THE WATER EDITION

WINTER 2011

# SHOWCASE

LEADING-EDGE TEACHING AND RESEARCH AT TRENT UNIVERSITY

## For the Sake of Our Lakes

### Trent's Inaugural Holder of the David Schindler Professorship in Aquatic Science, Dr. Paul Frost Puts Global Water Quality into Local Perspective

"This is our mad scientist room," jokes Dr. Paul Frost at the beginning of a tour of several labs he uses for research in Trent's Biology Department. The tiny, oddly-lit lab contains bubbling jars of green algae-filled water, produced to feed the tiny, microcrustaceans, Daphnia multiplying and floating in jars down the hall. To explore how nutritional stress affects the tiny aquatic animals, Professor Frost and his students carefully change the nutrient content of the algae and measure an array of metabolic responses by the Daphnia. This is just one way the Schindler Professor in Aquatic Science is exploring the role that nutrients have in the food webs of our local lake and stream ecosystems.

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### The Water Issue

As the river runs through it, Trent University is the place for all things water. Home to the Institute for Watershed Science and North America's leading Water Quality Centre, Trent leads the way in research of all aspects of aquatic science. This 'Water Edition' of Showcase highlights Trent's interdisciplinary approach to the life source, from measuring contaminants in parts per quadrillion to how the Canadian identity plays out on the ice.

**INSIDE**



TRENT UNIVERSITY 1964 2014 50

# Bringing Water into Focus

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Whether participating in water leadership initiatives or speaking as an expert at events organized in the community, Prof. Frost hopes to increase the awareness of water quality issues at a local level, providing opportunities for his students to do the same. Working with students and the community, Prof. Frost promotes collaboration among local stewards, policymakers, and his researchers at Trent. He hopes his work will lead to effective management and reduction of future threats to our local waters.

## Hands-on in the Classroom

"I pose a question to students and facilitate their own discovery through testing and experimentation," says Prof. Frost in describing his inquiry-based approach to education, where learning is derived through practice, discussion and teaching others.

Prof. Frost promotes student research on the nutrition of aquatic organisms and on water quality of local and urban ecosystems. Students under his direction range from high-school and undergraduate students to Ph.D. candidates and post-doctoral researchers, all of whom stand to benefit from his active approach to learning as he helps guide their research activities.

In one project, funded in part by the Ontario Trillium Foundation, students are studying the algal communities of the Kawartha Lakes in collaboration with the Kawartha Lakes Stewards Association. This work will provide greater knowledge of food webs in local lakes and will ultimately result in the production of a reference guide on algae in the Kawartha Lakes for lakeside residents.

Prof. Frost is also overseeing a research project studying the aquatic ecology of urban ponds in collaboration with Environment Canada and the four municipalities of Peterborough, Richmond Hill, Whitby and Ottawa, funded by the Natural Science and Engineering Research Council (NSERC). This project aims to study urban storm water ponds from an ecosystem perspective to gain insight on the ability of these systems to retain nutrients originating in the urban landscape.

## Leadership in the Community and Overseas

"There are unique and specific threats to our local water quality, but they are not independent from each other. They're all related," says Prof. Frost. "Issues such as nutrient pollution, invasive species, acidification and the cumulative effects of shoreline development all reflect our use, over-use, and misuses of water resources. We should carefully consider our impact on aquatic ecosystems and their watersheds with an aim of responsible management to ensure their continued health."

"On a busy day during tourist season, it's great to see so many people out enjoying our water resources.

**"There are unique and specific threats to our local water quality…"**

How many of these users truly understand the local and regional drivers of water quality or its real ecological and economic value? " Prof. Frost asks.

In addition to being appointed Trent University's David Schindler Professor in Aquatic Science in September 2010, Prof. Frost has been awarded a Humbolt Fellowship for Experienced Researchers by the Alexander von Humboldt Foundation in Germany. In June 2011, he will travel to Germany for six months to complete research that examinines the potential uses of bioindicators of nutritional stress in aquatic invertebrates. Prof. Frost's international collaboration with colleagues overseas will pave the way to the further development and refinement of elemental bioindicators and their use in ecological stoichiometry for the purpose of better understanding the role of nutrients in aquatic ecosystems.

On March 2, 2011, Prof. Frost will host the community event "For the Sake of Our Lakes: Global Change and its Effects on the Lakes of Ontario." A panel consisting of global change experts and representatives of key stakeholders will examine how global change drivers may affect the future health of our local aquatic ecosystems. trentu.ca/aquaticscience ■

# Fish Out of Their Waters

*Dr. Stephen Bocking*

## The Science and Politics of Salmon Farming on Canada's Pacific Coast

### The Role of Science in the Water Debate

Out of the waters of the Pacific Ocean come two types of salmon that nutritionists tell us to eat more of, but which is best, and why? Is Pacific salmon caught in the wild better than farmed Atlantic salmon? What are the conflicts in salmon farming? Can science provide the answers to these questions?

This is the focus of Dr. Stephen Bocking's enquiry. The chair of Trent's Environmental and Resource Science/Studies program, Professor Bocking is interested in debates that are at the interface of science, politics and policy.

"Some of the toughest environmental challenges occur when there are conflicting uses and values attached to the same body of water," says Prof. Bocking.

Pacific salmon are essential to coastal ecosystems. Five species of salmon are found in the wild. They possess a unique ability to migrate hundreds of kilometres across the ocean, returning to spawn in the very stream from which they originated. Along the way they serve as a basic food supply for killer whales, sea lions, and grizzlies; their discarded remains nourish the coastal forest. Pacific salmon also play a major role in Aboriginal cultural traditions, history and lifestyle.

Due in part to their docile nature, Atlantic salmon are well suited to be farmed in pens scattered along the Pacific coast. Nearly one hundred salmon farms operate in British Columbia, employing thousands of people and raising millions of fish.

### Economic versus Environmental Impact

"While these farms are economically important, they are also a source of conflict," says Prof. Bocking. "Many people are concerned about the environmental impact of these farms, and their potential interference with wild salmon populations or recreational activities. As a result, salmon farming is a major controversy, with protest marches in front of the B.C. legislature, publicity campaigns by activists, and responses by industry and governments to criticism in the media."

Science is at the core of the salmon controversy and the goal of Prof. Bocking's study is to understand its role in debates concerning management of the salmon farming industry. "Scientists in universities, government, industry, and environmental organizations have done a great deal of research on the impact of these farms on the environment, particularly on wild salmon. There is much debate about how this research should be done, what the results mean, and how those results should be applied to the industry," explains Prof. Bocking.

**"Some of the toughest environmental challenges occur when there are conflicting uses and values attached to the same body of water," says Prof. Bocking.**

In addition to interviewing scientists, policy makers and others who use science as a foundation for argument, Prof. Bocking examines scientific literature, environmental history and media reports in order to understand how research has developed in the region in relation to the controversy, and how scientists have used various methods to build reliable knowledge about salmon farms in the aquatic environment. ■



# Building Alliances Along the Trent-Severn Waterway

Running through the heart of Ontario in a series of rivers, canals, lakes and streams, the Trent-Severn Waterway (TSW) extends its reach from Port Severn at Georgian Bay to Trenton at Lake Ontario. One of Canada's treasured historic sites, the TSW connects a vast network of vibrant communities, to which people from all over the world come to live, work and play, including Trent University along the banks of the Otonabee River.

As the university of authority on water matters and a leader in interdisciplinarity, Trent played the perfect host to the Trent-Severn Waterway Leaders' Roundtable on January 20, 2011, in partnership with Parks Canada. Delegates representing three levels of government, First Nations, non-governmental organizations, and leaders of communities throughout the Trent-Severn Watershed joined in the Great Hall of Champlain College along the river, to envision a future for the shared lifeblood that flows through the TSW.

**"It's all about the water…"**

## Pooled Information and Resources

"There is a lot of expertise in this room and I hope to tap into it," said Ms. Dawn Bronson, field unit superintendent for Parks Canada Central Ontario. "What do we really care about?" Ms. Bronson invited everyone in the circle to voice their passion concerning the TSW.

One by one, individuals from far and wide spoke their hearts and minds to the group of gathered leaders. The purpose of the open forum was to identify the issues, challenges, opportunities and questions around the future of the TSW from every possible perspective. In the end, ten major themes were identified as priorities, including water quality, culture and heritage, environmental impact, tourism and marketing, infrastructure, and land conservation.

Dr. Steven E. Franklin, Trent's president and vice-chancellor said, "The leadership forum provided a unique opportunity to build new alliances within the water community. The round table discussion represents a major step forward in the government's response to the summary report from the Trent-Severn Waterway Panel, of which Trent's founding president and vice-chancellor Professor Tom Symons was a member."

"It's all about the water," said Prof. Symons. In addition to the components of the care and development of the waterway itself with respect to water quality, control and flow, Prof. Symons highlighted the necessity to care for and protect the cultural aspects of the TSW and such fundamental aspects as its history and archaeology. "What is needed is public consensus and political will," Prof. Symons said. "Today's meeting will help us move in that direction." ■

# The Trent University Water Quality Centre

*Dr. Peter Dillon*

## Measuring Parts Per Quadrillion

The insidious thing about water is that you can't always see or taste contaminants that impact our ecosystems and human water supplies. Trent University is home to the internationally- respected Water Quality Centre (WQC). Arguably the most impressive facility of its kind in the world, WQC houses some 20 instruments with a combined value of $12-13 million. There is no other place that has a collection of equipment on as broad a scale as that found at WQC. Trent University is often involved in joint studies with research scientists from places the likes of China, Germany and Norway.

This compilation of mass spectrometry equipment which, in layman's terms, measures mass or weight of particles, includes ten instruments that measure trace metals at levels lower than any other technology. It is possible to measure contaminants down to levels in some cases below parts per trillion and in a few cases, actually down to parts per quadrillion.

Dr. Peter Dillon is a professor in the Environmental and Resource Science/Studies and Chemistry Departments and the WQC director. According to Professor Dillon, the facility is focused on researching why things are the way they are with the ultimate goal of determining "what we can do about contaminants."

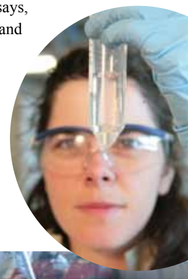
Professor Dillon points to contaminants like mercury, present at levels that restrict the consumption of fish. The water these fish come from may have dramatically lower mercury levels; contamination accumulates with each step of the food chain. Algae for instance, may have mercury one hundred times higher than the water, small invertebrates one hundred times higher than the algae, little fish that feed on these invertebrates one hundred times higher again and so on. "At each step of the food chain, levels increase," says Prof. Dillon. "If you want to understand what's going on, you need to measure them in different places."

## Instruments on the Cutting Edge

Another set of instruments at WQC is used to measure trace organic compounds like pesticides and PCBs that have been introduced into the environment by humans. Considerable work is being done on which pharmaceutical and personal care products are getting into our rivers and lakes.

A third series of instruments looks at elements that have more than one isotope (one or two forms of an element all having the same chemical properties but with different mass). "For example," says Prof. Dillon, "If pesticides are found in a fish, what was the pathway? In the main food source of perch, carbon and nitrogen are two key components. Looking at the ratios of their isotopes in different components of the ecosystem is a convenient way to see where food and energy are moving. This information can lead to solutions to indicate the source and pathways that contaminants take in the environment."

"It's a world-renowned facility for trace-containment research," Prof. Dillon says, "an excellent place to train graduate and post-doctoral students with state-of-the-art methodologies. We want to keep moving ahead and remain at the absolute cutting-edge, to handle problems that couldn't be addressed, lead the way and transfer our knowledge to government and other universities." ■



## TRENT SPEAKS – WHAT DOES WATER MEAN TO TRENT AND WHAT DOES TRENT MEAN TO WATER?

**Student Perspective:**
**Dylan Burrows**
**Fourth-year History student**

As one walks across the Faryon Bridge it is easy to forget the great body of water whose strong currents flow beneath us. Recently, I found myself striding across the bridge in the vain attempt to get to class before the frigid cold numbed my extremities. Midway across the bridge I gazed over the river and was struck by the ethereal beauty of the mist rising from the Otonabee. It enveloped the surrounding area, coating the surrounding environment with hoarfrost. Gazing, I came to the realization of the ubiquity of water at Trent. From every building on campus it is possible to see the river which provides Trent and the surrounding area with power, clean water and recreation. For me, the banks of the Otonabee have become a place of introspection and meditation. The river is the true focal point of Trent's campus, unifying what can seem like a disparate collection of buildings.

While the pervasive presence of water has greatly defined the identity of Trent, the University has had a reciprocal impact. As a result of hosting the Trent-Severn Waterway Leaders Roundtable discussion, Trent has become a catalyst for raising awareness of the importance of water in our everyday lives. From my experience working with the Trent Centre for Community Based Education, I have become vastly more aware of how critical institutions such as Trent are, particularly in efforts towards conservation and sustainable development.

**Faculty Perspective:**
**Dr. Jim Buttle**
**Professor, Geography**

As a hydrologist whose teaching and research focus on the properties and processes that govern water movement through different landscapes, it is hardly surprising that I sing the praises of the links between water and Trent. Nevertheless, I cannot think

**Undergraduates, graduate students and faculty have been at the forefront of studies of the physical, chemical, biological and socioeconomic aspects of water.**

of another university that is as intimately linked to water as Trent is. Beyond serving as the dominant feature of the University's physical setting, water has been a key theme running through some of our most innovative and exciting areas of teaching and research since Trent's inception.

Undergraduates, graduate students and faculty have been at the forefront of studies of the physical, chemical, biological and socioeconomic aspects of water. This is exemplified by a wide range of activities, from fieldwork examining snow and ice cover on Little Lake during Peter Adams' undergraduate course in hydrometeorology in the 1970s and 80s, to measurements in Trent's Water Quality Centre of a wide range of aquatic contaminants. Much of this work has been inspired and enabled by Trent's continued emphasis on the value of interdisciplinary approaches to studying water and its integrating role in physical, chemical and biological systems. The former Watershed Ecosystems Graduate Program has also been instrumental in establishing our national and international reputation in water-related research.

**Alumni Perspective:**
**Allie Kosela '05**
**Outreach Coordinator, Lake Ontario Waterkeeper**
**B.Sc. Biology and Environmental Science**

When you ask any Trent student about campus it's certain that you'll hear about the Otonabee River. The Otonabee River was an absolute selling point for me to come to Trent. I was raised in Muskoka, a place revered by many for its plentiful lakes and rivers. After touring a few different universities in some big cities, I knew my home away from home just had to be Trent. Some of my best memories from my time at Trent are from the shores of the Otonabee River at Champlain College. The beach was a place where our first year class bonded after the Great Race. We swam, had picnics and took our best photos on that very river.

As an environmental science and biology student, I was lucky enough to have access to the Trent University Water Quality Centre and to pick the brains of world experts in the water field. I gained valuable knowledge about contaminants, aquatic ecosystems and our need to solve important water-related problems.

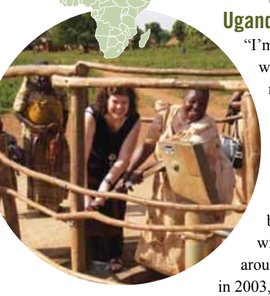
My time at Trent reinforced my love for water and taught me that there are many things to learn about and from our water. Since graduating from Trent, I've been able to deepen my connection to the waters I hold so dear to my heart by becoming part of the Waterkeeper family: champions for water and environmental justice worldwide. ■

## WORLD OF TRENT ALUMNI

### Water Matters from East Africa to Atlantic Canada

**Two Distinct Perspectives from Trent Alumni Working in Water-related Careers**

#### Well Development in a Ugandan Village



"I'm an educated, Western woman. There has to be more that I can do in Africa."

This was the realization Laurie Davey Quantick came to after distributing bed kits to Uganda with 'Sleeping Children around the World' in Africa in 2003, where she could not fathom the "absolute decrepit state

**"You can't be a Trent grad without needing to go out into the world and do something!"**

of schools with leaky roofs, no water and no washroom facilities.

Ms. Davey Quantick made the decision in 2006 to set about building a school in the village of Nabintende, Uganda, "but when we got to the community," she says, "the first issue we had to deal with was a clean water source."

"Children and their mothers walk up to ten kilometres, carrying ten-gallon jerry cans, in the early hours before dawn and again in the evening at dusk, putting themselves at risk of exhaustion, attack and abduction," Ms. Davey Quantick explained. "The ability to focus on education and schooling is limited until this and issues such as health and safety in the face of water-borne contaminants are addressed."

A 'bore hole' to access fresh water costs between $7,000 and $8,000 U.S. After raising the funds and then sourcing the equipment in Uganda, Ms. Davey Quantick arranged to have the hole dug in Nabintende and a mechanical pump installed with a concrete pad, all through her organization, Omwaana Ono International, which means 'This Child' in the Lusago dialect of Ugandan. The well now serves about three hundred families and has been operating since June 2010.

"You can't be a Trent grad without needing to go out into the world and do something!" Ms. Davey Quantick exclaims. "The Trent experience instils in you that desire to do more – in that social, responsible way. Maybe it's a certain type of student who comes to Trent in the first place, but I think the Trent environment encourages a certain curiosity and interest, and allows it to germinate."

Laurie Davey Quantick graduated from Trent with an Honours B.A. in Psychology in 1981 and returned to Trent to complete a Master's degree in Canadian Studies in 2010.

#### International Water Policy from a Canadian Biological Station

"I lean on my experience from Trent every day," says Dr. Rob Stephenson '72, who graduated with an honours B.Sc. in 1976 and has been a research scientist with the Department of Fisheries and Oceans (DFO) Biological Station in New Brunswick since 1984. He reflects on the value of his Trent education and its relevance not only to his career, but to the full scope of international water policy.

"There is a cohort of water researchers from Trent that has had significant influence on water management in Canada and internationally. As students we were fortunate to have been close to faculty members with interests in water, and to see their research first-hand, in biology, geography, and other subjects. Trent brought us together as teams in the tutorial system, which was a wonderful introduction to interdisciplinary practice."

"My Trent experience set the groundwork for my ongoing interest in undertaking applied research that is relevant to society," says Dr. Stephenson, whose current research relates to the application of the 'ecosystem approach' to management of fisheries and other marine activities. "The landscape of fisheries and oceans management in Canada, and internationally, is adapting to adhere to higher standards of conservation and more diverse management objectives with new attention to the

**"There is a cohort of water researchers from Trent that has had significant influence on water management in Canada and internationally…"**

cumulative impacts of multiple activities. This is a real challenge that requires incorporation of new information in a multidisciplinary approach to management."

Dr. Stephenson is currently leading the new Natural Science and Engineering Research Council (NSERC) Canadian Capture Fisheries Research Network. This leadership involves bringing together the academic community, the fishing industry and government agencies to undertake collaborative research that is required for the evolving fisheries management system.

The fact that the river flowed right through campus was intrinsic to Dr. Stephenson's experience at Trent and his path to a career in water. "Water was always a unifying factor at Trent," he says, recalling the view from the library of the river, rowing on the canal, and the ice-flow races from the lock upriver, where teams would gather with their wet suits and lawn chairs to float along on ice chunks every spring.

"Water is what brought me to Trent in the first place." ■



## SPOTLIGHT ON ATHLETICS

### Enraptured by Rowing

"Rowing for Trent has defined my university experience," says third-year biology student and varsity athlete Maija Robinson. This is quite a statement coming from a student who never tried the sport of rowing before coming to Trent. But what started as curiosity to try something new quickly turned into a full-blown passion for the sport.

"I started out in the novice rowing program in my first year, which was a wonderful way to learn about and be completely enraptured in the sport," Ms. Robinson explains. "I was encouraged

**"Trent Rowing is my home, my community, my family."**

to row over the summer and did so at the Peterborough Rowing Club to gain more experience before trying out for varsity in the fall. I have been on the varsity team for the past two years and cannot imagine rowing for any other school. Trent Rowing is my home, my community, my family."

Drawn to Trent by the University's picturesque natural surroundings, Ms. Robinson discovered a new appreciation for the river that runs through the heart of the Symons Campus when she became a rower.

"Rowing along the canal, under the Faryon Bridge and seeing the campus in the morning before anyone else is even awake, is nothing less than a fairytale," she says, adding that she feels incredibly fortunate to have been trained in the sport at a university where the rowing facilities are located right on campus.

### Woman of Influence

In recognition of all of her achievements and contributions both on and off the water, Ms. Robinson was recently selected as one of the Ontario University Athletics' (OUA) 2010/11 Women of Influence, an awards program that honours female student-athletes who have excelled in their chosen sports, fields of study and community involvement.

Commenting on the honour, Ms. Robinson says, "I am honoured to be named a 2011 Woman of Influence. I am proud to represent Trent University, but more so I hope that I can represent many other women of influence in my community (Trent Rowing and beyond) whose actions inspire myself and others. When I first found out about this award I was a little surprised to be honest. I was mostly very touched that my coach Jacqui Cook thought to nominate me, as her passion for sport and continual encouragement have been critical in my accomplishments."

As of the end of February, Ms. Robinson will be spending a semester at the Arava Institute for Environmental Studies in Israel as part of an international program which brings students from the Middle East, North America and Europe together to address trans-border environmental issues.

After her adventures abroad, Ms. Robinson will return to Trent for a final year of study, during which she looks forward to competing in another rowing season, aiming for gold at provincial and national regattas, before embarking on a future career as a doctor, working in rural or underdeveloped regions and countries. ■

## GRADUATE STUDIES

### Whither Ice and Whence Weeds: Water at the Graduate Level

**Trent University's School of Graduate Studies is a small school with a large reputation for research and scholarship. Here are two individuals whose work touches on water in very different ways.**

### Identity on Ice:

**Kristi Allain, Ph.D. Candidate, Canadian Studies**

Growing up in Peterborough, Ontario, Kristi Allain had a relationship with ice not unlike many other Canadians: through the sport of ice hockey. But when her family agreed to board a Russian player with the Peterborough Petes, the game took on a more central role in her life. Attending many a Petes game in her youth, she became increasingly interested in the cultural, identity and gender issues expressed in this popular game played out on frozen water. Little did she know that special brand of oh-so-Canadian entertainment would form the basis of the Ph.D. she would pursue at the Frost Centre for Canadian and Indigenous Studies at Trent.

"My research examines the relationships between dominant notions of Canadian national identity, men's elite level ice hockey and particular expressions of masculinity," explains Ms. Allain.

Ms. Allain's research explores this complex subject by looking at perceptions and media coverage of famous hockey personalities Sydney Crosby and Alexander Ovechkin – and reviewing a particular brand of masculinity presented through Don Cherry's *Coach's Corner*.

"I argue that Cherry's construction of hockey masculinity and morality in general draws upon a nostalgic understanding of the past and a construction of Canadian hockey masculinity as under threat," says Ms. Allain. "These ideas are linked through a celebration of men's bodies – particularly those who are able-bodied, disciplined, white, and heterosexual."

"I think it is important to examine how various constructions of hockey masculinity actually play out in Canadian locker rooms," she says. The very Canadian aspects of snow, ice and cold also have a role.

"To play hockey is to overcome the elements and take to the ice – even though it is hard, cold and unforgiving," adds Ms. Allain.

### Of Weevils and Water Weeds:

**Kyle Borrowman, M.Sc. Student, Environmental and Life Sciences**

Environmental and Life Sciences Master's student Kyle Borrowman would be the envy of many. Some of his most enjoyable research takes place snorkelling or boating in cottage country on some of Ontario's most beautiful lakes. Despite the glorious surroundings, it's serious work.

"My research consists of exploring the ecology between a native insect, the milfoil weevil (*Euhrychiopsis lecontei*), and an invasive-exotic aquatic plant, Eurasian watermilfoil (*Myriophyllum spicatum*)," says Mr. Borrowman.

Most cottagers would recognize Eurasian watermilfoil as the long, feathery plant that can create dense stands that reach the surface in seemingly open water. The invasive foreign species tends to wrap itself around the legs of skittish swimmers and the motors of frustrated boaters.

"Eurasian milfoil has been present in Ontario since the 1960's and has been heavily managed since the 1970's," explains Mr. Borrowman. "This species can negatively impact fish and invertebrate populations, water temperature, navigation and recreational use of lakes."

Mr. Borrowman is exploring how a hungry little insect, the size of a sesame seed and native to Ontario lakes, can help to control the spread of the unwelcome weed. Throughout the mid-west United States, the small bug, called the milfoil weevil, has been used as a form of biological control to manage nuisance populations of Eurasian watermilfoil. Surprisingly, despite being native to North American lakes, the tiny water bug actually prefers the exotic flavours of Eurasian milfoil to native water milfoil. With its spattered black and yellow shell and what Mr. Borrowman calls an "extended gonzo-like" nose, the weevil mows through Eurasian milfoil and helps to keep balance in the lakes.

His favourite part of the ENLS program at Trent: "I find the field work very rewarding and love the opportunity to spend time snorkelling around small bays in central Ontario lakes." And if his research can help reduce the amount of Eurasian milfoil causing havoc in our lakes, Mr. Borrowman says it will be satisfying to see that his research has made a difference. ■

Dr. Stephen Brown

# Tides of Change

Scholar, philosopher and literary naturalist, Loren Eiseley, once mused in his 1957 book, *The Immense Journey*, "If there's magic on this planet, it is contained in water."

Water cast a magical transformation over Scotland in the 18th-century. The River Cramond and the water of Leith in part delivered Scotland, then the poorest country in western Europe, from destitution to

**"If there's magic on this planet, it is contained in water."**

publishing powerhouse. How so? Ready access to river systems to support paper mills contributed significantly to Scotland's papermaking industrial expansion, which in turn contributed to the information revolution brought about by printing. With the use of water also came some of the first industrial pollution because of chemicals developed to bleach the rag pulp used to make paper. These morsels of information set the stage for a book slated for release in fall 2011.

Trent University's Dr. Stephen Brown, professor of English literature, is one of the contributing editors behind the four-volume *History of the Book in Scotland*. His academic work includes some 60 refereed publications and 40 conference papers; he is also a 3M fellow (one of only six ever at Trent) and a fellow of the Society of Antiquaries of Scotland, the second-oldest learned society in the English-speaking world.

## How Could 18th-Century Scottish Publishing Possibly Have Relevance in Today's World?

The revolution in 18th-century print, which was dominated in the English-speaking world by Scottish publishers, has many parallels to our present communications revolution: copyright issues, rights to information by the public, freedom of communication, all the questions around intellectual property.

"When the *Encyclopaedia Britannica* was released in 1769-1771," says Professor Brown, "it was attacked by the establishment just as Wikipedia has been attacked. It was among the first attempts to place all knowledge in the public sphere and was dismissed for lacking 'credentials."

In an odd way, the material presented in Prof. Brown's volume of *The History of the Book in Scotland* is probably more relevant than ever, particularly in relation to freedom of information. The 18th-century British government learned to control the press through taxation, often forcing politically controversial publications out of business. "The persecution of the publisher of WikiLeaks," Prof. Brown suggests, "is much like the persecution of those radical editors."

Modern parallels aside, historical and entertaining insights abound. Prof. Brown points to some of his own research for the volume which compared typefaces and watermarks to reveal the individual responsible for printing Robert Burns' collection of obscene poetry, *The Merry Muses of Caledonia*.

**"With the use of water also came some of the first industrial pollution …"**

"It was a demanding project," Prof. Brown acknowledges, recalling an editor's nightmare: one article, commissioned at 5,000 words, came in at 51,000. But now, the launch date is set for St. Andrews Day 2011. Libraries and research institutions across the world have placed advance orders. This reference work is expected to stand for some time as the authoritative source on Scotland's 18th-century booktrade. Juxtaposed against today's digital environment, Scotland's 18th-century publishing ascent, with its challenges and legacies, serves as a reminder of how history does, indeed, have a way of repeating itself. ■

INVESTING IN TRENT

# Streams of Scientific and Indigenous Knowledge Flow as One

## Traditional Knowledge Meets Water Management

Among Canada's Indigenous communities, water is a living force understood and respected on a level foreign to western scientific sensibilities. Yet, according to Dr. Chris Furgal, a professor in Trent University's Indigenous Environmental Studies (IES) program, water protection and management is a critical Aboriginal issue due to growing disassociation between people and land.

Traditional knowledge and relationships to the natural world are being challenged as social and economic pressures such as mining and oil extraction and community expansion intensifies. It's this very disconnect and the opportunity to do something about it that brought RBC and $500,000 in Blue Water project funding to Trent University in 2009.

"We believe the high level of expertise and work behind Trent University's collaborative project to develop a curriculum for water management in northern Aboriginal communities is going to have a huge impact," says Mr. Ian McNeill, RBC vice president, Kawartha Lakeshore Region.

Significant milestones have already been achieved 18 months into the five-year project.

**"… the high level of expertise and work behind Trent University's collaborative project to develop a curriculum for water management in northern Aboriginal communities is going to have a huge impact …"**

## Science Curriculum Development

Trent University's Institute for Watershed Sciences (IWS), IES and partner organization Fleming College, are developing science curriculum modules addressing both waste-water treatment and source-water protection.

"We're addressing source-water protection as the first stage in the multi-barrier approach to protecting drinking water," explains Ms. Leslie Collins, biologist and training coordinator for IWS. "It's about identifying and adopting barriers to mitigate contamination."

Dr. Chris Furgal

## Environmental Sustainability in a Northern Cultural Context

Trent University and its partners are working to develop a sustainable approach. The focus is on relevance to northern people. That, says Professor Furgal, is where the IES program, in collaboration with academic and community partners, is making valuable inroads.

"We're doing environmental research within a cultural context, pulling together insights and resources applicable to Aboriginal communities in northern Canada and by extension, Indigenous people around the world."

UN-affiliated university campuses, says Prof. Furgal, "are interested in learning from us, what makes sense when bringing together Indigenous knowledge and science. Our curriculum approach may be applicable to other topics and other Indigenous people. Water is the springboard to a much larger international picture."

With science modules now complete, material is with Yukon College for regionalization and cultural adaptation. The pilot launch is expected by early summer. Once vetted, the final curriculum will be offered as part of a Yukon College degree-program. Delivery will be face-to-face and through long-distance video conferencing to 14 First Nations communities. And that's just phase one.

Future plans are to adapt material for community-based workshops. Educational development will be offered to those in remote communities who require knowledge to lead or deliver services.

## Distilling Information into Understanding

The final component is to distil material into succinct pieces of meaningful information for the general northern populace. Individual knowledge is key. Messages may be as simple as how actions can impact waste-water treatment, wetland systems and, ultimately, the drinking water used in homes.

By understanding what source-water protection entails and how to plan around that, northern Aboriginal communities will be supported in their pursuit of respecting and protecting the land and waters where their ancestors lived more than 12 thousand years ago. ■



MEET THE INNOVATORS

# Buccaneers and Indians: Historian Dr. Arne Bialuschewski Investigates the Effects of Cross-cultural Interactions in Mesoamerica's Past

Dr. Arne Bialuschewski

While popular culture often portrays the drama of meetings between swashbucklers on the high seas and the Indigenous people they encounter, Trent history professor, Dr. Arne Bialuschewski is looking into the real thing.

In his forthcoming work, *Beneficial Encounters?*, Professor Bialuschewski will examine the emergence of a new generation of marauders – the buccaneers – and their interactions with Indigenous communities in Mesoamerica during the 1600s.

## Plying the Coastal Waters

"I think most buccaneers had some seafaring background," Prof. Bialuschewski says, "but it would have been suicidal for them to attack the large Spanish treasure fleets in the Caribbean."

In contrast to pirates, buccaneers established bases and stayed in the Caribbean for years. They mostly used vessels for a kind of amphibious warfare in their raids of Spanish towns or treasure shipments.

## Buccaneers as Adventurers and Ethnographers

In the last two decades of the 17th-century, several buccaneers including Alexandre Exquemelin and Raveneau de Lussan published books, presenting their exploits as exotic adventures. "As part of this project, I plan to investigate how Indigenous people were described and characterized in these accounts. I would also like to compare some published episodes with the picture that emerges from more reliable sources," says Prof. Bialuschewski.

"I hope that through my teaching, students will think in an in-depth way about things that they may not have been familiar with before, and I also encourage them to question interpretations or even facts that they thought were established."

## The Research Practice

In researching his current project, Prof. Bialuschewski spends three months a year poring over Spanish, English, and French archival material, writing up his findings during the semester.

"There is a close interaction between research and teaching," says Prof. Bialuschewski. "In the last few years, discussions with students inspired several research projects. And while I am conducting research in archives, I always look for sources that my fourth-year students could use for their essays." And Bialuschewski's proficiency in – and love of – research is paying off. "An astonishing number of students submit great pieces of original research," he says.

## What Did it Mean for Indigenous Mesoamerica?

Buccaneers were known to kidnap Indigenous people, but many questions linger: did they mistreat their captives or focus on forming temporary alliances; enslave them, or make efforts to establish amicable relations? In his research, Prof. Bialuschewski aims to shed light on the cross-cultural relations between buccaneers and numerous Indigenous communities, including: the Mayan population of the Yucatán, the Miskito Indians (traditional enemies of Spanish colonial rule) in present-day Nicaragua, the Indigenous people of Maracaibo in what is now Venezuela, and the Cuna Indians in Panamá.

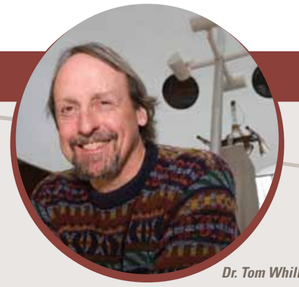
## Research with Merit

Funders are increasingly taking notice of Prof. Bialuschewski's work. Before he joined Trent, he was awarded a major grant from the Andrew W. Mellon Foundation. "I always discover new things," he says. The Social Sciences and Humanities Research Council (SSHRC) recently ranked Prof. Bialuschewski's current project number one among all grant applications in the field of history last year. ■

MATTER OF COURSE

# Mixing Currents of Science and Policy

**Ecology and Management of Wetland Systems**
**Environmental & Resource Science ERSC 3510H**
**Professor: Dr. Tom Whillans**



Dr. Tom Whillans

Eighty per cent of wetlands in southern Ontario are lost and eighty per cent of that loss is due to agricultural drainage, although urban development has become a major cause. "Agricultural land-use repercussions can be reversed, but once something is paved, you can't take it back. This course teaches students how to turn things around," says Dr. Tom Whillans, professor in the Environmental and Resource Science/Studies Program.

## Overlapping Ecology and Management Processes

Covering about one-seventh of Canada, wetlands are transitional zones between terrestrial and aquatic ecosystems, requiring an understanding of the overlapping ecological processes and management practices of both ecosystem types. Initiated in 1983 as the first regular wetlands-management course in a Canadian university and now the longest standing, Trent's Environmental and Resource Science/Studies course on the Ecology and Management of Wetland Systems is a field-based course incorporating practical applications of scientific theory and approaches to management and policy.

**Students are intrigued by the mixture of science and policy-based information needed for wetland management**

"Students are intrigued by the mixture of science and policy-based information needed for wetland management," said Prof. Whillans. The fact that the course is applied in nature prepares students in the third-year course for impending work opportunities. Management of wetland ecosystems is less about manipulation of biophysical conditions than it is about working with people who affect wetlands," explains Prof. Whillans.

## Bringing Theory into the Field

Students are engaged directly in field-based work, such as generating ideas and proposals for actual wetland restoration projects. One example of this is a case study near Gannon's Narrows, where a road through the middle of a wetland was causing a water flow problem, evident in the obvious change of aquatic plant growth on one side versus the other. "Understanding the problem to begin with is fundamental," said Prof. Whillans, explaining the use of theory in the field. "Once you know the causes of the dominance of a plant species, for example, you can make the appropriate recommendations to recreate balance in that ecosystem."

"Then it's a matter of identifying ideal organizations to work with, the legalities and permits," Prof. Whillans adds. "A number of non-governmental organizations and government departments could be involved in a project. This course also helps students understand the difference between working with a government agency and a community organization, both of which can be effective in managing a variety of issues." In the past, Prof. Whillans has received permission from students to send copies of their papers to wetland managers, such as Parks Canada and the Ministry of Natural Resources. "Some of those students now serve as volunteers for the organizations and are likely well-poised to attain employment as a result," said Prof. Whillans. ■

OSHAWA

TALK ABOUT TEACHING

**Dr. Brendan Hickie**
**Environmental Resource Science/Studies**
**Trent University Oshawa Thornton Road Campus**

# From the Global Waters to the Local Creek

"Students really like hearing about ongoing research," says Professor Hickie, an assistant professor in Trent's Environmental and Resource Science/Studies program at Trent University Oshawa Thornton Road Campus.

"In my research funded by ArcticNet I am examining how climate change may affect the behaviour of contaminants (mainly mercury) in the Arctic Ocean and their accumulation in the marine foodweb."

Water is a constant theme running through Prof. Hickie's first and second-year environmental courses, which he breaks down in global, Canadian and local contexts.

Dr. Brendan Hickie

Prof. Hickie encourages his students to explore ideas and study examples of water in urban environments such as municipal water supplies and treatment facilities. "We talk about how the local treated sewage goes back into Lake Ontario, which leads us into the issue of Great Lakes pollution. I teach about the history of regulation or the lack thereof in the

**"In Oshawa, we determined that the water quality was moderately impacted."**

1960s, and the increasing awareness of water quality issues in the 70s that brought about the Great Lakes Water Quality Agreement between Canada and the United States."

## Students Get their Hands Wet

Prof. Hickie takes his students out into the local environment to take samples in field-based research. In his second-year course, students examine the water quality in Oshawa creek, in the downtown Valleyview Gardens.

"In a biological assessment, rather than measuring the presence of pollutants, we examine insects that dwell on the stream bottom, referred to as benthic invertebrates, such as dragonfly larvae. Given that we understand the difference

*continued on page 8*

## MEET A TRENT STUDENT

Mr. Ryan Browne started his Trent University education in the water, as a young lad in the lifeguard-training program. Growing up with an island cottage in the Kawartha Lakes, Mr. Browne has been an aquatic creature himself since the age of seven. “My mom used to say I was a fish, but to my friends, I was always the science guy,” says the third-year environmental chemistry student.

“I chose Trent because it has great Environmental Science and Chemistry Programs. I want to make a difference and learn all I can about chemistry in our everyday lives.”

With an interest in smog and specifically how to prevent it, Mr. Browne has chosen to focus his studies at Trent in the area of atmospheric chemistry. “There is a lot of water in the atmosphere, affecting its chemistry quite a bit.

**“Water is the next oil in our world. We’re using it up at an unsustainable rate and we’re eventually going to be fighting over rights to it.”**

Without atmospheric water acting as a solvent, acid rain, that is - nitric-acid precipitation - would not occur as easily,” he says.

In his environmental chemistry class, Mr. Browne has had the opportunity to learn about aquatic chemistry. “It is amazing how water affects every aspect of our lives. We would not be here today without the chemical properties of water being as they are. Its polarity comes from its molecular shape and gives it some amazing characteristics. For example, ice is less dense than liquid water. If it wasn’t, lakes would freeze from the bottom up, and solidify eventually. This would kill all the aquatic life in lakes and rivers every time the temperature fell to 0 degrees C. Life on Earth would no longer exist since it originated from aquatic life. Water is the most important and essential compound on Earth; without it, there would be nothing,” says Mr. Browne.

When asked his thoughts about the future of water, Mr. Browne says, “Canada is lucky to have such vast supplies of fresh water. If you look at the water on Earth, 97 per cent is salt water and three per cent is fresh water. Of that, 79 per cent is frozen in ice caps. There is only about 0.3 per cent useable fresh water and only 0.014 per cent that is readily available, which still needs to be treated before it can be safely consumed. Water is the next oil in our world. We’re using it up at an unsustainable rate and we’re eventually going to be fighting over rights to it.”

Despite being a busy undergrad, Mr. Browne enjoys leisure time interacting with water of a different kind. “I also love to snowmobile and try to get up to the lake as much as possible in the winter. It’s nice to be able to head up to the cottage after class on Friday and be there in about an hour.” ■

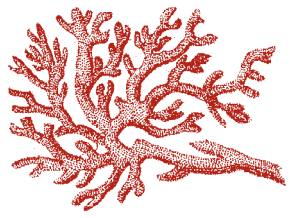


# DeFacto

**A glimpse into the latest findings at Trent**

## Ravaged Riviera Maya

If you go for a holiday to Cancun or other tourist destinations along Mexico’s ‘Riviera Maya’, think for a moment about the effects of tourist development on water quality. Pharmaceuticals, illicit drugs, pesticides, chemical run-off and other pollutants are infiltrating the region’s giant fresh water aquifer, says Dr. Chris Metcalfe, Trent professor and senior research fellow of the United Nations University. The polluted water runs to the Caribbean Sea and may add to the ecosystem stresses that have resulted in a loss of 50 per cent of the coral reefs in the region since 1990. What’s needed, says Professor Metcalfe, is a monitoring system to pin-point the origin of the pollutants, along with measures to ensure that expanding development does not damage the marine environment, human health and, in turn, the region’s tourism-based economy.

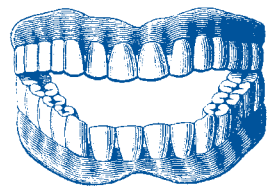


## An Act of Godlessness

In his comprehensive evaluation of the biggest land reclamation project ever attempted, Trent international development professor, Dr. Haroon Akram-Lodhi, found that powerful landlords in Pakistan’s Peshawar valley deliberately controlled canal water, thereby controlling the lives and livelihoods of area farmers. The Canadian International Development Agency (CIDA) project he studied set out to restore an irrigation network and reclaim the land used by peasant farmers in northern Pakistan. The project saw the farmers’ productivity go up; they called it an act of God. But by controlling land and water, the landlords were able to sustain their control of rural society, and keep small farmers in dire poverty.

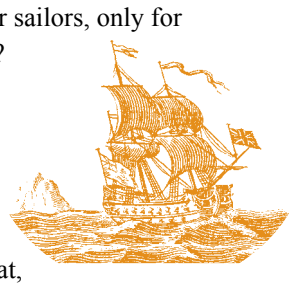
## You are What You Drink

Teeth have long been used to reveal information about lifestyle, gender, age and ethnic origin from beyond the grave. Now scientists are using the fact that oxygen isotope composition varies geographically – and bones and teeth incorporate the chemical composition of water or food over time – to learn about where a person was born and lived over the course of their life. Over the past 12 years, anthropologist Dr. Anne Keenleyside has been studying the skeletal remains of ancient Greeks from the Black Sea coast of Bulgaria. Measuring tooth enamel, Prof. Keenleyside has discovered that nearly ten percent (five of 60 people studied) were not native to the region, and that both men and women moved during childhood, either with their parents or traded as slaves.



## Say Your Prayers

Reading the Anglo-Saxon masses Pro Navigantibus, (for those sailing ships) and Pro Iter Agentibus (for those taking journeys), medievalist and liturgical historian Dr. Sarah Keefer thought perhaps she’d be deluged with pleas ‘for those in peril on the seas.’ But no, there are almost no prayers for sailors, only for those carried as passengers. Why? Possibly because prayer for sailors could be seen as prayers for pirates or Vikings. From her intensive reading of the Masses as compared with Old English poetry, Professor Keefer posits that, in replicating elements of these prayers, the poets found the prayers appealing and inspiring. Through her work Prof. Keefer not only explodes preconceptions, but gains valuable insight into what did and didn’t matter to a society that lived a millennium ago.



## Precious Water

Research combining archaeological and ancient documentary evidence is leading to fresh insights into the way ancient Egyptians envisioned their physical landscape and the place of water within it. Working from an abundance of well-preserved papyrus documents including agricultural contracts, military records, private letters, magical spells, and legal verdicts – as well as remains found in the landscape – ancient history and classics professor Dr. R. James Cook is unearthing new information about agricultural techniques, population size, and settlement patterns in the Fayum region of Egypt during the Graeco-Roman period (ca. 330 BC – AD 642). Proof of the importance of water in ancient Egypt: it was a capital offence to breach the bank of a canal and allow the precious water to escape. ■

## From the Global Waters to the Local Creek *continued*

between tolerant and sensitive species, we can determine the health of the water through identifying the mix of insects present. Good water quality is indicated by a healthy mixture of insects, including the sensitive species. In Oshawa, we determined that the water quality was moderately impacted, in that some sensitive species were excluded,” explains Prof. Hickie.

Comparisons between the Thornton Road campus and the Peterborough campus are ongoing and both campuses have their benefits. Prof. Hickie describes the different approach to teaching that he can take with his Oshawa students. “You deliver a course differently when you are working with 45 rather than 300 students. The scheduling differs too, in that we cover all of the material in one three-hour lecture instead of two shorter ones. This is a benefit for our mature and part-time students, who may have time-management challenges with children and jobs.”

Something Prof. Hickie has on his list for his Oshawa students is the bottled-water debate on the Oshawa Thornton Road Campus. The discussion about bottled water has been raised in class, considering both the economic and environmental cost of shipping, etc., but Prof. Hickie has decided to take it one-step further. “I know that the students at the Peterborough campus are working towards a ban of bottled water. Perhaps we should discuss that here as well,” he says. ■

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