

Annual Report

2012/2013



A close-up photograph of several green grass blades. The blades are covered with numerous clear, spherical water droplets of varying sizes. The background is a soft, out-of-focus green, creating a sense of depth and freshness. The lighting is bright, highlighting the texture of the grass and the clarity of the water.

Our Mission:

to facilitate excellence in research, education and innovation in water science, technology, management and governance.

Our Vision:

to become an internationally recognized centre of excellence in integrated water management.

Strategic Goals:

Increase Waterloo's profile as a centre of excellence in water research.

Increase interdisciplinary research among Waterloo faculty.

Facilitate Waterloo, private sector, government and civil society partnerships.

Support the development of interdisciplinary water teaching programs.

“The Water Institute continues to demonstrate the benefits of cross-institutional collaboration. Internally, our broad base of water researchers has greater opportunity to conduct innovative research and to work together across disciplines to solve complex problems. Externally, our partners recognize the value of “one window” access to our water programs”.

Dr. George Dixon
Vice-President,
University Research,
University of Waterloo



A Message from the Executive Director

Priorities of the Water Institute for 2012/13 included external partnerships, new education programs, identifying new research opportunities and member communications. It has been a busy and productive year, and happily, we can report that significant progress has been made in all four priority areas. The External Partners Program, the foundation of our partnership and outreach activities, was launched in late winter of this year. Based on the early response and the interest in our inaugural research symposium, we are optimistic that the program will provide an effective and mutually beneficial link between the Water Institute and organizations external to the university.

The Collaborative Water Program is a new interdisciplinary graduate program developed through the Water Institute. The program provides the type of training that should give our graduates a unique ability to perform effectively in multidisciplinary teams, the type of environment necessary for addressing many of our most complex water issues. A \$1.75 million donation from RBC will support scholarships and visiting fellows and will support some truly unique elements in the program.

The Water Institute has had considerable success over its short history in securing research funding. In the past year we played a major role in securing the RBC donation and were instrumental in negotiating a Communitech/COMDEV/FedDev grant of approximately \$500,000. In spite of these successes, one of our goals for the coming year is to develop and implement a more focused and coherent approach for securing research funding.

As a young organization, the successes of the past year are vital in securing the foundation of the Water Institute. From this foundation, we look forward with great anticipation to continued growth and development over the coming year.

Dr. Robert W. Gillham
Executive Director, the Water Institute

A Message from the Chair of the External Advisory Board



Photo by Alyssa Bistonath / WWF-Canada

“The Water Institute is an exciting initiative with tremendous potential” is how the Water Institute’s External Advisory Board summed up its inaugural review earlier this year.

The Board comprises a cross-section of water sector stakeholders, with representatives from industry, government, academia and civil society. Our responsibility is to provide an independent opinion on the Institute’s progress towards its goals, and to provide recommendations on how it might make a greater impact. In undertaking this task, we met with a broad range of Water Institute “clients” – from senior administrators, to faculty researchers, to some very enthusiastic graduate students, and the Institute’s administration. The review made clear that the Water Institute has, and is, making significant progress and is an important part of the University community involving researchers and students from across all six academic faculties.

The Board noted important progress in a number of areas, including the Institute’s role in enabling new research and teaching initiatives, the launching of the External Partners Program and Research Symposium, and the ongoing support for the graduate student chapter. The Board also identified areas where the Water Institute might focus attention in the future, such as developing a more focused research strategy, strengthening collaboration across disciplines and among junior and senior faculty, and improving its communications capacity.

I congratulate the University of Waterloo for investing in the Water Institute, its researchers and students. As a University of Waterloo alumni and resident of Waterloo Region, it is both an honour and a pleasure to be part of this initiative.

Tony Maas
Director, Freshwater, WWF Canada

Inspiring Others

The University of Waterloo was established in 1957 and shortly thereafter began to attract young faculty that subsequently became leading experts in a variety of water-related disciplines.

The Water Institute's 2011/12 annual report included a tribute to four of the University's founding water researchers - Robert N. Farvolden, H. B. Noel Hynes, Bruce Mitchell and Tharakal E. Unny. We are pleased to continue that tradition by recognizing the outstanding contributions of the following professors.

George Dixon



A native of Brownsburg Quebec, Dr. George Dixon received his PhD in Biology from the University of Guelph in 1980. Following two years as a Visiting Fellow with The Department of Fisheries and Oceans, he joined the University of Waterloo's Department of Biology as an Assistant Professor.

Dr. Dixon is a renowned ecotoxicologist, with significant experience in aquatic toxicology and environmental risk assessment and management, principally with respect to the environmental impacts associated with metals and mining activity. Dr. Dixon has served as an advisor to Environment Canada and the Department of Fisheries and Oceans, as well as to numerous US government agencies and the World Health Organization.

Currently he serves on a five-member expert panel charged with reviewing oil sands water monitoring initiatives. He has received both the Award for Excellence in Research (2000) and the Distinguished Teaching Award (1989) from the University of Waterloo.

Dr. Dixon is currently Vice-President, University Research and Professor of Biology.

Grahame J. Farquhar



Dr. Grahame Farquhar, an early alumnus of the University of Waterloo engineering program (1964), subsequently completed his PhD in sanitary engineering at the University of Wisconsin in 1968. Grahame returned to Waterloo as an Assistant Professor in Civil Engineering that same year.

Dr. Farquhar has published extensively on topics such as acid rain, groundwater contamination, and leachate and gas migration problems associated with landfills, and was one of the first to apply rigorous engineering principles in the design and performance monitoring of sanitary landfills.

More recently, he was one of the earliest proponents of the use of permanganate for the in situ destruction of chlorinated solvents in groundwater and was instrumental in the development of the Canadian Water Network, where he continues as an advisor on scientific matters.

Dr. Farquhar received the Distinguished Teaching Award in 1982 and is a Distinguished Professor Emeritus of the University.

George Francis



Dr. George Francis was born in Toronto, and following his passion for natural history, obtained his PhD in Resource Conservation and Management from the University of Michigan in 1964. He joined the University of Waterloo in 1970 as the inaugural Chair of the Department of Environment and Resource Studies.

Dr. Francis' research interests have focused primarily on the governance implications associated with ecosystem management. He has pursued these interests through numerous collaborative efforts associated with the UN, OECD, CIDA and UNESCO. He has made particular contributions to management of the Great Lakes, having served as a member of the International Joint Commission Science Advisory Board, the Great Lakes Fisheries Commission Board of Technical Experts and Great Lakes Tomorrow Board of Directors. He has published widely on Great Lakes issues, including management and governance, natural heritage, and rehabilitation and restoration.

Dr. Francis is a Distinguished Professor Emeritus of the University.

Emil O. Frind



Following completion of his PhD in Civil Engineering at the University of Toronto in 1971, Dr. Emil Frind joined the University of Waterloo's Department of Earth Sciences, as a core member of its newly established groundwater group.

Having developed the first groundwater model in Canada in 1969, Dr. Frind became a pioneer in this new discipline. In 1972, he and George Pinder published the seminal paper on finite elements in groundwater analysis, destined to become a standard modelling approach. Dr. Frind was also among the first to develop courses on modelling in groundwater science, training many professionals now in consulting, government, and academia. He has received the M. King Hubbert award of the National Ground Water Association and the Robert N. Farvolden Award of the International Association of Hydrogeologists. In 1998 he received the Distinguished Teaching Award.

Dr. Frind is a Distinguished Professor Emeritus of the University.

Building On A Tradition Of Excellence

The University of Waterloo has a long tradition of excellence in water research and education. Recently, Waterloo was ranked 10th best water research institution in the world by Lux Research Inc. The Water Institute connects 135 researchers from across all six university academic faculties (Applied Health Sciences, Arts, Engineering, Environment, Mathematics and Science) and 18 departments in facilitating interdisciplinary research and education to address increasingly complex water issues.

Waterloo's water research programs are diverse, and collectively comprehensive, with core disciplinary expertise in areas such as:

- Hydrological (groundwater, surface water) science and engineering;
- Water/wastewater treatment and technology;
- Ecohydrology;
- Aquatic ecology and ecotoxicology;
- Water management and governance.



A well-attended poster exhibition is part of the annual World Water Day celebration.

The Water Institute provides its members with a range of services, including:

Co-ordination & Collaboration

- Identify and introduce researchers with common areas of interest.
- Establish and support researcher working groups and clusters.

Opportunity Identification

- Cultivate industrial, governmental, civil society or other partners.
- Identify funding opportunities.

International Partnerships

- Facilitate and support international collaborations and partnerships.
- Manage faculty delegations to other countries.
- Host academic delegations at Waterloo.

Education Programming Support

- Support the development of new education and teaching programs.
- Develop and administer graduate student scholarship program.
- Support and enable the Water Institute's graduate students chapter (SWIGS).



Bob Gillham, Executive Director of the Water Institute, signed a Memorandum of Understanding at Hohai University, China in March 2013.

Proposal Development Support

- Identify and organize interdisciplinary teams.
- Solicit co-investigators.
- Solicit letters of support.
- Provide review and advice.

Knowledge Sharing Support

- Support and organize:
 - Seminars;
 - Workshops;
 - Research symposia;
 - Distinguished Lectures.
- Organize and support media relations.

Researcher Recognition

- Promote and profile Waterloo researchers through various business development activities.
- Nominate members for awards or other forms of recognition.
- Provide letters of support.

How We Rank

10th Best Water Research Institution In The World

Source: Lux Research Inc., Top Academics and Institutions in Water Research 2013. www.luxresearchinc.com

20th Most Prolific Water Research Institute In The World

Source: Stockholm International Water Institute and Elsevier, The Water and Food Nexus: Trends and Development of the Research Landscape, August 2012.

7th Most Prolific Groundwater Research Institute In The World

Source: Scopus database search: groundwater publications, 2003-2012. www.scopus.com

Research: Making a difference

The Water Institute is comprised of researchers from across all six academic faculties, working across a diversity of disciplines. This year's annual report recognizes the contribution of three faculty members who had significant and unique responsibilities over the past year serving on high-profile water-related initiatives external to the university. We have asked Donald Burn, Rob de Loë and David Rudolph to reflect on how this experience has contributed to their perspectives and research programs.

Donald Burn

International Great Lakes Study Board Member, International Joint Commission

Dr. Donald Burn is a Water Institute member and Professor in the Department of Civil and Environmental Engineering. From 2007 to 2012, Don was a member of the International Joint Commission's (IJC) International Great Lakes Study Board. The IJC established the International Upper Great Lakes Study to: i) determine if changes are occurring in the St. Clair River that could result in decreased water levels on Lake Michigan and Lake Huron; and ii) to review and recommend possible changes to the operation of the control structure that regulates outflow from Lake Superior.



Donald Burn (right) receives a certificate of appreciation in recognition of his efforts as a member of the IJC Great Lakes Study Board.

I was fortunate to be one of five Canadian Study Board members, along with five American members, who were jointly responsible for the oversight of the five year, roughly \$17 million study. The task presented to the Study Board was challenging due to the complex nature of the technical issues and the need to consider the various interested and affected parties, including industries (shipping, recreational boating, hydroelectric power generation), stakeholder groups (cottagers and riparian landowners, native North Americans), as well as the various levels of government involved on both sides of the border.

While developing technical solutions and an increased understanding of the physical systems involved was important, equally important was interacting with the various stakeholder groups. A key part of this interaction was a Public Interest Advisory Group (PIAG), which acted as a liaison between the Study Board and the stakeholder groups. Public interest in the study, and its outcomes, was high, in part due to the very low levels of the Great Lakes in recent years.

My experiences working on the Study Board were both rewarding and fulfilling. As I move on from my time as a member of the Study Board, I am even more convinced of the need for multidisciplinary teams to tackle critical water problems wherein engineers and scientists work with economists, planners, social scientists and others to develop solutions that best address societal needs.

Equally important is an understanding of the political role in the decision-making process for complex water problems. The Study Board made a series of recommendations to the IJC, some of which will likely be implemented. However, other recommendations, although based on sound science, will likely be either altered, or not implemented, largely as a result of political pressure.

Rob de Loë

Past Chair of the RBC Blue Water Project Advisory Panel

Dr. Rob de Loë is a Water Institute member and Professor in the Department of Environment and Resource Studies. From 2008

to 2012, Rob Chaired the RBC Blue Water Project advisory panel. The panel developed a strategic approach for RBC's Blue Water Project activities, recommended key program assessment criteria and reviewed specific project proposals. As of 2013, the RBC Blue Water Project had pledged over \$38 million in grants to over 650 charitable organizations worldwide.



Late in 2007, I opened up the newspaper to see a full page advertisement from the Royal Bank of Canada. RBC was announcing the launch of its new Blue Water Project, a \$50 million, 10 year charitable grant program to support fresh water conservation, protection and accessibility. Needless to say, as a water researcher, I was excited at the prospect of a new funding stream!

I never did receive any funding from RBC to support my water research. Instead, I received something much better: an entirely new perspective and an opportunity to learn, from the inside, about a key emerging player on the water scene in Canada. This came about because RBC asked me to become the inaugural Chair of the Blue Water Project Advisory Panel it had formed; I held this position from January 1, 2008 until the end of December, 2012.

Serving as Chair of the BWP Advisory Panel for a five year term was an education. Not only was I able to learn a great deal from

Research: Making a difference

engaging with outstanding colleagues on the Panel, but also I had the chance to learn how members of Canada's financial sector think about water. In previous decades, it's safe to say that they didn't think much about water. That has changed dramatically with growing recognition of the materiality of water in the banking, insurance, and manufacturing sectors.

Water now matters to these new players, and they have the clout to change the ways in which we manage and govern water in Canada. The insights I've gained through this experience are transforming the way I approach my research on water governance. I'm now much more aware of the tendency of the water community to be inward looking, and extremely mindful of how "non-water" interests such as banks, financial institutions and other powerful firms are reshaping the politics of water in Canada.

David Rudolph 2013 Darcy Lecturer

Dr. David Rudolph is the past Executive Director of the Water Institute and is a Professor in the Department of Earth and Environmental Sciences. Annually since 1986, the National Ground Water Association (NGWA) has invited an outstanding groundwater professional to share expertise as the Darcy Lecturer. Dave was recognized as the 2013 Darcy Lecturer and in this capacity will visit about 45 universities over the calendar year to share insights on his research and experience.

I was honoured to accept the invitation of the NGWA to serve as the Henry Darcy Distinguished Lecturer in Groundwater Science for 2013. There was however, considerable trepidation in recognition of the substantial time and travel commitment that accompanies the lectureship. While the schedule has been grueling, the rewards have been unexpected and substantial. I was completely unprepared for the opportunity to be exposed to the current research directions and emerging priorities at many of the world's most highly recognized and innovative water research centers.

The opportunity to interact with graduate students has been particularly rewarding. From the enthusiasm and commitment demonstrated as they present their work to me, one can only conclude that the future of the groundwater discipline is in capable hands. It has been quite remarkable that students, with few exceptions, have taken the time to explain the context of their work relative to some aspect of societal need. While my generation tended to focus on journal publications as the key metric of impact, this next generation clearly sees societal need as an important index of the value of their work.

From my various visits, it is clear that research priorities are evolving in a remarkably consistent manner. While water quality continues to be a major focus of research, there is an unmistakable resurgence in quantity, particularly as it relates to mineral and energy resource development, food production and ecosystem rehabilitation. With continued intensification of resource extraction and agricultural production it is inevitable that this trend will continue and on a global scale.

The opportunity to visit many of the major groundwater research facilities in the world has been an exceptional privilege and one that will have a profound influence on my views of research, as well as on my personal research program. Hopefully these newly gained insight can be shared in a manner that benefits my Waterloo colleagues.



Research Chairs

The Water Institute has 16 members who currently hold prestigious research chairs:

Canada Excellence Research Chair

Dr. Philippe Van Cappellen *Ecohydrology*

Canada Research Chairs

Dr. David Blowes *Groundwater Remediation*

Dr. Pu Chen *Nano-Biomaterials*

Dr. Brian Dixon *Fish & Environmental Immunology*

Dr. John Heikkila *Stress Protein Gene Research*

Dr. Dongqing Li *Microfluidics & Nanofluidics*

Dr. Janusz Pawliszyn *New Analytical Methods & Technologies*

Dr. Daniel Scott *Global Change and Tourism*

Dr. Mark Servos *Water Quality Protection*

Dr. Ed Sudicky *Quantitative Hydrogeology*

Dr. John Yeow *Micro & Nanodevices*

Industrial Research Chairs

Dr. Peter Huck *Water Treatment*

Dr. Janusz Pawliszyn *New Analytical Methods & Technologies*

University Research Chairs

Dr. Rob de Loë *Water Policy & Governance*

Dr. Sherry Schiff *Watershed Biogeochemistry*

Dr. Michael Tam *Functional Colloids & Nanomaterials*

Centre for International Governance Innovation Chair

Dr. Thomas Homer-Dixon *Global Systems*

Partnerships – creating opportunity

External Partners Program

A key strategic goal of the Water Institute is to facilitate partnerships between researchers and members of the private sector, government, civil society or other organizations that have a particular interest in the water sector. In response to this goal, the Water Institute launched its External Partners Program in early 2013.

The External Partners Program builds on the traditional strengths of the University of Waterloo and the Water Institute to develop close associations and collaborative opportunities with water sector stakeholders. It is through this collaboration that we are able to conduct leading-edge research in a variety of water-related disciplines with a wide range of partners.

Four levels of membership are available to our partners – Platinum, Gold, Silver and Bronze – with commensurate benefits.

Depending upon the membership level, External Partners Program benefits can include:

- Water-related Information and news;
- Invitations to the Water Institute's seminar series;
- Introductions to relevant Waterloo researchers to discuss opportunities for collaboration;
- Invitations to the annual Water Institute Research Symposium and Distinguished Lecture;
- Support for student recruiting activities, such as a Water Institute Career Fair or Employment Forum;
- Recognition through Water Institute graduate scholarships (Platinum members only);
- Recognition and acknowledgment of membership and scholarship support on the Water Institute website and at our Research Symposium.

"Matrix is a proud partner of the Water Institute. This partnership helps us to continue to provide leading-edge solutions to our clients, as well as applied research opportunities for Institute members."

David Van Vliet
Vice President, Water Resources
Matrix Solutions Inc.



Partnerships – creating opportunity

Research Symposium 2013

As a relatively young organization, we had many firsts during 2012/13. The Water Institute presented its first, and highly successful, research symposium on May 2, 2013 with approximately 140 people attending. The symposium focused on water research topics of particular interest to our external partners, while providing an opportunity for partners to interact with researchers and students.

Our Plenary session introduced attendees to Waterloo's water research frontiers such as ecohydrology, the water-energy nexus and water for well-being.

Three concurrent breakout sessions showcased multi-disciplinary research related to specific themes or issues; specifically water and oil sand mining, water and climate change and emerging contaminants. A roundtable was convened with representatives from the private sector, public sector, environmental non-governmental organizations and university sector to discuss *Opportunities and Constraints for University – External Stakeholder Collaboration in the Water Sector*.

The Water Institute's Research Symposium 2013 was immediately followed by our Distinguished Lecture, graduate student poster session and reception.



“CH2M HILL is pleased to partner with the Water Institute. We were particularly impressed by the students we met at Research Symposium 2013. They are studying across a wide range of disciplines related to water science, engineering and management, and are eager to get out into the world and make a difference!”

Chris Coggans
Vice President,
Business Development
CH2M HILL

Education: crossing disciplinary boundaries

Collaborative Water Program

A key strategic goal of the Water Institute is to “promote and support the development of multidisciplinary and interdisciplinary teaching programs.” With this goal in mind, and following broad consultation, in 2012/13 the Water Institute undertook the development of the new graduate Collaborative Water Program. A collaborative program is an intra-university program that provides an additional multi-disciplinary experience for students enrolled in an approved, “home” department and program.

The University of Waterloo offers specialist graduate degrees in a wide variety of water-related programs. As we address increasingly complex water issues, highly trained technical experts are very much required. It is often the case, however, that experts are required from several different disciplines. Unfortunately it is also the case that the technical experts frequently do not have an appropriate appreciation of each other's abilities and contributions, making multi-disciplinary or inter-disciplinary efforts difficult. The objective of the University of Waterloo's new Collaborative Water Program is therefore to provide

students with a broad, multi-disciplinary foundation in water science and engineering, technology and management beyond the specialist training they will continue to receive in their home unit. The degree conferred will be that of the home (specialist) program, with the completion of the collaborative program indicated by a transcript notation and adjunct qualification to the degree.

The Water Institute is enormously grateful to the RBC Foundation for their generous gift of \$1.75M over eight years in support of the Collaborative Water Program. The RBC gift will be used to attract high quality students through entrance scholarships (RBC Water Scholars) and program fellows (RBC Water Fellows), and to support an annual student symposium and various program enrichment activities. Waterloo's new Collaborative Water Program is expected to be launched in the Fall term of 2013 with seven departments (Civil and Environmental Engineering, Environment and Resource Studies, Environment, Enterprise and Development, Geography and Environmental Management, Applied Mathematics, Biology, Earth and Environmental Sciences) initially agreeing to collaborate in its development and delivery.

“The RBC Blue Water Project is proud to support the Water Institute in developing a truly unique graduate program where educators and students work collaboratively across disciplines to address local, national and international water security issues.”

Dave McKay
Group Head, Personal and
Commercial Banking, RBC



Guests toured an ecohydrology lab after the RBC donation announcement. Chris Parsons, Maria Mesquita, Marianne Vandergrindt, Ekaterina Markelova, Jane Black (RBC), UW President Feridun Hamdullahpur, Dave McKay (RBC), Robert Gillham (Executive Director, WI), Francine Dyksterhuis (RBC) and Mark Servos (Professor, Biology and Chair, CWP Program Committee)



Graduate student and MASc candidate Maricor Arlos delivers her “three-minute thesis” at the RBC donation announcement.

Education: crossing disciplinary boundaries

Distinguished Lecture 2013

The Water Institute was honoured to present Professor Asit K. Biswas as its 2013 Distinguished Lecturer. Dr. Biswas, recipient of the prestigious Stockholm Water Prize in 2006, is one of the world's leading authorities on water management. He is the founder and the president of the Third World Centre for Water Management in Mexico, and Distinguished Visiting Professor at the Lee Kuan Yew School for Public Policy in Singapore and the Indian Institute of Technology, Bhubaneswar, India.

Dr. Biswas' lecture was entitled *Future of the World's Water: Rhetoric and Reality* and it challenged the widespread belief that there is an impending global water crisis. He argued that the world has enough water to support growing human populations, associated food and energy requirements, and environmental needs, if managed properly. Dr. Biswas identified poor water management practices as a significant obstacle to water security and described how notable advances are being made in unexpected places. Dr. Biswas remarked on how Canada, and the Water Institute, might play a more significant role in improving the world's water future.



Students of the Water Institute, Graduate Section

The Water Institute's graduate students section (SWIGS) was established in 2010 to promote interdisciplinary water research and learning among graduate students from various academic faculties. By 2012/13, SWIGS had over 400 graduate student members from across all six faculties. Under the leadership of the SWIGS executive, a variety of academic, social and outreach events focused on water-related themes were successfully organized and well attended.

Of particular note was the annual World Water

Day Graduate Research Fair organized and co-hosted by the Water Institute, SWIGS and Wilfrid Laurier University, which featured graduate student posters, industry booths, keynote speakers, a feature film and a networking reception.

The 2012/13 SWIGS Executive team included:

- Chair: Melissa Barnard, *PhD Candidate, Civil and Environmental Engineering*
- Vice-chair Academic: Josh King, *PhD Candidate, Geography and Environmental Management*
- Vice-chair Conference: Jessica Leung, *MSc Candidate, Biology*
- Vice-chair Operations: Ryan Ahola, *MSc Candidate, Geography and Environmental Management*
- Vice-chair Outreach: Allison Bawden, *MASc Candidate, Civil and Environmental Engineering*
- Vice-chair Social: Ben Plumb, *PhD Candidate, Civil and Environmental Engineering*



Ms. Nancy Soontiens accepts the *Golder Associates Graduate Scholarship* from Mr. John Petrie.

Water Institute Scholarship Recipients

The ARCADIS Graduate Scholarship 2012/13

Ms. Laura Sauder

PhD Student, Faculty of Science, Department of Biology

Supervised by Dr. Josh Neufeld

Ecology of ammonia-oxidizing microorganisms in municipal wastewater treatment plants.

The Golder Associates Graduate Scholarship 2012/13

Ms. Lillian Knopf

Masters Student, Faculty of Science, Department of Biology

Supervised by Dr. Roland Hall

Short-term changes in phosphorus delivery to lakes: Implications for phytoplankton

The Golder Associates Graduate Scholarship 2012/13

Ms. Nancy Soontiens

PhD student, Faculty of Mathematics,

Department of Applied Mathematics

Supervised by Dr. Marek Stastna and Dr. Michael Waite

Flow over topography in various idealized fluid environments.

Centres and Institutes

The Water Institute is pleased to be affiliated with other centres and institutes of the University that have a focus on water.

Centre for Advancement of Trenchless Technologies

www.civil.uwaterloo.ca/catt/

Interdisciplinary Centre on Climate Change

www.ic3.uwaterloo.ca

Centre for the Control of Emerging Contaminants

www.civil.uwaterloo.ca/ccce/

Centre for Ecosystem Resilience & Adaptation

www.environment.uwaterloo.ca/research/era/

Centre for Groundwater Research

www.uwaterloo.ca/groundwater-research

Waterloo Institute for Nanotechnology

www.uwaterloo.ca/institute-nanotechnology

Waterloo Institute for Sustainable Energy

www.wise.uwaterloo.ca

Faculty Recognition and Awards

Dr. Niels Bols

Professor, Department of Biology

Was honoured by the Society for In Vitro Biology with their Lifetime Achievement Award recognizing academic excellence in their field of study and those who have made significant contributions to the field of in vitro biology.

Dr. Keith Hipel

University Professor, Department of Systems Design Engineering

Elected President, Royal Society of Canada.

Dr. Josh Neufeld

Associate Professor, Department of Biology

Selected as one of Waterloo Region's "40 Under 40" which celebrates the young leaders in our community.

Dr. Janusz Pawliszyn

Professor, Department of Chemistry

Recipient of the 2013 Chemical Institute of Canada's Environmental Division Research and Development Award given for distinguished contributions to research and /or development in the fields of environmental chemistry or environmental chemical engineering.

Dr. David Rudolph

Professor, Department of Earth & Environmental Sciences

Selected as the 2013 Darcy Lecturer by the National Ground Water Association to promote interest and excellence in groundwater science and technology.

Water Institute Interdisciplinary Workshops

The Water Institute supports workshops or small symposia to encourage new initiatives in interdisciplinary water research or education. Workshops are co-ordinated by faculty members and provide an opportunity for a variety of international experts to visit campus and share knowledge. 2012/13 workshops included:

September 24, 2012

Resolving Science-Policy Gaps in Transboundary Water Governance

Faculty Co-ordinator:

Derek Armitage, *Environment and Resource Studies*

Forthcoming in 2013

Healthy Climates: Governance in the Water, Energy, Food and Climate Security Nexus

Faculty Co-ordinator:

Larry Swatuk, *Environment, Enterprise & Development*

Thinking About Water: What, Why and How We Teach to Engage the Next Generation of Interdisciplinary Water Leaders

Faculty Co-ordinator:

Sarah Wolfe, *Environment and Resource Studies*

Water for Well-being in Marginalized Communities

Faculty Co-ordinator:

Susan Elliott, *School of Public Health and Health Systems*

Water Institute Seminars

June 28, 2012

Trevor Dickinson, *Professor Emeritus, University of Guelph*

How Rising Temperatures Have Changed Winter Hydrology Across Ontario

August 10, 2012

Everton de Oliveira, *Hidroplan and State University of Sao Paulo at Rio Claro, Brazil*

Water Compensation: A Breakthrough To Make It Happen

September 20, 2012

Eran Feidelson, *Hebrew University of Jerusalem*

Water, The Real Conflict In The Middle East?

September 27, 2012

Ray Ison, *Open University, UK and Monash University, Australia*

Australia's Murray-Darling Basin: A Systemic Governance Approach

October 3, 2012

Maurice B. Dussault, *University of Waterloo*

Water Demands For Hydraulic Fracturing And Shale Gas Development

November 6, 2012

John B. Czarnecki, *U.S. Geological Survey*

Assessing Groundwater Sustainable Yield In Arkansas

January 17, 2013

Rick Everdell, *Ontario Power Generation and Paul Moorhouse, Hatch*

The Niagara Tunnel Project: Planning, Design And Construction Of A Hydroelectric Wonder

February 28, 2013

Michael Azulay, *Ontario Ministry of Infrastructure International Water Law*

External Advisory Board

The purpose of the External Advisory Board of the Water Institute is to provide an independent and external evaluation of the progress of the Institute and to provide recommendations to help it meet its goals.

The Board held its inaugural meeting on April 23, 2013 and reported findings to the Water Institute's Senior Management Committee. Current members of the External Advisory Board are:

Tony Maas (Chair)

Director, Freshwater, WWF Canada, Toronto, Ontario

John Coburn

Managing Director, XPV Capital, Toronto, Ontario

Robert Leech

Environment Practice Lead, AECOM, Toronto, Ontario

Michael Murray

Chief Administrative Officer, Region of Waterloo, Kitchener, Ontario

Jeffrey McDonnell

Professor, School of Environment and Sustainability; Assistant Director, Global Institute for Water Security, University of Saskatchewan, Saskatoon, Saskatchewan

Georg Teutsch

Scientific Director, Helmholtz Centre for Environmental Research - UFZ, Leipzig, Germany

Dan Wicklum

Chief Executive, Canada's Oil Sands Innovation Alliance, Calgary, Alberta

A Progress Report

Area	Goal (May 1, 2012 to April 30, 2014)	Status
Management	The Governance Plan will be fully operational.	WI's Strategic Planning Committee, Senior Management Committee and External Advisory Board are active and functioning.
	The management structure will be reviewed annually for efficiency and ability to meet goals. Adjustments will be made where necessary and appropriate.	WI's External Advisory Board reviewed the management structure and provided recommendations to the Senior Management Committee which will be considered in the five-year institutional review process.
	By year three, the communications and branding efforts should be well-tested. Effectiveness of the programs will be evaluated annually and adjustments made as appropriate.	WI's communications activities (e.g., website, SplashPad newsletter, seminar series) implemented and, as necessary, improved. WI's key programs (e.g., education, partnerships) were developed and launched during 2012/13 and will be evaluated and adjusted as appropriate with implementation experience.
	Similarly, results of the marketing strategy should become clearer by year three as evidenced, for example, by several (at least three) new research agreements. Effectiveness of the programs will be evaluated annually and adjustments made as appropriate.	WI instrumental in securing new research-related agreements, including the Canada Excellence Research Chair, Southern Ontario Water Consortium, Communtech DATA.BASE and new education program supported by RBC.
Research and Technology Development	By year three, there will be several (perhaps as many as six) well-established partnership agreements with government agencies, industry, and civil society groups. Efforts will continue for further development of these types of agreements.	WI <i>External Partners Program</i> includes a variety of private and public sector members. WI's External Advisory Board is chaired by a civil society organization representative.
	By year three, there will be increased attention directed towards international agreements and particularly towards those in support of developing countries.	WI facilitated water-specific agreements with the Helmholtz Centre for Environmental Research (Germany), the University of São Paulo (Brazil), Nnamdi Azikiwe University (Nigeria) and Hohai University (China).
	WI will secure or facilitate procurement of \$3M in incremental research funding, relative to 2009/10 funding levels. That is, the goal is to facilitate an increase in research funding of \$1M per year.	WI instrumental in securing i) over \$8M for about 20 Waterloo researchers from five departments from SOWC, ii) ±\$10M CERC research program, iii) ±\$0.5M Communtech DATA.BASE project for four research groups and iv) \$1.75M RBC grant for new graduate program.
Education and Outreach	By year three, several of the educational programs will have been implemented. These could include integrated cross-faculty programs at both the undergraduate and graduate levels, masters programs by distance education, short courses, and possibly others.	WI led development of the new graduate <i>Collaborative Water Program</i> , including obtaining \$1.75M support from RBC. WI organized its inaugural Research Symposium and annual Distinguished Lecture.
	The success and effectiveness of programs implemented late in year one and in year two will be evaluated and adjustments made as appropriate.	As the new educational program was developed during 2012/13, this will be evaluated in 2014.
Budget and Finance	As WI develops, potential means for generating revenue will become much clearer. In year three, the strategy for financial sustainability will be implemented.	WI developed and implemented its <i>External Partners Program</i> to attract new partners to the university and improve the long-term financial sustainability of the Institute.

The Water Institute Welcomes New Members

Over the past year, the Water Institute has been pleased to add the following researchers as members:

Nandita Basu

*Earth & Environmental Sciences
and Civil & Environmental Engineering*

David Blowes

Earth & Environmental Sciences

Ioannis (John) Chatzis

Chemical Engineering

Hans Dürr

Earth & Environmental Sciences

Tadeusz Górecki

Chemistry

Robert Gracie

Civil & Environmental Engineering

Bryan Grimwood

Recreation and Leisure Studies

Peter Johnson

Geography & Environmental Management

Carol Ptacek

Earth & Environmental Sciences

Fereidoun Rezanezhad

Earth & Environmental Sciences

Rebecca Rooney

Biology

Andrea Scott

Systems Design Engineering

Daniel Scott

Geography & Environmental Management

Heidi Swanson

Biology

Olaf Weber

Environment, Enterprise & Development

Steven Young

Environment, Enterprise & Development

Priorities for 2013-14

The Water Institute will continue to build and maintain operations and programming in its core areas of research, education and partnerships in 2013/14. In addition, we will initiate a formal internal review of our progress and identify strategic priorities for the next five-year period. Specific initiatives include:

Strategic Review

As the Water Institute nears the completion of its initial five-year mandate and Business Plan, 2013/14 will be a time to assess past accomplishments and define new strategic priorities. To this end, the Institute will engage its membership and stakeholders to define key priorities, objectives and activities for the next several years. These priorities will form the basis of a refreshed strategic and business plan that will be used to further grow and develop the Water Institute.

Late in 2013/14, the Institute will submit its formal five-year review report, including an assessment of past accomplishments and vision for the future, for evaluation by the Senate Graduate and Research Council.

Strengthen Existing Programs

Significant progress was made on two key Water Institute priorities during 2012/13. The Institute's External Partners Program was launched for the purpose of attracting new partners to the university and expanding opportunities for water researchers and external stakeholders to collaborate on "real world" problems.

The University of Waterloo's new graduate Collaborative Water Program was also approved in 2012/13 and subsequently received generous financial support from the RBC Foundation. There is much work left to be done, however, in the further development of both of these programs. This will require considerable effort over the upcoming year.

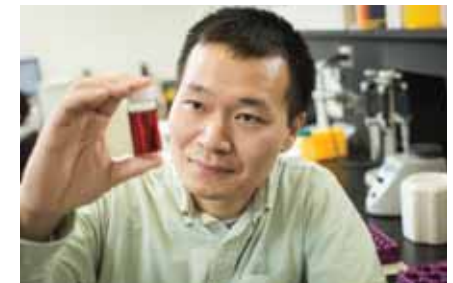
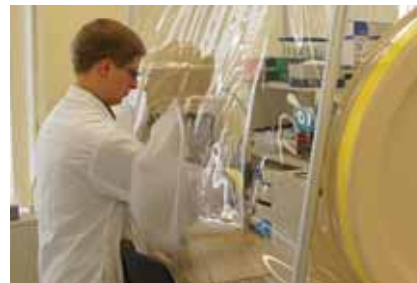
In addition, opportunities to improve other core Water Institute activities, such as our seminar and workshops series, will be identified and acted upon.

Identify Research Opportunities

Perhaps the Water Institute's most important and elusive objective is to identify new research opportunities. The Institute was established to encourage and support interdisciplinarity – to co-ordinate Waterloo faculty with disparate backgrounds and interests to jointly address increasingly complex water issues, and to match research teams with funding opportunities.

The Institute is committed to this objective as it not only represents Waterloo's competitive advantage, but also represents the most practical approach to contributing to local, national or international water security. The Institute has been successful in contributing to the development of new research funding.

During 2013/14, the Water Institute will work with its membership, External Partners and other stakeholders to identify new interdisciplinary research opportunities and to develop a more pro-active strategy for the development of major research projects.



Water Institute Senior Management Committee

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Dean, Faculty of Applied Health Sciences

André Roy
Dean, Faculty of Environment

Pearl Sullivan
Dean, Faculty of Engineering

Terry McMahon
Dean, Faculty of Science

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Ellsworth LeDrew
Canadian Cryospheric Information
Network (CCIN)

Stephen Murphy
Centre for Ecosystem Resilience
and Adaptation (ERA)

Andre Unger
Institute for Groundwater
Research (WIGR)

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Kevin Boehmer
WI Managing Director

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Chemical Engineering

William B. Anderson
Civil & Environmental Engineering

William Annable
Civil & Environmental Engineering

Ramon Aravena
Earth & Environmental Sciences

Derek Armitage
Environment & Resource Studies

Gladimir Baranoski
Computer Science

James Barker
Earth & Environmental Sciences

David Barton
Biology

Nandita Basu
Earth & Environmental Sciences;
Civil & Environmental Engineering

David Blowes
Earth & Environmental Sciences

Niels Bols
Biology

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Civil & Environmental Engineering

Donald Burn
Civil & Environmental Engineering

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Giovanni Cascante
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Zhongwei Chen
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Juewen Liu
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Geography & Environmental Management

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Public Health and Health Systems

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Biology

Robert McKillop
Civil & Environmental Engineering

Bruce Mitchell
Geography & Environmental Management

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David Rose
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Earth & Environmental Sciences

André Roy
Geography & Environmental Management

David Rudolph
Earth & Environmental Sciences

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Earth & Environmental Sciences

Andrea Scott
Systems Design Engineering

Daniel Scott
Geography & Environmental Management

Frank Seglenieks
Civil & Environmental Engineering

Mark Servos
Biology

Orfan Shouakar-Stash
Earth & Environmental Sciences

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Earth & Environmental Sciences

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Civil & Environmental Engineering

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Earth & Environmental Sciences

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Earth & Environmental Sciences

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Steve Young
Environment, Enterprise & Development



Bricks For Water



Safe water shouldn't be a luxury. Yet for one in six people worldwide, it is. Among the 894 million people around the world without access to safe water are the residents of Usoma, Kenya. For years, the people of this small village have been drinking, cooking and washing with contaminated water from nearby Lake Victoria. As a result, their babies are dying, their children are sick, and life expectancy is short. But that will soon change.

The United Nations University's Institute for Water, Environment and Health (UNU-INWEH) has been leading efforts to improve water and public health conditions in Usoma for several years (inweh.unu.edu/kape/). In January 2013, with generous funding from The Rotary Club, construction began on a water and sanitation station in the village. This life-changing facility will provide villagers with safe, accessible drinking water, latrines, showers, and a place to do laundry.



Dr. Susan Elliott, Dean of the Faculty of Applied Health Sciences, Water Institute member and UNU-INWEH collaborator, is a longtime water researcher in Kenya and was instrumental in kick-starting Usoma's water project. Inspired by Usoma's residents, Dr. Elliott has developed the "Bricks For Water" charity in order to ensure the project's completion and on-going success. Dr. Elliott, and her students, are giving back to the community that is home to their research and making Waterloo proud.

For more information or to buy a brick visit:
www.bricks4water.com

Contact Information

Robert W. Gillham

Executive Director, the Water Institute
519-888-4567 x84658
rwgillha@uwaterloo.ca

Kevin Boehmer

Managing Director, the Water Institute
519-888-4567 x32643
kboehmer@uwaterloo.ca

Grant Murphy

Industrial Liaison Officer, the Water Institute
519-888-4567 x31883
g3murphy@uwaterloo.ca

Mary Anne Hardy

Administrative Associate, the Water Institute
519-888-4567 x32658
mahardy@uwaterloo.ca

Office Address

Research Advancement Centre, Room 2127
David Johnston Research + Technology Park
475 Wes Graham Way
Waterloo, Ontario N2L 3G1
Canada

Mailing Address

the Water Institute
University of Waterloo
200 University Avenue West
Waterloo, Ontario N2L 3G1
Canada

www.water.uwaterloo.ca

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