



## New IJC Great Lakes Water Quality Agreement

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The International Joint Commission was founded in 1909 by the Boundary Waters Treaty, with the authority to approve or prohibit any use, obstruction, or diversion of water that affects the other country. While the work of the Commission originally and still largely deals with water quantity issues, increasingly these are complicated by water quality and environmental issues. For example, a new plan for managing water levels in Lake Ontario will allow more natural seasonal fluctuations, thereby promoting the recovery of littoral wetlands, to the detriment of recreational boaters mostly on the U.S. side whose activities are restricted by low summer water levels. The much-anticipated Upper Great Lakes Study, produced in 2013 and dealing with low water concerns in Lakes Michigan and Huron, was controversial even among the Commissioners. The U.S. Co-Chair Lana Pollock appended her dissenting opinion to the study, opposing the suggestion that a control structure on the St. Clair River should be considered.

Water quality responsibilities have been added to water quantity responsibilities for several water

Boards along the international boundary, including the St. Croix, Rainy-Lake of the Woods, Red, and Souris Boards. The new International Watershed Initiative now provides water Boards funding to address issues such as habitat and pollution that were previously beyond their scope.

For the Great Lakes, the new GLWQA is a mixed blessing...

The first Great Lakes Water Quality Agreement was signed in 1972 in response to concerns about deteriorating water quality in the Great Lakes. Amendments were signed in 1987 and 2012. While the IJC does not have regulatory authority with respect to water quality, it does have a mandate to make recommendations to the two countries (the "parties") and report on their progress towards achieving the objectives of the Agreement. Essentially, it holds their feet to the fire. The GLWQA establishes a Great Lakes Regional Office, situated in Windsor, Ontario, and two Boards, the Great Lakes Water Quality Board and the Great Lakes Science Advisory Board, to make recommendations to

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the Commission and help it carry out its mandate. It has many successes to its credit, including the creation of target loads for phosphorus that (initially) reversed the eutrophication of the lakes.

The new 2012 GLWQA contains some important changes for its Boards. The Water Quality Board remains the principal advisor to the Commission on water quality issues, but whereas it used to consist of government managers and was dominated by Environment Canada and US-EPA, it now also may include "representatives from Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, downstream jurisdictions, and the Public". While this should reduce the extent that the parties are providing advice to themselves through the IJC, it has raised concerns from managers that they will not be able to be candid in their discussions given that non-government people are around the table.

The Science Advisory Board has also changed significantly. It will be combined with an existing body, the Council of Great Lakes Research Managers. The old SAB will be the Science Priority Committee of the new SAB, and the Council will be the Science Coordination Committee. Members of the old SAB expressed concern that the advice of Science Priority Committee,

dominated by scientists from academia and protected by tenure, will now be filtered by managers before reaching the Commission. While the old principle for all IJC Boards was to "leave your hat at the door" the changing climate for government scientists in both countries has resulted in many scientists and managers feeling uncomfortable or even unable to do so. As I write this in January, 2014, the new Boards mandated under the 2012 agreement are yet to be struck.

The annexes of the GLWQA contain the specifics of what needs to be done. The new agreement streamlines 16 annexes to 9 and, significantly, adds one new one; Climate Change Impacts. The purpose of the new annex is "to contribute to the achievement of the General and Specific Objectives of this Agreement by coordinating efforts to identify, quantify, understand, and predict the climate change impacts on the quality of the Waters of the Great Lakes, and sharing information that Great Lakes resource managers need to proactively address these impacts". At this point, Annex Committees are being struck who will hammer out the specifics under each of the annexes.

The new GLWQA requires the IJC to report on the progress of the parties every 3 years, whereas past reporting was every 2 years. Reporting has been difficult because of inconsistency in data collection for many areas

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## Mark your Calendar: May 1, 2014

the Water Institute's

## Research Symposium 2014

Plenary and Breakouts

Student Poster Session and Scholarships Award Ceremony

**Coming Soon: Distinguished Lecture 2014 Information**

## Water Researchers in the News

### Awards and Honours

There are several Water Institute members who have been recognized for the outstanding research they are undertaking.

**Juewen Liu** is the 2014 recipient of the Canadian Society for Chemistry Fred Beamish Award for his innovative research in the field of analytical chemistry, where it is anticipated to have significant potential for practical applications. The award will be presented during the 97th Canadian Chemistry Conference in Vancouver in early July. As winner of this award, Juewen will deliver a lecture at the conference.

**André Roy** was awarded an honorary doctorate from ENS de Lyon, France for his contributions to fluvial geomorphology.

**Keith Hipel** was awarded the status of Honorary Diplomate, Water Resources Engineers (Hons.D.WRE) from the American Academy of Water Resource Engineers, a subsidiary of the American Society of Civil Engineers.

**Brian Dixon** was part of a team of researchers who, with a private company, were awarded the 2013 NSERC Synergy Award for Innovation, Small & Medium sized companies. The collaboration among the seven researchers from across Canada and Yellow Island Aquaculture Ltd (YIAL) has led to techniques that allowed YIAL to become the first commercial salmon farm in Canada to organically produce a native species.



**Fereidoun Rezanezhad** was invited to be an Associate Editor of the Journal of Hydrology.

### Water Research in the Press

Water issues remain high on the media's radar and some publications by Water Institute mem-

bers have been covered by the mainstream and online media, including:

A report by lead author **Daniel Scott** concluded that climate change would eliminate several former winter Olympic sites as venues in the future. This report received world-wide coverage by [PRI](#), [CBC](#) and web [science](#) and [print](#) pages.

PhD candidate **Cristina Surdu** and coauthor **Claude Duguay's** publication in *The Cryosphere* outlined climatic impacts on ice. The Arctic ice season has decreased by 24 days since 1950 and ice thicknesses decreased tremendously during that period. Coverage included the [CBC](#), [BBC](#), [other outlets](#) plus [web science](#) and [technology](#) pages.

Streams and rivers were found to release more CO<sub>2</sub> than previously thought. **Hans Dürr** was a co-author on this interdisciplinary article in *Nature* covered in [ScienceDaily](#), [Market Business News](#) and other outlets.

In a paper in *PLOS One*, **Sherry Schiff** and John Spoelstra reported on the widespread occurrence of artificial sweeteners in the Grand River Watershed. Their findings were reported in many outlets including the [LA Times](#), [Globe & Mail](#), and [Huffington Post](#).

**Maurice Dusseault** gave a presentation in Corner Brook, Newfoundland & Labrador on the controversial subject of hydraulic fracturing. Reports on the talk appeared in [The Telegram](#) and [The Western Star](#).

World Wetlands Day was marked by a symposium organised by the Ecohydrology Research Group on January 31st. **Philippe Van Cappellen** was interviewed regarding the importance of wetlands by [RCI](#) and others.

The benefits of long, snowy winters were advanced by **Richard Kelly** in the [local](#) paper and [CBC](#) radio. He also reminded us to be citizen scientists and tweet snow depth measurements and location to #snowtweets.

## Technology and Innovation

### Amphibious Architecture: A Strategy for Flood-Resilient Housing

As global climate change causes sea levels to rise and weather events to become more extreme, the occurrence of severe floods will become more common around the world. The large populations living in deltaic or riverine floodplain regions will be particularly severely affected, especially those living at the lowest levels of income.

There is increasing awareness worldwide that traditional flood-mitigation strategies that alter the environment and create concentrations of risk, such as levee- and dike-building, only increase the likelihood of catastrophic consequences when eventual failure inevitably occurs. The greater the degree of artificial protection, and the confidence that builds in the communities living behind it, the more disastrous are the consequences when an unexpected failure occurs. New Orleans learned this lesson the hard way in 2005, when 80% of the city flooded due to numerous failures of the levee system in Hurricane Katrina's aftermath.

Can we protect ourselves in other ways? Under certain circumstances, yes. Amphibious construction is an innovative, alternative, low-cost, low environmental impact flood mitigation strategy that can reduce the hazard vulnerability of housing in flood-prone regions and increase a community's long-term disaster resilience. Amphibious foundations retain a home's relationship to the ground by resting on the earth most of the time, but floating the house as high as necessary when flooding occurs. They can provide temporary elevation as needed, when needed, and do so by working in synchrony with floodwater instead of resisting it.

Amphibious housing has been successfully implemented in rural Louisiana since the mid-1970s, and in both the Netherlands and New Orleans during the last decade. Amphibious housing projects are also under development in the UK, France and Canada. Fully engineered and code-compliant modern amphibious foundations can be a cost-effective, resident-friendly flood mitigation

solution for areas where rising flood waters are not accompanied by waves or high-velocity currents. Whereas permanent static elevation at a fixed height ("houses on stilts") may prove to be inadequate in an unexpectedly severe flood, the variable elevation provided by amphibious foundations can accommodate not only short-term extreme flood levels, but long-term land subsidence and sea level rise as well. Maasbommel, Netherlands and Racourci Old River, Louisiana experienced conditions of extreme flooding in 2011, and the amphibious houses in these locations successfully demonstrated the reliability of this emerging technology.



In Louisiana, after the spring 2011 flood. Amphibious house on left is undamaged. Note waterline on elevated house on right.

The examples of amphibious construction cited above are all applications that serve moderate- to high-income populations in industrialized countries. However, amphibious technology has much to offer to rural and low-income populations in developing countries as well, either by inclusion in new low-cost housing projects or as a retrofit solution for existing communities. Amphibious construction can provide flood mitigation that is both more effective and considerably less expensive than other currently available options. It can dramatically reduce a community's vulnerability both to regular, relatively mild, seasonal flooding, and to severe, otherwise-catastrophic flooding.

Amphibious foundations are a sustainable, low-impact floodproofing strategy that is rapidly gaining acceptance for applications around the globe. My team is currently developing amphibious housing projects for flood-prone regions in Nicaragua and Bangladesh, and for Canadian First Nations communities subject to severe seasonal flooding in northern Ontario and in Manitoba.

**Elizabeth English** is an Associate Professor in the School of Architecture and the Founder and Director of Buoyant Foundation Project: <http://uwaterloo.ca/architecture/people-profiles/elizabeth-english>

Buoyant Foundatn: <http://www.buoyantfoundation.org/>



## Water Institute News

### 2013-14 Water Scholarship Recipients

Thirty-two applications from across four faculties were received for the five scholarships offered in the Water Institute graduate scholarship competition. It was a highly competitive field with many outstanding applications. The applications were judged on several criteria including academic excellence, water research impact, and leadership ability.

The Water Institute is pleased to announce the following scholarship recipients for 2013-2014:

#### AECOM Graduate Scholarships in Water Research

Jessica Mendoza, Masters student, Department of Biology  
Using stable isotope analyses to trace pulp mill effluent exposure to white sucker (*Catostomus commersonii*) in Jackfish Bay, Lake Superior  
Supervisors: Mark Servos and Mark McMaster



Fei (Alex) Chen, PhD student, Department of Civil and Environmental Engineering  
Biofiltration as a pre-treatment technology for ultrafiltration membranes  
Supervisors: Peter Huck, Raymond Legge, Sigrid Peldszus



#### Golder Associates Graduate Scholarships in Water Research

Silvia Vlad, Masters student, Department of Civil and Environmental Engineering  
Examining the use of the AMES fluctuation test in determining disinfection by-product genotoxicity  
Supervisors: Peter Huck, Bill Anderson, Sigrid Peldszus



Helen Powley, PhD student, Department of Earth and Environmental Sciences  
Dynamic modelling of water and nutrient fluxes in the Mediterranean basin: Linking land processes and marine ecosystems at the regional scale

Supervisor: Philippe Van Cappellen



#### Stantec Graduate Scholarship in Water Research

Scott Ketcheson, PhD student, Department of Geography and Environmental Management  
The initial hydrology of a constructed watershed  
Supervisor: Jonathan Price



### Water Institute Workshops Funded

The Water Institute is pleased to support the development of workshops or small symposia that enhance interdisciplinary water research, facilitate university-government-private sector partnerships and build knowledge and capacity to address emerging water management issues. The Water Institute's fourth call for workshop proposals closed in November 2013 and the Water Institute is pleased to announce support for the following workshops during 2014:

*How are we adapting to the water-related impacts of climate change?* proposed by **Carrie Mitchell**, School of Planning and **Johanna Wandel**, Geography & Environmental Management, and six co-applicants.

*The Grand River Watershed: From Science to Smart Water Management* proposed by **Hans Dürr**, Department of Earth & Environmental Sciences, and 15 co-applicants.

## The New Great Lakes Agreement *(continued)*

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covered by the agreement. To improve reporting, an exercise is underway to produce a limited set of key indicators that the parties will then be asked to provide data on. In the words of Water Quality Board member David Ullrich, "the few that tell us the most." An important change will be the inclusion of indicators of human health, which are being developed by another one of IJC's boards, the Health Professionals Advisory Board.

One of the roles of the IJC has been to identify areas of the Great Lakes where beneficial uses are impaired. These are the "Areas of Concern", each with an associated Remedial Action Plan or RAP. Under the previous GLWQA, IJC identified AOCS, reviewed their RAPs, reviewed progress on eliminating the use impairments, and effectively controlled the decision that an AOC could be de-listed. Under the new agreement, this process is essentially transferred to the parties. Given the political mileage from de-listing an AOC, one might question whether the Parties should be charged with making the decisions.

The Lakewide Management Plans used to guide the management of each of the lakes are now also more in the hands of the Parties. The old wording was that LAMPs "shall be submitted to the Commission for review at four stages", from definition of the problem to the resto-

ration of beneficial uses. The new wording is that the Parties "shall provide a copy (of the LAMP) to the Commission for advice and review" and "shall report on progress towards implementation ... every three years".

In all, recent changes to the IJC are mostly positive, in the sense that the environmental protection role of the IJC across the continent is being strengthened. For the Great Lakes, the new GLWQA is a mixed blessing; adding a welcome new focus on climate change and broadening the involvement of stakeholders, but also moving some oversight away from the IJC and back to the Parties, and diluting the voice of the relatively independent Science Advisory Board. Changes in the climate for government scientists in both countries threaten the effective functioning of all IJC Boards. The IJC website is much improved in many ways, but those familiar with the old one will notice the absence of the AOCs and references to toxic chemicals that are still an important issue and cause so much public concern. The value of the IJC lies in the extent to which it makes a difference relative to what the parties would do without oversight. For the Great Lakes, much will depend on how the newly-constituted Water Quality and Science Advisory Boards are chosen and how they function. Time will tell.

**William Taylor** is a Professor Emeritus in the Department of Biology.

<http://www.science.uwaterloo.ca/~wdtaylor/>

### Celebrate World Water Day 2014

WWD Graduate Research Fair & Water Celebration

Speakers Cecelia Brooks and Monique Dubé

Poster Session, Career Fair

<http://water.uwaterloo.ca/WWD/WWD2014>

Friday, March 21<sup>st</sup>, EIT Foyer

## Students of the Water Institute, Graduate Section (SWIGS)

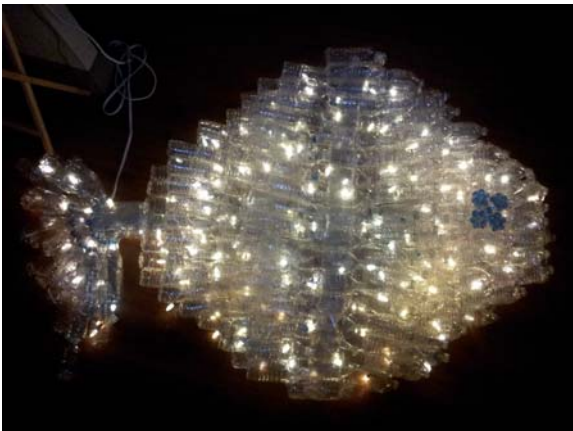
### Happy New Year!

The SWIGS executive committee would like to wish all SWIGS members, and their family and friends a Happy New Year! May 2014 be filled with happiness, health... and great water related activities.

### Looking back at Fall 2013

In September 2013, SWIGS successfully kicked-off the start of the **International Water Cooperation Speaker Series**, which included captivating presentations by Tony Maas, Freshwater Program Director at the World Wildlife Fund, GlobalMedic and Water for People. Stay tuned for more great presentations during Winter 2014.

SWIGS also participated in Kitchener's inaugural **Night/Shift** event, by building a light installation out of reused plastic water bottles. SWIGS's goal at the event was to raise awareness about the environmental impacts of single use plastic water bottles.



SWIGS would like to thank all those that presented as part of the **Student Lecture Series** last term.

### 2014 and beyond

Mark your calendars - **World Water Day** will be taking place at the EIT building at the University of Waterloo on Friday, March 21<sup>st</sup>. This year's

theme is Water & Energy. In addition, the 2<sup>nd</sup> annual **Water Institute Research Symposium** will be taking place on May 1, 2014.

The SWIGS Speaker Series is hosting Dr. Cynthia Wesley-Esquimaux, Lakehead University, on February 26th. "How we can "IdleKNOWmore" and change policy in Canada."

**SWIGS is looking for you** - Do you have a passion for water? Are you looking to get involved in a meaningful way? Join the 2014-2015 SWIGS executive committee.

For more information, email [water.grad@uwaterloo.ca](mailto:water.grad@uwaterloo.ca).



**Stay connected!** To ensure you don't miss any of these great events, please join our **Facebook** group, follow us on Twitter @UW\_SWIGS and take a look at our website - [www.swigs.uwaterloo.ca](http://www.swigs.uwaterloo.ca). Join our **mailing list** by scanning the QR code.

**Remember, the success of SWIGS depends on the people involved!** If you are a faculty member who participates in water related research, please encourage your graduate students to get involved with SWIGS. There are many ways to learn more about the world of water through SWIGS, from volunteering on committees to leading event planning as an executive!



STUDENTS OF THE WATER INSTITUTE GRADUATE SECTION  
**SWIGS**

## External Partners Program

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The Water Institute is pleased to welcome many new External Partners to its growing network, which now includes the City of Waterloo, the City of Kitchener and Stantec Limited.

Stantec Limited is the Water Institute's newest Platinum External Partner and Steve Brown, Canada East Surface Water Lead for Stantec, states that "the interdisciplinary approach to water research that the University of Waterloo promotes, fits well with Stantec's approach to addressing global water challenges". Stantec brings together more than 13,000 specialists working in over 200 locations around the world. A professional consulting firm in the fields of planning, engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management and project economics.

In October, the City of Waterloo and the City of Kitchener joined as Gold External Partners. These municipal partners reinforce support from our local community, and underscore the importance of municipal and university collaboration. The Cities of Kitchener and Waterloo work together on several shared services initiatives, including stormwater management best practices and road salt management. Among the many services that the two neighboring cities provide to their citizens, there is a strong focus on sustainable management of water resources in support of healthy communities.

Questions about the External Partners Program? Contact Grant Murphy at [g3murphy@uwaterloo.ca](mailto:g3murphy@uwaterloo.ca) or at 519 888 4567 ext. 31883.



### **CAREER FAIR - MARCH 21 2014**

The Water Institute is hosting a Career Fair at the World Water Day Event on Friday March 21, 2014. The Career Fair is one of the many benefits of being a Water Institute External Partner. It provides a great opportunity to have valuable one-on-one time with some of our talented and energetic graduate students.

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