SPLASH PAD

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privatisation, integration and devolution:

25 YEARS OF WATER MANAGEMENT AND GOVERNANCE IN THE UK

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With sixty-three million people living in an area equivalent to just one quarter of Ontario, the UK faces some very significant water challenges. Throughout most of the twentieth century, water in the UK was generally regarded as a matter for government and public authorities. However, the late 1980s marked a major turning-point in UK water policy, and subsequent developments related to privatisation, integration and devolution have been particularly important.

PRIVATISATION

Water supply and waste water services in England and Wales were privatised in 1989. At present, thirty-four privately-owned water service companies operate as geographically-defined monopolies. The water service companies are regulated by the Office of Water Services (Ofwat), which sets the maximum prices charged to customers for five-year periods.

Since 1989, the water companies have invested approximately £108 billion (approximately 195 billion CAD) in managing and improving services and achieve a 99.6% compliance rate with European drinking water standards. Leakage from water supply systems has fallen by 35% and there has been a 99% reduction in the incidence of low-pressure water supply problems. However, average annual domestic water charges have increased in England by approximately 70% in twenty-five years although customers are set to receive a 5% average reduction in water bills in 2015-20.

Arrangements in parts of the UK other than England are very different. For example, since 2001, Welsh Water has operated as a unique not-for-profit public water company. Scottish Water is owned and governed by the Scottish Government, whilst Northern Ireland Water operates according to water service charges set by the Utility Regulator for Northern Ireland.

INTEGRATION

Since approval of the European Union (EU) Water Framework Directive (WFD) in 2000, the UK has given increased attention to water protection and restoration. The WFD is designed to integrate legislation and policies for water and land use and involves a system of river basin planning aimed at meeting ambitious chemical, physical and ecological targets.

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The River Thames and Houses of Parliament, London. Credit: Sam Watson

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Implementation of the WFD includes identification of River Basin Districts (RBDs) and the appointment of 'competent authorities' to lead the planning process. For each RBD, a six-year planning cycle is followed. The first cycle of planning was completed in 2009, and revised plans are expected in 2015, 2021 and 2027. The WFD also requires the competent authorities to ensure full public access to information and to provide opportunities for public participation in decision making throughout the entire planning process.

In the UK, some of the biggest challenges associated with WFD implementation are institutional rather than technical and scientific. Two RBDs include parts of both England and Wales, and one also spans the border between England in Scotland. Three of the four Northern Ireland RBDs are shared with the Irish Republic. In addition, four different organisations hold the status of 'competent authority' — the Environment Agency (England), the Scottish Environmental Protection Agency, Natural Resources Wales, and the Department of Environment (Northern Ireland). It is not surprising that some difficulties were experienced during the first cycle of planning. The competent authorities relied heavily on their own data and information, and created participatory processes that gave priority to groups with the capacity to deliver water improvements. However, land-water connections, multi-party collaboration and public participation have received greater attention and emphasis in the second cycle of planning.

DEVOLUTION

Although the Scottish people voted against independence in 2014, devolution remains high on many political agendas throughout the UK. The Welsh and Scottish governments are likely to gain increased powers in the next few years and, if that were to happen, it would seem logical to also have separate arrangements for England. Furthermore, politicians representing regions in England, and also large cities such as Liverpool and Manchester, have seized the opportunity to argue for further redistributions of power. All of these possibilities have significant implications for water. For example, the Welsh government's proposals for constitutional reform could mean that decisions regarding water supplied to customers in England would be made by the Welsh National Assembly, while new systems of regional governance could fit very well with RBDs and the other WFD arrangements.

There is also an increasing government appetite for the delegation of responsibilities for water management. For example, in England, since 2011 national government has encouraged the formation of around ninety local catchment management partnerships that include public agencies, local governments, water companies, resource users and conservation groups.

CONCLUSIONS

Privatisation and the use of business principles to deliver water services often cause controversy. However, experiences during the last 25 years in the UK suggest that there are advantages which promote, rather than hinder, the development of integrated approaches for water and related resources, including increased investment, environmental improvements and high-quality services for water users. Devolution could imply that governance will be more complex and fragmented in the future, but equally transfers of power and changes to decision making arrangements could create new opportunities for integrated water governance and management at a regional and river basin scale.

Nigel Watson is a researcher and lecturer at the Environment Centre, Lancaster University, UK and was an RBC Visiting Fellow at the Water Institute, University of Waterloo during the Fall 2014 term.

http://www.lancaster.ac.uk/lec/about-us/people/nigel-watson

water researchers in the news

CATT'S BURIED INFRASTRUCTURE SURVEY A FIRST IN CANADA

The Centre for Advancement of Trenchless Technologies (CATT) published the first Canadian Municipal Buried Infrastructure Survey results this past fall. The survey provides an overview of Canada's water, wastewater, and storm water sectors and assesses the market conditions related to the construction, renewal and financing of water, wastewater and storm water networks. In all, 124 municipalities from across Canada responded to the survey, with the majority being from Ontario. The 2014 survey is underway and it is hoped that the results will enable CATT to measure how trenchless technology varies across Canada by region and municipality size. Trenchless Technology Canada magazine included a feature article about this inaugural survey and its importance to the trenchless technology industry.

TTC article: http://trenchlessonline.com/catt-starts-canadaspecific-annual-buried-infrastructure-survey/

Infrastructure survey results: http://cattevents.ca/2014/09/05/2013-municipal-buried-infrastructure-survey/

AWARDS ANNOUNCED HONOURING OUR MEMBERS

» **Monica Emelko and Mike Stone** — *2014 Council of the Federation Excellence in Water Stewardship Award* and the 2014 Emerald Challenge Award for Water: The **Southern Rockies Watershed Project** received these two prestigious awards in 2014. The Project is co-led by Uldis Silins (Renewable Resources, University of Alberta) and Monica Emelko (Department of Civil and Environmental Engineering) with Mike Stone (Department of Geography and Environmental Management) acting as a team lead. The project is in its 10th year of watershed research and monitoring and focuses on climate, hydrology and stream ecosystem health. The research spans 80 square kilometres and nine watersheds and represents the largest and longest running forest hydrology research project in Alberta.

http://www.srwp.ualberta.ca/

» **Emil Frind** — *2014 Grand River Conservation Authority Watershed Award*: Emil Frind, Department of Earth and Environmental Sciences, was awarded a 2014 Grand River Conservation Authority Watershed Award for his outstanding conservation and environmental work in the Grand River watershed. Emil was recognized for bringing his extensive expertise in water modelling to many Grand River watershed initiatives.

» **Brian Dixon** — *2015 Robert Arnold Wardle Award*: Brian Dixon, Department of Biology, has been announced as the recipient of the 2015 Robert Arnold Wardle award of the Canadian Society of Zoologists. The award recognizes outstanding contributions to Canadian-based research on the interrelationships among infectious agents, the response of animals to these agents, and the environment in which these relationships exist. The award will be presented to Brian at the society's annual meeting in Calgary in May 2015 **https://uwaterloo.ca/science/news/brian-dixon-honoured-canadian-society-zoologists**

» **Philippe Van Cappellen** — *2015 Science Innovation Award*: Philippe Van Cappellen, Department of Earth and Environmental Sciences, has been announced as the recipient of the 2015 Science Innovation Award from the European Association of Geochemistry. This award is bestowed on scientists who have recently made a particularly important and innovative breakthrough in geochemistry. Philippe will receive the award at the Goldschmidt meeting in Prague in August 2015. **https://uwaterloo.ca/ecohydrology/news/philippe-awarded-2015-science-innovation-award-european**

» **Jim Barker** — *2014 Robert N. Farvolden Award:* Jim Barker, Department of Earth and Environmental Sciences, is the 2014 recipient of the Robert N. Farvolden Award of the International Association of Hydrogeologists (IAH) Canadian National Chapter and the Canadian Geotechnical Society. The award honours outstanding contributions to the disciplines of earth science and engineering that emphasize the role or importance of groundwater. Presentation of the award take place at the IAH-CNC annual meeting in October 2015 in Waterloo.

technology and innovation

JUEWIN LIU, Chemistry, Water Institute member

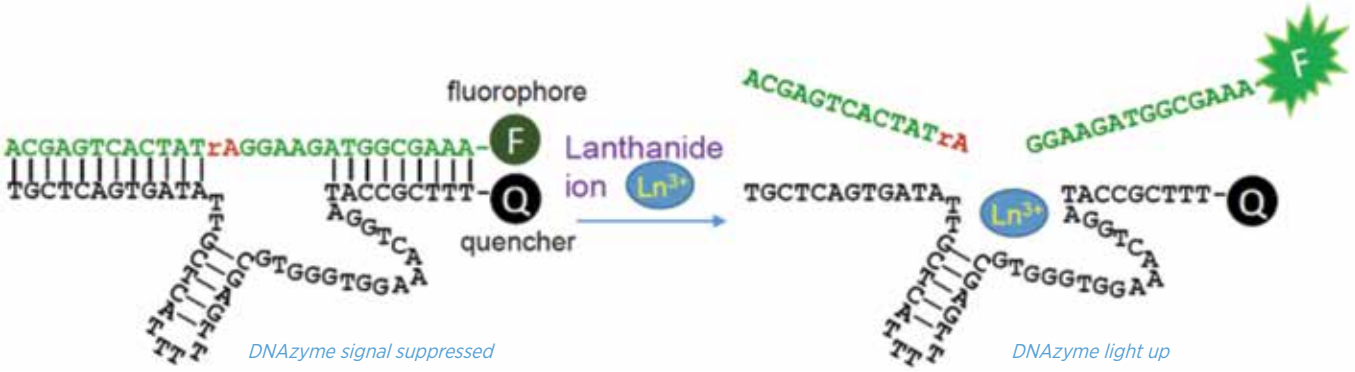
SNIFFING CONTAMINANTS WITH DNA

While DNA is well known as a genetic material, developments in biotechnology have allowed its function to expand. Now, DNA is more and more used as a generic material for constructing nanostructures and for making biosensors. My lab uses DNA to detect contaminants in water, in particular, heavy metal ions. These metals are bioaccumulative and pose significant health concerns. Drinking water is a main source of potential heavy metal intake. In some cases, DNA sequences can be rationally designed for metal recognition. For example, in 2010, we reported a hydrogel containing a thymine rich DNA that can achieve visual detection of 10 nM mercury (2 parts-per-billion), and the sensor also works for Lake Ontario water (with spiked mercury).

More often, the best DNA sequence is identified by a combinatorial biology technique called in vitro selection. We isolate special DNA from a huge library containing hundreds of trillions of random sequences. The criteria for selection is that the DNA needs to be able to bind target molecules. In the last two years, we isolated a number of DNA that can recognize various lanthanide ions. An example is shown in the figure below. A fluorophore is attached to one strand of DNA and a quencher is attached to the other strand. In this initial complex, the fluorescence is masked. Only in the presence of lanthanide ions, the strand bearing the fluorophore is cleaved into two pieces, unmasking the fluorescence. We are currently working on more toxic metals including mercury, chromium, cadmium, lead, arsenic, and thallium. The goal is to make portable devices to achieve on-site detection at a low cost, providing complementary information to the current technologies.

To reduce the cost of DNA, the Liu lab is also seeking other types of materials for monitoring water contamination. With the help of the Water Institute, Juewen has successfully led an NSERC Strategic Project grant with a team of four professors. This project develops new polymers for water analysis in collaboration with Geosyntec Inc. based in Guelph.

Juewin Liu is an Associate Professor in the Department of Chemistry. http://www.science.uwaterloo.ca/~liujw/



DNAzyme signal suppressed *DNAzyme light up*

water institute news

Upcoming Lectures in March:

DC 1302 | 2:30PM | AVAILABLE BY LIVESTREAM

THURSDAY, MARCH 5

» DR. JOHN SMOL
Queen's University

Exploring the Past to Protect our Future: Using Lake Sediments to Study Water Quality Issues

THURSDAY, MARCH 12

» DR. CHARLES VÖRÖSMARTY
The City University of New York

Water in the 21st Century: Sources of Pessimism, Sources of Optimism

TUESDAY, MARCH 17

» DR. SHEILA OLMSTEAD
University of Texas at Austin

Water Resources and Climate Change Adaptation: An Economist's Perspective

SAVE THE DATE:

Water Institute Research Symposium

THURSDAY, APRIL 30

SAVE THE DATE:

World Water Day Graduate Research Fair and Water Celebration

MONDAY, MARCH 23
Paul Martin Centre, WLU

collaborative water program

NEW COHORT BONDS IN HUNTSVILLE

The students newly enrolled in the Collaborative Water Program (CWP) for 2014 participated in a Leadership Weekend at the Huntsville Summit Centre in late November. Led by Mark Servos (CWP Director) and Nigel Watson (RBC-CWP Visiting Fellow), students participated in a variety of cooperative activities to help them learn about each other and themselves in a collaborative and fun environment. This included a full day in the snow doing different team challenges, a hike to the summit and cooking a great lunch on an open fire in the woods. The trip provided an opportunity for the students to gain an appreciation of the breadth of interests among the water students at Waterloo. This should be helpful as they enter the first course in the program this winter. It was a terrific experience for us all.

Students interested in the Collaborative Water Program are encouraged to contact Kevin Boehmer or Mark Servos for additional information.

An outdoor lunch on the fire, Leadership Weekend, Huntsville

Nigel Watson leads student discovery at the Leadership Weekend

RBC VISITING FELLOW: NIGEL WATSON

The Water Institute was fortunate to have Dr. Nigel Watson from Lancaster University in the UK join us this past fall as the RBC Visiting Fellow. Nigel is an outstanding researcher working on watershed management, including the complexities of public engagement. During his visit he gave a Water Institute Lecture (webinar) and engaged in a variety of discussions about water science, management and governance with faculty and students across campus. Nigel provided the editorial for this issue of *Splash Pad*.

Nigel's participation in the Collaborative Water Program greatly enhanced the experience of the students in the Program. In addition to spending a weekend at the Huntsville Summit Centre with the new class, he participated in the teaching of Water 602 along with Mark Servos (Biology) by actively engaging in our class sessions and meeting with student groups to discuss their final projects: a research project on the Grand River addressing a knowledge gap in the recently released Grand River Watershed Water Plan. Nigel brought a unique and international perspective to the class that enriched the discussion. We all benefited tremendously from his participation and we hope he will come back to visit in the near future.

Link for the seminar: https://www.youtube.com/watch?v=cLmRQcMUt1g&index=6&list=PLawkBQ15 NDEkajDjQxgbRZlqXCKXbvtJJ

students of the water institute

GRADUATE SECTION

UPCOMING EVENTS:

- Monthly BlueDrinks
- World Water Day
  March 23, 2015, Wilfrid Laurier University
- SWIGS at ENVigorate Festival 2015
  Friday, March 27th, EV3

WI Staff, SWIGS members and volunteers at another successful SWIGS BBQ

ANNOUNCEMENTS:

- In Fall 2014 SWIGS launched an improved website with new ways to stay informed of events, opportunities and ways to get involved!
- The new site includes a new community Blog initiative which features Waterloo student research, experience and interest pieces.
- Blogs are accepted on a rolling basis, see the website for more details.
- SWIGS is now actively recruiting for Executive positions for the April 2015-2016 Year!
- See website details for more information, or contact water.gra@gmail.com

The "Creatures of the Gyre" were arguably the biggest hit at Night Shift 2014! The SWIGS booth in Kitchener City Hall provided infographics, an interactive trivia game and the not so 'fun' facts about plastic pollution and marine debris.

Didn't get a chance to see them? A few of the enormous bottle creatures will be featured at ENVigorate Festival in March.

WORLD WATER DAY

Each year, UN-WATER marks the importance of freshwater by designating World Water Day. This year's theme is 'Water and Sustainable Development'. We are pleased to announce that the 6th Annual World Water Day Graduate Fair and Water Celebration will be held on Monday March 23rd. This event is organized by SWIGS and Laurier's Centre for Cold Region and Water Science Student Network (CCRWIN), and is sponsored by the Water Institute and the Laurier Institute for Water Science, with additional contributions from the Laurier Graduate Students Association and the Office of Research Services at Laurier.

Join us for a day-long celebration on Monday March 23, 2015 at the Paul Martin Centre, Wilfrid Laurier University. The event will highlight university water research and will raise awareness of local and global water issues.

The event includes:

- Lectures by Robert Sandford and Chris Turner
- Poster presentations
- Booths from local community, government and business
- Water sector networking
- Buffet lunch

water institute external partners program

Platinum Level

AECOM

Golder Associates

RBC Foundation

Stantec

Gold Level

CH2MHILL

Kitchener

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

The City of Waterloo

Matt Vanderkooy of Geosyntec leads a discussion group with SWIGS students.

Dave Flynn, Steve Brown and Roger Freymond shares perspectives about careers with Stantec.

Matt Alexander of AECOM (far left) networking with Waterloo graduate students

EXTERNAL PARTNER EMPLOYMENT FORUMS — A BIG SUCCESS!

In early November, Water Institute Employment Forums took place and included our Platinum External Partners AECOM and Stantec, and our Silver External Partner Geosyntec. The forums connected our External Partners with over 50 Waterloo Masters and PhD students with a research focus on water. The Water Institute is pleased to include this service to our students and particularly as part of the membership benefits to our External Partners.

External Partners made presentations describing their organizations and potential career opportunities, held group discussions and conducted one-on-one networking discussions with the Waterloo students. The Water Institute partnered with the Students of the Water Institute, Graduate Section (SWIGS) and the Tatham Centre for Co-operative Education & Career Action to host these forums. We look forward to similar Employment Forums during 2015.

On March 23rd, the Water Institute is once again hosting a Career Fair in partnership with SWIGS and Wilfrid Laurier University, as part of the World Water Day activities. External Partners interested in participating in the World Water Day Career Fair should contact Grant Murphy at g3murphy@uwaterloo.ca or at 519-888-4567, ext. 31883.

Find more information about the External Partner Program at **http://water.uwaterloo.ca/epp/**.

the water INSTITUTE

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