Alkylbenzene Sulfonate (LAS) in Water” *Journal of Environmental Science & Health, Part A: Toxic/Hazardous Substances & Environmental Engineering* 40(5) 1003-1012

Venhuis, S.H. and M. Mehrvar 2004 “Health effects, environmental impacts, and photochemical degradation of selected surfactants in water” *International Journal of Photoenergy* 6(3) 115-125

Vincent, J., D. Kolozsvari, W.S. Roberts, P.F. Bolton, H.M.D. Gurling and S.W. Scherer 2004 “Mutation screening of X-chromosomal neuroligin genes: no mutations in 196 autism probands” *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics)* 129B. 82–84

Warith, M.A. and G. Takata 2004 “Effect of aeration on fresh and aged municipal solid waste in a simulated landfill bioreactor” *Water Quality Research Journal of Canada* 39(3) 225-231

Wellington, A., C. Burley and M. Rollinson-Lorimer 2010 “The Walkerton tragedy: a comprehensive chronology” in A. Greenbaum and A. Wellington eds *Environmental Law and Policy in the Canadian Context* (Toronto: Captus Press) 511-538

Wellington, A. and M. Rollinson-Lorimer 2009 "Bulk water removal: legal and political issues" in A. Greenbaum, R. Pushchak and A. Wellington eds *Canadian Issues in Environmental Law and Policy* (Toronto: Captus Press) 295-327

In addition, ENSCIMAN students have authored or co-authored papers presented at many scholarly conferences including:

- A.D. Latornell Conservation Symposium
- Annual Conference of the Canadian Society for Civil Engineering
- Annual Aquatic Toxicity Workshop
- Annual General Meeting and Conference of the Ontario Association for Impact Assessment
- Annual International Symposium on Green Supply Chains
- Annual Meeting of the American Association of Geographers
- Annual General Meeting of the American Society for Microbiology
- Annual Symposium on Supply Chain Management
- ArcticNet Annual Scientific Meeting
- Association for Practical and Professional Ethics, Annual Meeting
- Canadian Chemical Engineering Conference
- Canadian Geotechnical Conference
- Canadian Quality Congress
- Canadian Society for Ecological Economics
- Central Canadian Symposium on Water Quality Research
- Conference of the Environmental Studies Association of Canada
- EnviroAnalysis 2008
- GIRA 2010 Conference on Corporate Governance, Innovation, Social and Environmental Responsibility
- International Conference on Antimicrobial Resistance
- ISO 14001 Colloquium IV

- Joint Meeting of ASLO/NABS: “Aquatic Sciences: Global Changes from the Center to the Edge”
- Society for Conservation Biology Annual Conference
- Third European Communication Conference
- World Congress on Industrial Biotechnology and Bioprocessing
- World Heritage and Tourism Conference

ENSCIMAN Faculty

When established, the Environmental Applied Science and Management program had a core of fifteen faculty members. In the intervening years, while there have been retirements, transfers to other graduate programs and faculty members who have left Ryerson University for other academic positions, the total number of faculty members in the program has grown to 57 (Appendix B). The faculty are in schools and departments from across the university (Table 11). As well, there are now six adjunct faculty members from government laboratories and industry who have supervisory privileges in the program. Many ENSCIMAN faculty also participate in other graduate programs at the University.

Several ENSCIMAN faculty members are working in leading areas of environmental research such as green roof technologies, biological assays for toxic contaminant detection in the environment, environmental biotechnology for water and waste water treatment, modeling of contaminant fates, environmental biology, health risk assessment and the health effects of environmental contaminants, urban reforestation, environmental policy, and protection of source waters from pathogenic threats. Over the time of the program’s operation, research by ENSCIMAN faculty has resulted in publication of 844 scholarly papers and reports (Figure 1; Figure 2).

External research funding among ENSCIMAN faculty from the granting councils has achieved an annual average of approximately $900,000 dollars over the last ten years. Other grants and contracts have averaged approximately $487,000 dollars each year (including an annual average of $267,000 dollars in external contracts). A portion of

some of these funds has helped the ENSCIMAN program in providing a reasonable level of funding support.

Table 11: Participating Academic Units at Ryerson

Faculty of Arts
- Department of Economics
- Department of Geography
- Department of History
- Department of Philosophy
- Department of Politics and Public Administration
- Department of Sociology

Faculty of Business
- School of Hospitality and Tourism Management
- Ted Rogers School of Business Management

Faculty of Community Services
- School of Occupational and Public Health
- School of Urban and Regional Planning

Faculty of Engineering, Architecture and Science
- Department of Aerospace Engineering
- Department of Architectural Science
- Department of Chemical Engineering
- Department of Chemistry and Biology
- Department of Civil Engineering
- Department of Mechanical and Industrial Engineering

Figure 1: Annual Number of Publications by ENSCIMAN Faculty, 2000-2008

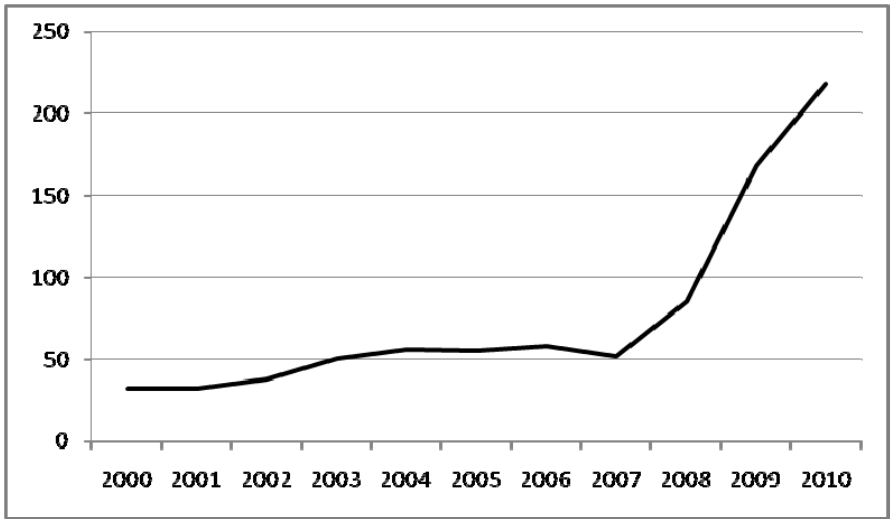
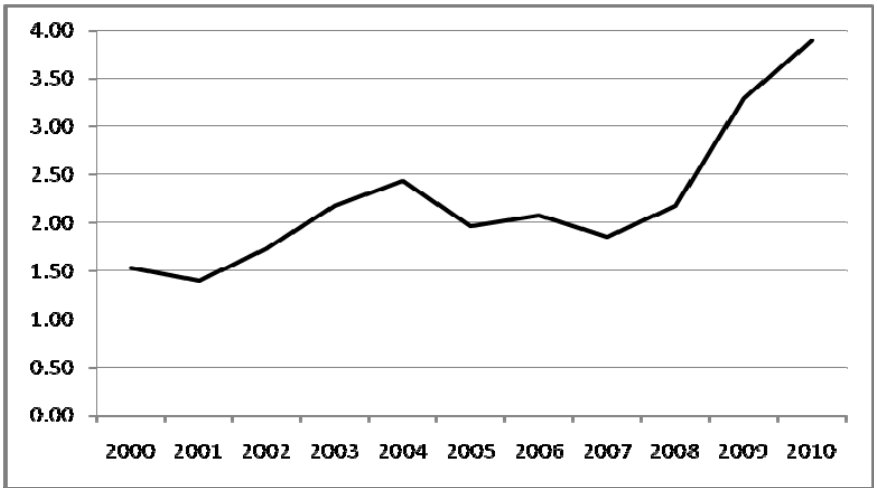


Figure 2: Average Annual Publication Rate per ENSCIMAN Faculty Member, 2000-2008



Further, infrastructure funding for other graduate programs at Ryerson University, in particular, those in the departments of Chemistry and Biology, Chemical, Civil, and Mechanical Engineering, and Geography provide support for student research in the ENSCIMAN program since those academic units participate in the program and provide laboratory space and equipment access for the ENSCIMAN students whose research is supervised by faculty members in the participating departments (Table 12).

The program's applied focus has been supported by the association of external adjunct faculty to facilitate professional projects for graduate students in private and public sector research facilities and other non-governmental applied settings for environmental research (Appendix B). The program has emphasized applied research in collaboration with agencies such as the Ministry of the Environment, Ontario, CRESTech, Environmental Defence Canada and other research institutions in industry and government.

After ENSCIMAN

The initial employment experiences of students graduating from the ENSCIMAN program reflects a relatively rapid uptake in the environment industry in Ontario and Canada in a wide variety of positions (Table 13).

Table 13: ENSCIMAN Graduate Employment

Air Quality Engineer, AECOM
Analyst, Facilities, Ontario Energy Board
Analyst, Innovest Strategic Value Advisors
Aquatic Systems Research, Stantec Consultants
Assistant Planner, Policy Development, Ontario Ministry of Municipal Affairs and Housing
Associate, Booz Allen Hamilton Inc.
Atmospheric Impact Assessment, Transport Canada
Building Plan Reviewer, City of Toronto
CEO, Toronto Recycling Ltd.
COA Great Lakes Scientist, Ontario Ministry of the Environment
Consulting Engineer, SENES Consultants Ltd.
Data Analyst, Waste Data Analysis Group, Waste Diversion Ontario
Directeur, Développement des Affaires - Région du Québec - Services Environnementaux, Maxxam Analytique
Engineer, Design and Construction, Toronto Water
Engineer, Transportation Department, City of Toronto
Environment, Health and Safety Coordinator, Urban Space Property Group
Environmental Audit Professional, Office of the Auditor General of Canada
Environmental Campaign Officer, Oceans Project, Greenpeace Canada
Environmental Consultant, Environmental Auditing and Site Assessment, Integrated Management Solutions
Environmental Consultant, RSK Environment Ltd.
Environmental Health and Safety Coordinator, Compass Group
Environmental Health and Safety Officer, Magna International
Environmental Health Officer, Hamilton-Wentworth Health Unit
Environmental Health Officer, Regional Municipality of York
Environmental Health Officer, Toronto Public Health
Environmental Manager, Energy, Nuclear and Environmental Sciences, Senes Consultants Ltd.
Environmental Manager, Sony Canada
Environmental Officer, Transport Canada
Environmental Planner, Ecoplans Ltd.
Environmental Planner, Elecsar Engineering
Environmental Planner, Planning and Building Department, City of Mississauga
Environmental Planner, SENES Consultants Ltd.
Environmental Planner, Town of Richmond Hill
Environmental Policy Analyst, Ontario Ministry of Environment
Environmental Resource Planner and Environmental Assessment Coordinator, Ontario Ministry of the Environment
Environmental Scientist, Catox Environmental
Environmental Scientist, Golder Associates
Environmental Scientist, Knight Piesold Consulting Engineers
Environmental Specialist, Ontario Realty Corporation

GIS analyst, Town of Aurora
Health and Safety Coordinator, IMT Corporation - Forge Group
Instructor, Environmental Health, Ryerson University
Intern, Energy and Environment Cluster, United Nations Development Programme
Junior Environmental Consultant, Tebodin Middle East (Abu Dhabi)
Land Use Policy Coordinator , Inuvialuit Regional Corporation
Land Use Research Advisor, Inuvialuit Regional Corporation
Manufacturing Project Manager, Canac Kitchens (a Kohler Company)
Parks Planner, Environmental Stewardship Division, BC Ministry of Environment
Pilot Project Administrator, Zenon Waste Water Treatment
Planner, Pembroke District, Ontario Ministry of Natural Resources
Planner, Town of Vaughan
Planning Analyst, Ontario Power Authority
Policy Analyst, Ontario Ministry of Municipal Affairs
Policy Analyst, Ontario Ministry of the Environment
Policy Analyst, Transport Canada
Product Application Engineer, Mobile Climate Control
Professional Maintenance and Reliability Engineer, Sanofi Pasteur Ltd.
Program Support Coordinator, Environmental Assessment Support Unit, Ontario Ministry of the Environment
Project Assistant, Policy and Planning Division, Ontario Ministry of Transportation
Project Engineer, ABTECH Scientific Inc.
Project Engineer, B.M. Ross and Associates Limited
Project Engineer, R.J. Burnside & Associates Ltd.
Project Engineer, Wastewater Division, Esolar Applied Research
Project Manager, Franz Environmental Inc.
Project Manager, Golder Associates
Project Officer, Environmental Assessment Branch, Ontario Ministry of Environment
Project Scientist, Morrow Environmental Consultants
Research Analyst, Environmental Social and Governance, Innovest Strategic Advisors
Research Associate, Environment Canada
Research Associate, Nutrient Management, George Morris Centre
Research Associate, University of Toronto
Research Chemist, 3XR Research Inc.
Research Health and Safety Officer, Environment, Health and Safety, Brock University
Scientist, Manitoba Health
Senior Air Engineer, Ontario Ministry of Environment
Senior Business Analyst; Loblaw Companies Limited
Senior Drinking Water Adviser, Ontario Ministry of the Environment
Senior Policy Advisor, Air Policy and Climate Change Branch, Ontario Ministry of the Environment
Senior Project Engineer, Ontario Ministry of Environment
Senior Project Officer, Biofuels Unit, Environment Canada
Senior Wastewater Engineering Adviser, Water Standards, Ontario Ministry of the Environment
Sport Fish Contaminant Specialist, Ontario Ministry of the Environment
Strategic Services Department, Town of Markham
Supervisor, Service Programs, Toronto Water
Terrestrial and Aquatic Scientist, SENES Consultants Ltd.
Vice President, Operations & Sustainability, Energy Advantage
Water Resources and Stormwater Operations Coordinator, Town of Richmond Hill
Water Resources Engineer, Aquafor Engineering Inc.
Water Resources Engineer, UMA Engineering Inc.
Water Technician, Ontario Ministry of the Environment
Watershed Coordinator, Ontario Ministry of Environment
Watershed Monitoring Coordinator, Toronto Region Conservation Authority

A number of other students have chosen to continue on the doctoral studies. ENSCIMAN students enrolled in PhD programs including:

- Chemical Engineering and Applied Chemistry, University of Toronto
- Civil Engineering, Ryerson University
- Civil Engineering, University of Ottawa
- Ecology and Evolutionary Biology, University of Toronto
- Environmental and Occupational Health and Safety, University of Waterloo
- Environmental Applied Science and Management, Ryerson University
- Geography, Queens University
- Health Sciences and Gerontology, University of Waterloo
- Natural Resources Management, University of Arizona

The Future

The University has a continuing commitment to both the PhD and the MASc programs. In the foreseeable future increased enrolment numbers are not anticipated, except as a result of the "roll out" of the PhD program until it reaches a steady state. However, innovations in pedagogy and in research will continue to be a hallmark of the ENSCIMAN program.

New faculty members with an interest in environmental issues and from an ever-broadening breadth of disciplines continue to be attracted to Ryerson University. Adding to this is the overall growth in enrolment at Ryerson University and the need for expansion of faculty numbers in existing academic units. One anticipated outfall will be the continuing growth in the number and diversity of ENSCIMAN faculty into the coming academic years.

Contacts and Information

http://www.ryerson.ca/ensciman

Appendix A: ENSCIMAN Graduates' MASc Theses and Research Papers

Name	Year	Thesis or Project Title	Research Supervisor(s)
Ahchong, Katrina	2010	Anthropogenic Climate Change Coverage in Canadian News Media from 1988-2007	Dodds, R.
Al Shawaf, Zainab	2010	The Characterization of MCEF: An AFF Transcription Factor Associated with Acute Lymphoblastic Leukemia and HIV-1	Estable, M.
Allen, Brent	2002	Ozone Inactivation of Fungi Associated with Barley Grain	Wu, J.
Amernic, David	2003	An Examination of Drinking Water Qualify Management in Ontario using the Australian Framework as a Benchmark	Pushchak, R. / Liss, S.
Au, Amy	2007	Simulation of the Stormwater Reduction and Energy Saving Benefits of Urban Greenroofs	Li, James
Au-Yeung, Wai Ching	2002	Methylmercury Bioaccumulation in Sport Fish and the Relation to Human Exposure	Luk, G.
Au, Yick	2007	A Planning Tool of Urban Greenroofs	Li, James
Awad, Emily	2009	Toxicity and Bioaccumulation of 2.2',4,4' - Tetrabromodiphenyl Ether (BDE47) in a Laboratory Aquatic Food Chain	Bostan, V./ Laursen, A./ McCarthy, L.
Bamfo, Eli	2007	'Sustainable but Just on the Edge': The Strength and Fragility of the Commercial Whale-watching Industry in the Lower Bay of Fundy, New Brunswick, Canada	Bardecki, M.
Bandelj, Emil	2004	Assessment of Androgenic Response Potential of Effluents Using *in vitro* and *in vivo* Methods	McCarthy, L. / van den Heuvel, R.
Berghoef, Naomi	2010	Assessing the Feasibility of a Sustainable Winemaking Eco-label Initiative In Ontario	Dodds, R.
Berhe, Entehabu	2002	Post Environmental Assessment (EA) Audit of Municipal Solid Waste Landfills	Pushchak, R.
Borsy, Emily	2009	The Impacts of Climate Change on the Availability of Granular Resources in the Inuvialuit Settlement Region, NWT	Duerden, F.
Botticella, Lisa-Anne	2006	Examining the Contribution of Toronto's Press in Maintaining an Environmentally-Detrimental Social Paradigm, 2003-2006	Bardecki, M.
Bowler, Renee	2006	Evaluating Municipal Wastewater Treatment Plant Impacts on Surface Water Quality Using the Canadian Water Quality Index: A Case Study of the Nith River, Ontario	Pushchak, R.
Brei, Elena	2006	Isolation, Separation and Identification of the Extracellular Polymeric Substance (EPS) Protein Fraction from the Activated Sludge Floc	Liss, S.
Bridge, Deon	2009	PM2.5 Dispersion Modelling from La Ronde Fireworks Event in Montreal Using Aermod And Arcmap	Hicks, J.
Buan, Eric	2009	Development of a Laboratory Analytical Method Beneficial to the Policies of the Canada-Wide Standards for Dioxins and Furans	Li, James / Lo, Ching
Burley, Caitlin	2007	Drinking Water Quality and Trust: Communities and Risk Information	Pushchak, R.

Bykova, Olga	2006	Do Zebra Mussels (*Dreissena polymorpha*) Alter the Water Chemistry in a Way that Favours Microcystis	Laursen, A. / McCarthy, L.
Cairns, Elaine	2009	Comparison of Mercury Species in Indoor and Outdoor Air in Toronto, Canada	Lu, Julia
Camacho, Rosanne	2005	Public Participation in Nuclear Waste Management: A Comparative Analysis of the Swedish and Canadian Processes	Pushchak, R.
Campbell, Cheryl	2004	Using Six Sigma to Design an Environmental Management System	Strahlendorf, P.
Cao, Weihua	2009	Combined Anerobic Baffled Reactor and UV/H202 Process for the Treatment of Slaughterhouse Wastewater	Mehrvar, M.
Capotorto, Tonia	2008	An Ecological Assessment of Invasive Plant Species in a Constructed Wetland in Markham, Ontario, Canada	Bardecki, M.
Carmichael, Stephen	2003	Residential Energy Efficiency and Home Construction and Renovation: How Much Progress?	Mars, J.
Chan, Andrew	2009	Analytical Hydrological Modelling of Green Roof Technology on a Watershed Basis	Li, James
Charron, Christopher	2004	Ontario's Drinking Water Supply System: A Framework For a Preventive Management Strategy	Fang, L.
Chen, Elaine	2008	Enzyme-linked Immunosorbant Assay (ELISA) for the Screening of Dioxins in Fish Samples	Li, J. / C. Lo
Cheng, Christina	2010	The Interface Between Science and Policy in Transboundary Water Management	Gore, C.
Cheng, Irene	2008	Studies of Potential Sources that Contribute to Atmospheric Mercury in Toronto, Canada	Lu, J.
Cheng, Vivian	2010	The Development of Risk-Based Spill Management Criteria Related to the Beneficial Use Impairments in the St. Clair River	Li, James
Chmakova, Alexandra	2007	Environmental Assessment of Storm Water Ponds: Impacts on a Rouge River Tributary	Bostan, V.
Chui, Jenny King Lai	2002	Control of Oil Spills in Urban Areas	Li, J.
Currie, Beth Anne	2005	Estimates of Air Pollution Mitigation with Green Roofs Using the UFORE Model	Pushchak, R.
Davis, Greg	2009	Learning From Third Party Certified Environmental Management Systems In Local Authority Organizations	Webb, K.
Des Lauriers, Angelune	2004	The Fate and Transport of Methoprene in an Urban West Nile Virus Mosquito	Banting, D. / Li, J.
Diaz, Rodrigo	2004	Life Cycle Assessment of Municipal Solid Wastes: Development of “Wasted” Software	Warith, M.
Di Poce, Victoria	2010	The Air Pollution Contributions of a Large-Scale Suburban Development	Pushchak, R.
Dinca-Panaitescu, Mihaela	2004	Cumulative Effects of Chemical Spills Using Spatial-Temporal Dynamics Analysis Algorithm	Li, J.
Dort, Andrea	2010	The Application of an Early-warning Biomonitoring System (EWBS) in a Canadian Context	McCarthy, L. / Pushchak, R.
Earl, Rebecca	2006	Biosecurity in Agriculture: A Suggested Strategy for the Protection of Source Water Against Pathogenic Contamination	Pushchak, R. / Johns, C.
Ehsanipour, Mandana	2010	Acid Pretreatment and Fractionation of Source-Separated Organic Waste for Lignocellulosic Saccharification	Luk, Grace
Esmail, Karima	2005	Environmental and Ethno-cultural Groups Working Together: An Examination of Toronto-based	Milroy, B.

		Environmental Programs	
Fantin, Ann	2009	An Evaluation of Defluoridation Technologies in the Context of Decision-Making Strategies	Warith, M.
Farkh, Ruba	2006	Removal of Tetracyclines in Wastewater: Accumulation and Distribution of Chlortetracycline in Bulk Water and Biomass Compartments in Activated Sludge	Liss, S. / Mehrvar M.
Farrugia-Uhalde, Ann Marie	2003	Nuclear Fuel Waste and Aboriginal Concerns. Canada's Nuclear Fuel Waste Management Concept Public Hearings: A Content Analysis	Pushchak, R.
Fleet, Vivian	2010	Use of the Multispecies Freshwater Biomonitor to Determine Behavioural Effects of Tributyltin and Atrazine on *Daphnia magna* and *Hyalella azteca*	Bostan, V. / Laursen, A. / McCarthy
Forgione, David	2010	Mapping and Modeling Urban Solar Energy Potentials Using Geospatial Data: A Case Study of Ryerson University Campus	Li, Songnian
Fowler, Amanda	2006	A Comparison of the Waste Diversion Legislation, Practices, Enforcement and Efficiency in Select Jurisdictions Across North America and Europe	Missios, P. / Warith, M.
Fromme-Marcellin, Michelle	2007	Analysing Prediction Methods for Atmospheric Dispersion of Pollutants from Incineration: Three Canadian Case Studies	Banting, D.
Gebert, Sonja	2010	Assessing Ecological Impacts of Land-applied Municipal Biosolids: Effects of Run-off and Tile Drainage on the Aquatic Organisms *Daphnia magna*, *Hyalella azteca*, and *Lemna minor*	Laursen, A. / McCarthy, L.
Ghadakpour, Matahb	2007	Survival and Proliferation of an Opportunistic Pathogen in Mixed Community Biofilms	Wolfaardt, G.
Haffar, Miriam	2007	Comparative Detection and Enumeration Strengths of Quantitative, Real-time PCR and Fish for Water-borne Bacterial Pathogens in Municipal Waste Water	Gilbride, K.
Hahn, Kristen	2009	Urban Green Roof Vegetation Assemblage Demography, Classification, and Design Recommendations	Banting, D. / Li, James
Han, Yuqi	2008	A Web-Based GIS Planning Framework for Urban Oil Spill Management	Li, James
Hatfield Venhuis, Sarah	2004	Photolytic and Photocatalytic Treatment of Linear Alkylbenzene Sulfonate in Water	Mehrvar, M.
Holmes, Alison	2007	Trends in Public Attention to the Environment from 1956 to 2005	Pushchak, R.
Holt, Leigh	2007	Ecological Impacts of Biosolids Application on Nitrogen-fixing Bacteria	Laursen, A. / McCarthy, L.
House, Belinda	2006	The Impact of Acid Stress on *Escherichia coli* O157:H7 Virulence	Foster, D.
Imm, Mary	2010	An Evaluation of British Columbia's Medication Return Program as a Management Framework for Collecting Unused Pharmaceuticals	Pushchak, R.
Ji, Changhai (Kevin)	2003	Deleterious Effect of Mercuric Chloride on Human Epithelial Cells	Lu, J. / Foster, D.
Johnson, Wendy	2007	Managing threats to small drinking water systems in Ontario: a risk-based approach	Sly, T.
Jones, Catherine	2009	Addressing Direct and Indirect Environmental Impacts of a Highway Extension with the Land Transformation Model and the Long-Term Hydrologic Impact	Pushchak, R.

		Assessment Model	
Kakar, Durkhani	2010	Photochemical Degradation of Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) Using UV/H_2O_2	Mehrvar, M.
Kalt, Stephanie	2004	An Assessment of Municipal Capacity for Human-Wildlife Conflict Management in Selected Urban Areas of Southern Ontario	Milroy, B.
Kanetani, Mitsuko	2005	Association of *Escherichia coli* O157:H7 in Flocs: Role of Extracellular Polymeric Substances and Fate of Pathogenic Organisms	Foster, D. / Liss, S.
Katic, Sofija	2008	A Polymer to Detect Explosives: Towards an Effective Sensor Mateiral	Evans, C.
Kelly, Alicia	2005	The Characterization of Significant Direct Threats to Source Watersheds: A Risk-based Approach	Pushchak, R. / Sly, T.
Khan, Nalissa	2005	Acute Toxicity of Biodiesel and Biodiesel Blends	Warith, M.
King, Sarah	2006	Incorporating Cumulative Environmental Effects of Finfish Mariculture into Canadian Environmental Assessment	Pushchak, R.
Kitano, Yoshiki	2005	Conditions of Hydrolysis with a Specific Pair of Endo- and Exo-Cellulases	Turcotte, G.
Kolozsvari, Debbie	2005	Integration and Persistence of *Escherichia coli* 0157:H7 86-24 in a Naturally-Occurring Water Well Biofilm	Liss, S.
Komarova, Karina	2008	Strategy for Cellulase Immobilization and Its Partial Purification and Characterization	Heyd, D. / Turcotte, G.
Kraemer, Heather	2002	Characterization of Microbial Aggregates in Relation to Membrane Biofouling in Submerged Membrane Bioreactors	Liss, S.
Krasnova, Renata	2004	Hydrologic Modeling of Construction Site Sediment Control Pond Using SWMM	Li, J.
Laskarzewska, Barbara	2009	An Air Dispersion Model for the City of Toronto, Ontario, Canada	Mehrvar, M.
Lawson, Sarah	2010	A Planning Framework for Low Impact Development (LID) in Stormwater Management: An Ontario Perspective	Li, James/ Guergachi, A.
Lee, Timothy	2002	Urban Growth Management in Two North American Cities	Pushchak, R. / Lister, N.
Levin, Maina	2004	Voluntary Environmental Initiatives Promoted by the Canadian Manufacturing Association	Strahlendorf, P.
Levinson, Lawrence	2008	Nitrogen-bearing Toxins and the Environment: Food Safety Monitoring Systems for the Quality Assurance of Vegetable Protein Production	Gilbride, K. / Pushchak, R.
Lim, Jason (Jong-Seok)	2003	Identifying the Variance in the Magnitude of Landfill Impacts on Residential Property Values Using Multiple Regression Analysis	Pushchak, R. / Missios, P.
Liu, Christopher	2004	Detection of Homoserine Lactones (Quorum Sensing Molecules) in Wastewater Microbial Floc	Liss, S.
Liu, Zhong	2005	Magnetic Coagulation for Oily Waste Treatment	Luk, G. / Fang, L.
Luciani, Peter	2005	Distributed Urban Stormwater Modeling within GIS Integrating Analytical Probabilistic Hydrologic Models and Digital Imagery	Banting, D. / Li, J.
Luisser, Frank	2005	Opportunities for VOC Emissions Reductions in Manufacturing Office Furniture Partitions	Rosen, M.
Mandula, Melissa	2005	The Effects of ISO 14001 on Corporate Financial and Environmental Performance	Bardecki, M.

Manson, Harry	2003	Uncertainty and Sensitivity Analysis of GIS Based Continuous Hydrological Modeling	Li, J. / Banting, D.
Marshall, Gillianne	2009	Assessing Behavioural and Physiological Responses of Three Aquatic Invertebrates to Tributyltin and Atrazine in a Multi-Species, Early Warning Biomonitoring Technology	Bostan. V. / Laursen, A. / McCarthy, L.
Masekoameng, Kolobe	2006	Modeling Ecotoxicity of Polybrominated Dephenyl Ethers in Aquatic Ecosystems	Bostan, V.
Maslo, Dennis	2007	Re-use and Recovery: Electronic Waste	Fang, L.
McComb, Stephen	2004	Measuring the Benefits of Remediating a Hazardous Waste Site in Sydney, Nova Scotia	Missios, P.
Mondal, Bibekananda	2006	Use of Shredded Tire Chips and Tire Crumbs as Packing Media in Trickling Filter System for Landfill Leachate Treatment	Warith, M.
Moszynski, Dorothy	2007	Municipal Progress in Conformity to Greenbelt Legislation: Challenges in Implementation and Toronto Green Belt Integrity	Pushchak, R. / Lister, N.
Mueller, William	2010	A Critical Review of Health Impact Assessments in Ontario's Nuclear Industry	Pushchak R.
Muscalu, Alina	2009	Determination of Polychlorinated Biphenyls, Organochlorine Pesticides and Chlorobenzens in Sludge and Sediment Samples by GCxGC- ECD	Liss, S.
Nandi, Monisa	2009	Ciprofloxacin Effects on Nitrogen Cycling Processes in Freshwater Aquatic Sediments	Bostan, V. /Laursen, A. /McCarthy, L.
Netto, Isabelle	2010	Examining Acute Behavioural Responses of the Protist (*Euglena gracilis*) under Toxicant Stress using the Image Analysis System ECOTOX	Bostan, V.
Nichols, Paul	2008	Environmental Policy Creation: Examining the Ontario Municipal Approach	Banting, D.
Norrie, Steven	2006	A Life-Cycle Based Decision-Making Framework for Electricity Generation System Planning	Fang, L.
Nowak, Eva	2003	Characterization of Activated Sludge Flocs by Confocal Laser Scanning Microscopy and Image Analysis	Liss, S.
Orfi, Mohammed	2008	Study of Transportation Strategies for Emission Control	Mehrvar, M. / S. Zolfaghari
Otke, Zachary	2008	Developing Habitat Suitability Index Models for the Wood Frog (*Rana sylvatica*) and Boreal Chorus Frog (*Pseudacris triseriata maculata*) in the Foothills Parkland Natural Sub-region and Bow River Basin	Bardecki, M.
Panagopoulos, Vicky	2003	ISO 14001 and Environmental Performance in an Automotive Manufacturing Plant	McCarthy, L. / Pushchak, R.
Parent, Deborah	2002	Evaluation of the Diffusion Gradient in Thin-Films (DGT) Technique for Measuring Trace Metal Concentrations in Freshwaters	Twiss, M.
Parhizgari (Eslami), Zahra	2009	A Physiologically Based Pharmaco-Kinetic Model for Uptake of Dioxins and Furans by Fish	Li, James
Park, Heather	2007	The Role of P13K Signaling in Enteropathogenic *Escherichia coli* Induced Apoptosis in Epithelial Cells	Foster, D. / Marshall, J.
Parson, Jessica	2010	The Role of Source Reduction in Resource Management Strategies and How United States Federal, State, and Local Environmental Agencies Implement and Communicate Source Reduction Policy and Initiatives	Bardecki, M.

Pearce, Christopher	2009	Investigating the Sub-Acute Responses of *Lemna minor*, *Pseudokirchneriella subscritata*, *Euglena gracilis* and *Anodonta grandis* to Tributyltin-Hydride and Atrazine in Freshwater	Heyd D. / McCarthy, L. / Mehrvar. M.
Pepin, Shane	2008	Water Resource Management in the Southern Ontario Region: Market Simulation under Scarcity Conditions	Missios, P.
Percy, Benjamin	2009	The Performance of Clostridium Phytofermentans for Biofuels Production from Lignocellulosic Biomass	Luk, Grace
Perlikowski, Elisabeth	2010	Regional Contributions to Achieving Sustainability: An Examination Using Sustainability-focused Policies in Regional Official Plans	Robinson, P.
Pileggi, Vincenzo	2007	Correlation of Selected Physicochemical Properties of Sludge Flocs with Partitioning and Competitive Equilibrium Adsorption-Desorption Behaviour of Environmentally Relevant Trace Polycyclic Synthetic Musks During the Aerobic Activated Sludge Sewage Treatment	Liss, S.
Pogue, Amy	2004	Impact of Protozoan Grazing on Nitrification and the Ammonia- and Nitrite-Exidizing Bacterial Communities in Activated Sludge	Gilbride, K.
Pryshlakivsky, Jonathan	2009	The Application of Best Available Technology in Dealing with Ontario's Waste Electric and Electronic Equipment: A Case Study	Missios, P.
Pullenayegem (Martil), Anoushka	2008	Environmental Justice and Project Development: the Sri Lankan Experience	Bardecki, M.
Pyatt, Lindsay	2003	Performance Evaluation of a Sediment Control Pond	Li, James
Radisic, Sally	2004	Risk Communication: A Case Study in The City of Hamilton	Sly, T.
Ramdayal, Raymond	2008	Ground Level Ozone and VOC Reactivity in Ontario	Hicks, J.
Rebellato, Steven	2004	Assessment of the Subsurface Pathogen Abatement Effects of Nutrient Management Policy in Ontario	Liss, S. / Pushchak, R.
Roberts, Andrew	2005	The Potential for Greenhouse Gas Emission Reduction through Small Distributed Cogeneration at Residential Sites	Pushchak, R.
Rollinson-Lorimer, Mary	2009	The Role of Risk Perception in the Ontario Source Water Protection Planning Process	Pushchak, R.
Sabir, Senna	2009	A Forested Urban Park: What Is the Value of Allan Gardens to the City of Toronto?	Millward, A.
Schroeder, Carl	2005	Health Effects of Hydrogen Fuel Substitution in Public and Private Vehicles in the GTA	Pushchak, R.
Smith, Daniel	2009	Aerobic Attached Growth Biofilter Using Tire Chips and Mixed Broken Glass as Media for Landfill Leachate Treatment	Warith, M
Smith, Derek	2003	A PCSWMM/GIS Based Water Balance Model for the Reesor Creek Watershed	Banting, D. / Li, J.
Spearin, Ashley	2003	Environmental Evaluation of Land-Applied Pulp Mill and Municipal Biosolids	McCarthy, L.
Stewart, Jennifer	2002	The Trophic Transfer of Pb and Cd from *Navicula pelliculosa* (Bacillariophyta) to *Hyalella azteca* (Amphipoda)	Twiss, M.
Stiefelmeyer, Kate	2003	The Pathogen Abatement Effects of Nutrient Management Policies: The Ontario Nutrient Management Act	Pushchak, R. / Liss, S.

Sule, Charles	2009	Elements of Sustainable Canadian Food Consumption: Measuring Self-Sufficiency	Bardecki, M.
Takata, Graham	2002	Effect of Aeration On Fresh and Aged Municipal Solid Waste	Warith, M.
Tang Kai, Natasha	2005	A Land-Based Oil Spill Management Planning Framework for the Petroleum Industry	Li, J.
Torchia, Melissa	2009	Role of Vegetation Placement for Temperature Moderation in an Urban Microclimate	Millward, A.
Torok, Andrea	2009	A Capacity Assessment and Legislative Review of the Clean Water Act in Ontario: Past, Present and Future	Warith, M.
Van Vliet, Ted	2003	The Use of Geographic Information Systems in the Development of a User-pay Stormwater Utility in the Mimico Creek Watershed	Li, J.
Vernon, Hayley	2006	Measuring the Effectiveness of Educational Instruments in Facilitating Environmentally Responsible Behaviour in Agriculture: The Canada-Ontario Environmental Farm Plan Program	Bardecki, M.
Vukomanovic, Jelena	2006	Effects of pH and Temperature on the Genotoxicity of Halogenated Disinfection By-Products in Chlorinated Water	Luk, G.
Wakefield, Charles	2004	Review of Landfill Groundwater Monitoring Requirements from an Ontario Perspective	Warith, M.
Walker, Lindsay	2010	The Factors that Influence Environmental Commitment in the Wine Growing Industry of Ontario, Canada	Graci, S.
Weinstock, Aaron	2009	Quantifying Fugitive Dust Emissions from Limestone Quarries: Data Selection and Uncertainty Assessment	Banting, D.
Welbourn, Rachel	2003	The Effect of Cu and Mn on Phytoplankton in Lake Erie, the Grand River and the Pacific Ocean	Twiss, M.
Wilson, Jay	2010	ENGO Positions Regarding Nuclear Power in Ontario	Pushchak, R.
Wolek, Darren	2004	Estimating Light-Duty Vehicle Emissions in the Greater Toronto and Surrounding Area	Hicks, J.
Wrzal, Marta	2009	Compensation in Hazardous Facility Siting: An Analysis of Compensatory Agreements	Pushchak, R.
Zheng, Wei	2008	Principles and Techniques Towards Successful Development of Enzyme-linked Immunosorbant Assay (ELISA) for Dioxin Analysis	Li, J. / C. Lo

Appendix B: ENSCIMAN Faculty and Research Interests

Professor David Atkinson, Assistant Professor, Department of Geography
PhD (ABD), Queen's University, Geography
Arctic biophysical systems, remote sensing, carbon flux, GIS and environmental analysis.

Dr. Douglas Banting, Professor, Department of Geography
PhD, University of Western Ontario, Geography
GIS in environmental management and facility siting, green roofs, applied spatial analysis in physical geography.

Dr. Michal Bardecki, Professor, Department of Geography, Director, Graduate Programs in Environmental Applied Science and Management
PhD, York University, Geography
Environmental assessment and decision-making, economic valuation, cumulative impact management, media and the environment, environmental discourse, wetlands.

Dr. Vadim Bostan, Assistant Professor, Department of Chemistry & Biology
PhD, University of Geneva, Earth Science
Environmental biology, aquatic ecotoxicology and geochemistry, assessment of antibiotic pollution on foodwebs, study of freshwater primary production community structure as a function of environmental changes.

Dr. Lesley Campbell, Assistant Professor, Department of Chemistry and Biology
PhD, Ohio State University, Evolutionary Ecology
Plant population biology, mating systems, rapid evolution, conservation biology, agro-ecology, global climate change, field ecology.

Dr. Yaser Dahman, Assistant Professor, Department of Chemical Engineering
PhD, University of Western Ontario, Chemical and Biological Engineering
Green fuel, green energy, and green chemicals, utilization of agriculture residues and wastes, nanostructured biomaterials (design, synthesis, and applications), design and examination of novel bioreactors, bioseparation sciences.

Dr. Rachel Dodds, Associate Professor, Ted Rogers School of Hospitality and Tourism Management
PhD, University of Surrey, UK, Sustainable Tourism Policy
Sustainable tourism, corporate social responsibility, ecotourism, climate change and tourism, tourism planning, stakeholder issues, tourism demand, island tourism.

Professor Frank Duerden, Professor Emeritus, Department of Geography
MA, University of Manitoba, Geography
Land and resource management, climate change, regional development, northern Canada, circumpolar issues, land claims.

Dr. Farhad Ein-Mozaffari, Associate Professor, Department of Chemical Engineering
PhD, University of British Columbia, Chemical Engineering
Fluid mixing technology, flow visualization using tomography and ultrasonic velocimetry, mixing in water and wastewater treatment processes, computational fluid dynamics, non-Newtonian fluid mechanics, dynamic modeling and identification.

Dr. Mario Estable, Associate Professor, Department of Chemistry and Biology
PhD, University of British Columbia
Biochemistry, molecular retrovirology, examination of the effects of environmental conditions on gene mutations and their role in human disease, gene transcription factors and DNA sequencing.

Dr. Liping Fang, Professor and Chair, Department of Mechanical and Industrial Engineering
PhD, University of Waterloo, Systems Design Engineering
Decision making and strategic planning in management, environmental management systems and operations research, environmental decision support systems, risk and reliability, bargaining and negotiations.

Dr. Zouheir Fawaz, Professor, Department of Aerospace Engineering
PhD, Sherbrooke University, Mechanical Engineering
Green aviation, evaluating the usability of "second generation" biofuels, characterization and analysis of advanced aerospace material, infra-red thermography for the detection of landmines.

Dr. Daniel Foucher, Associate Professor, Department of Chemistry and Biology
PhD, University of Toronto, Inorganic Chemistry
Novel inorganic and organometallic polymers, anti-microbial coatings, ferromagnetic materials.

Dr. Debora Foster, Professor, Department of Chemistry and Biology and Interim Dean, Faculty of Graduate Studies
PhD, University of Toronto
Cellular microbiological and biochemical research on the molecular basis of pathogenesis for several gastrointestinal pathogens and on the impact of environmental stress on these organisms focused toward the development of treatment and prevention therapies and environmental strategies.

Dr. Alan S. Fung, P.Eng., Associate Professor, Department of Mechanical and Industrial Engineering
PhD, Dalhousie University, Mechanical Engineering
Energy efficiency/conservation, alternative/sustainable/renewable energy, net-zero energy building, sustainable building integrated energy/HVAC systems, sustainable community energy systems, advanced power generation systems, GHG emission reduction strategy.

Dr. Kimberley Gilbride, Professor, Department of Chemistry and Biology
PhD, University of Toronto, Microbiology
Molecular microbiology and microbial ecology, assessment of microbial diversity with the use of molecular techniques, the role of microbes in the cycling of nutrients, and the effect microbial degradation of phytosterols in industrial waste water systems.

Dr. Christopher Gore, Assistant Professor, Department of Politics and Public Administration
PhD, University of Toronto, Political Science and Environmental Studies
Urban and environmental politics, policy, and administration, environmental policy processes and systems, global, national and local environmental governance, climate change, energy, electricity, Canada, Africa.

Dr. Mark Gorgolewski, Professor, Department of Architectural Science and Director, Graduate Program in Building Science
PhD, Oxford Brookes University, UK, Low Energy Architecture
Zero carbon buildings, building from waste, post carbon communities, building performance assessment, the impact of urban agriculture on the design of buildings and urban spaces.

Dr. Sonya Graci, Assistant Professor, Ted Rogers School of Hospitality and Tourism Management
PhD, University of Waterloo, Geography
Sustainable tourism, corporate social responsibility, environmental management systems, environmental impact assessment, community capacity building, pro-poor tourism development, partnership development, ecotourism, aboriginal issues.

Dr. Aziz Guergachi, Associate Professor, Ted Rogers School of Management - Information Technology Management
PhD, University of Ottawa, Engineering
Mathematical modeling of systems, data mining and machine learning with applications to environmental engineering and management.

Dr. Martina Hausner, Assistant Professor, Department of Chemistry and Biology
PhD, Ludwig Maximilians University, Munich, Germany, Microbiology
Microbial ecology, environmental microbiology and biotechnology, biofilms, characterization of the structure, composition and function of biofilms and other bioaggregates, fate of catabolic plamids in biofilms, bioaugmentation, drinking water biofilms.

Dr. Li He, Assistant Professor, Department of Civil Engineering
PhD, University of Regina, Engineering
Soil and groundwater remediation, water resources management, solid waste management, energy systems planning, environmental/health risks assessment, climatic change impacts and adaptation, environmental modeling and uncertainty analysis, sustainability.

Dr. Ingrid Hehmeyer, Associate Professor, Department of History
DAgrSc, University of Bonn, Germany, Agriculture
MSc (equivalent), University of Bonn, Pharmacy
History of water technology in ancient and medieval Arabia, history of the medical sciences in the Islamic world.

Dr. Darrick Heyd, Associate Professor & Department Chair, Department of Chemistry and Biology
PhD, University of Toronto, Chemistry
Surfaces and interfaces in water and air environments.

Dr. Miljana Horvat, Assistant Professor, Department of Architectural Science
PhD, Concordia University, Building Engineering; M.Arch., McGill

Solar energy and architecture, hygrothermal performance of building envelopes, advanced energy efficient facades, sustainability, performance evaluation of existing buildings, residential buildings.

Dr. Kouroush Jenab, Assistant Professor, Department of Mechanical and Industrial Engineering
PhD, University of Ottawa, Mechanical Engineering
Reliability, Quality and Safety Engineering: environmental reliability, environmental management in manufacturing systems, human reliability, fuzzy and stochastic health care reliability and safety, risk management, environment monitoring and controlling systems.

Dr. Carolyn Johns, Associate Professor, Department of Politics and Public Administration
PhD, McMaster University, Public Policy
Environmental policy; water policy; land use policy; public administration; intergovernmental relations; Canada and US.

Dr. Darko Joksimovic, Assistant Professor, Department of Civil Engineering
PhD, University of Exeter, Engineering
Urban drainage systems modelling and optimisation, hydroinformatics, development and application of decision support systems, water reuse, incident management in water distribution systems.

Dr. Greg Kawall, Associate Professor, Department of Mechanical and Industrial Engineering
PhD, University of Toronto, Mechanical Engineering
Air pollution and noise control, turbulence, and the statistical analysis and design of engineering experiments.

Dr. Mustafa Koc, Associate Professor, Department of Sociology
PhD, University of Toronto, Sociology
Sociology of agriculture and food security and food policy, globalization and sociology of migration.

Dr. Andrew E. Laursen, Assistant Professor, Department of Chemistry and Biology
PhD, University of Notre Dame, Biology
Ecosystem ecology, biogeochemisty, limnology.

Dr. James Li, Professor, Department of Civil Engineering
PhD, University of Toronto, Environmental Engineering
Water pollution control process, water quality monitoring and modelling, storm water management, immunoassay analysis of persistent organic pollutants, GIS applications in environmental management, watershed management planning, eco-hydraulics and hydrology, and green building design.

Dr. Songnian Li, PEng, OLS/OLIP, Associate Professor, Department of Civil Engineering
PhD, University of New Brunswick, Geomatics Engineering
Geospatial information systems, environmental modeling with GIS, public-participated GIS and spatial decision-making in environmental impact assessment, geospatially-integrated environmental management systems, 3D GIS for land-surface-subsurface modeling.

Professor Nina-Marie Lister, MCIP, RPP, Affiliate ASLA (Registered Professional Planner), Associate Professor, School of Urban & Regional Planning
MSc Pl., University of Toronto, Planning
Landscape urbanism, landscape ecology; adaptive ecological design; biodiversity conservation in urbanising landscapes; contemporary parklands, waterfronts and post-industrial landscapes; urban agriculture and edible landscapes.

Dr. Jinyuan Liu, Assistant Professor, Department of Civil Engineering
PhD, Polytechnic University, Geotechnical Engineering
Underground pollutant transport, underground excavation and tunneling, urban geotechnology, soil-structural interaction, physical modeling, transparent soil, digital image processing, and numerical simulation.

Dr. Julia Lu, Professor, Department of Chemistry and Biology
PhD, Carleton University, Analytical and Environmental Chemistry
Development, evaluation, validation, and applications of analytical methods for environmental studies; identification and quantification of toxic chemical species in environmental samples; biogeochemistry of environmental pollutants; sources, transport, transformation, fate, and impacts of persistent toxic pollutants in the natural environment.

Dr. Grace Luk, Professor and Graduate Program Director, Department of Civil Engineering
PhD, Queens University, Civil Engineering
Water pollution transport, wastewater treatment, toxins bio-accumulation in fish, contaminant fate and effects models, bio-chemical treatment of waste water sludge, drinking water toxicity with bioassays.

Dr. Vanessa Magness, Associate Professor of Accounting, Ted Rogers School of Business Management
PhD, University of Manitoba, Interdisciplinary Studies: Accounting, Finance and Environmental Economics

Environmental accounting: the inter-relationships between corporate disclosure, financial profit, and the management of environmental impacts

Dr. Lynda McCarthy, Associate Professor, Department of Chemistry and Biology
PhD, University of Waterloo, Biology
Environmental biology and environmental biotechnology, aquatic ecotoxicology, assessment of pollution and remediation, particularly endocrine disruptors in Great Lakes aquatic systems, land applications of pulp mill bio-solids and their impacts.

Dr. Mehrab Mehrvar, Professor, Department of Chemical Engineering
PhD, University of Waterloo, Chemical Engineering
Advanced oxidation technologies for water and wastewater treatment; biochemical engineering; air pollution control and modeling; photochemical reaction engineering in environmental processes; integration of advanced oxidation technologies and biological processes for the treatment of water and wastewater

Dr. Andrew A. Millward, Assistant Professor, Department of Geography
PhD, University of Waterloo, Geography
Application of geospatial methods to the study urban parks and nature in built environments. Principal investigator, Urban Forest Research & Ecological Disturbance (UFRED) Group.

Dr. Paul Missios, Associate Professor and Chair, Department of Economics
PhD, York University, Economics
Environmental economics (biodiversity, pollution, waste), environmental resource management and policy, natural resource economics, applied game theory, and international trade and the environment.

Dr. David Naylor, Professor, Department of Mechanical Engineering
PhD, University of Western Ontario, Mechanical Engineering
Heat transfer, building energy systems, laser interferometry, condensation, computational fluid dynamics, fluidized bed heat transfer, metal casting.

Dr. Corinne S. L. Ong, Associate Professor, School of Occupational and Public Health
PhD, University of Birmingham (UK), Chemistry
Microbial source tracking, contamination source inference, multi-use watersheds, source water protection, rural and urban water quality, foodborne parasites, epidemiology of foodborne and waterborne diseases, molecular epidemiology, spatial/temporal disease mapping.

Dr. Ronald Pushchak, Professor, School of Occupational and Public Health and School of Urban and Regional Planning (joint appointment)
PhD, Princeton University, Urban Planning
Environmental impact assessment, siting of hazardous waste facilities, risk assessment and facility siting.

Dr. Russell Richman, Assistant Professor, Department of Architectural Science
PhD, University of Toronto, Civil Engineering
Building science, building envelope, sustainable renovation of residential dwellings, low-energy building design, advanced claddings.

Dr. Claus Rinner, Associate Professor, Department of Geography & Program Director, Master of Spatial Analysis
PhD, University of Bonn, Geography
Geographic information systems (GIS), geovisualization, spatial decision support systems, participatory GIS, geodata infrastructures, environmental change: local effects, vulnerability, and adaptation strategies.

Dr. Pamela Robinson MCIP RPP, Assistant Professor, School of Urban and Regional Planning
PhD, University of Toronto, Geography
Cities and climate change, urban sustainability, regional planning, design, urban agriculture, civic engagement, progressive pedagogy, scholarship of teaching and learning, Southern Ontario, Canada, North America.

Dr. Cory Searcy, Assistant Professor, Department of Mechanical and Industrial Engineering
PhD, University of Alberta
Corporate sustainability, environmental management systems, quality management systems, performance measurement, industrial ecology, and life cycle assessment.

Dr. Tim Sly, Professor, School of Occupational and Public Health
PhD, Teesside University, Risk Studies
Risk assessment for environmental management and public health, biostatistics, epidemiology of communicable diseases, risk perception and communication.

Dr. Liaila Tajibaeva, Assistant Professor, Department of Economics
Ph.D., University of Minnesota, Economics
Environmental and natural resource economics, development economics

Dr. Cheryl Teelucksingh, Associate Professor, Department of Sociology
PhD, York University, Sociology
Environmental justice, urban sustainability, socio-spatial theory, applied geographical information systems, ethno-racial and immigrant settlement patterns in Toronto.

Dr. Ginette Turcotte, Professor, Department of Chemical Engineering
PhD, University of Western Ontario, Chemical/Biochemical Engineering
Biological processes in upgrading food wastes, biofuel ethanol, cellulose degradation of agricultural and food residues.

Dr. Mostafa Warith, Associate Professor, Department of Civil Engineering
PhD, McGill University, Geoenvironmental Engineering
Geotechnical soil properties, waste management, soil re-mediation, landfill leachate generation and treatment, municipal waste landfill design, modeling of contaminant transport, marshland soil attenuation assessment.

Dr. Kernaghan Webb, Associate Professor, Ted Rogers School of Business Management
LLD (PhD in Law), University of Ottawa, Regulatory Offences and Environmental Protection
Effectiveness and applicability of environmental management systems standards; the effectiveness, utility and meaning of corporate social responsibility, business ethics; (more...)

Dr. Alex Wellington, Assistant Professor, Philosophy
PhD, York University, Philosophy; LLB, LLM, Osgoode Hall Law School, Law
Environmental law and policy, intellectual property law and innovation policy, biotechnology and bioethics (including environmental ethics), business ethics, human rights and justice.

Dr. Gideon Wolfaardt, Associate Professor and Canada Research Chair in Environmental Interfaces and Biofilms, Department of Chemistry and Biology
PhD, University of Saskatchewan
Microbial Ecology, environmental Microbiology, biofilm research

ENSCIMAN Adjunct Faculty

Dr. Ian Droppo, Research Scientist, Environment Canada
PhD, University of Exeter, UK

Dr. Bernard Fleet, President, Fleetec Inc.
PhD, Birmingham, UK, Analytical Chemistry; DSc, Imperial College, University of London; FRSC
Climate change and corporate strategies for managing the transition to the low-carbon economy, sustainable development with a focus on the economics of clean transportation and zero-emission vehicle technologies.

Dr. John Hicks, Instructor, School of Occupational and Public Health, Ryerson University
PhD, York University, Experimental Space Sciences
Air pollutant sources and their transfer through media, the exposure of local populations to contaminants, and the estimation of risk of chemical exposures.

Dr. Yi-Fan Li, Senior Research Scientist, Modelling and Integration Research Section (ARQI), Science and Technology Branch, Environment Canada
PhD, Physics, University of Waterloo
Transport and transfer of persistent toxic pollutants (PTS) in multi-compartments, including air, soil, water, and sediment, the relationship of source/receptor of PTS in multi-compartments, usage/emission/residue inventories for PTS on both regional and global scales.

Dr. Steven N. Liss, Vice-Principal (Research) and Professor of Environmental Studies and Chemical Engineering, Queen's University
PhD, University of Saskatchewan, Applied Microbiology and Food Sciences
Environmental biotechnology and waste water treatment, floc stabilization and bio-remediation, biofloculation and environmental analysis.

Dr. Ching Lo, SCCM, Senior Research Scientist, Laboratory Services Branch, Ministry of the Environment
PhD, University of Windsor, Biology
Use of ELISA (Enzyme-linked Immunosorbent Assay) to detect infectious diseases and environmental pollutants including pesticides, bacterial toxins and persistent organic pollutants; global warming root causes