UNIVERSITY OF SASKATCHEWAN
Global Institute for Water Security
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Water News

Fall 2015 – Issue 9

Welcome

From Howard Wheater

As 2015 comes to a close and we usher in a new year, it is a good time to reflect on the progress made by our institute and provide an update on events and activities planned for the coming months.

This year has been highly productive. GIWS members published 209 journal articles and 216 papers in conference proceedings, delivered 60 plenary, key note and invited lectures, and published 10 book chapters and books. Launched in 2011 with $30 million in base funding, our additional external funding has now topped $68 million. It is fair to say we are making our presence felt in Canada and in the international community in a big way! Congratulations to all of our faculty, researchers and students who make this possible.

This year has also seen two important new interdisciplinary graduate training initiatives. In September we launched the CREATE for Water Security program, funded in part by the Natural Sciences and Engineering Research Council of Canada, and from September 2016 we will be running the Master of Water Security – a professional masters program offered through the School of Environment and Sustainability. Thank you to Cherie Westbrook (CREATE), and Jeffrey McDonnell and Toddi Steelman (MWS) for their dedication to seeing the proposals through to this stage. Andrew Ireson is picking up the baton of directing the professional Masters program. Graduate students will now have more opportunities to receive training that not only allows them to study their specialty in depth but also examines water security challenges using a holistic, multi-disciplinary approach.

We held our third annual Distinguished Lecture Series this Fall which welcomed nine world-renowned experts in water research. Lectures are archived to the GIWS YouTube channel, so if you missed some of the great talks, there's still a chance to catch up. Lectures from past years are there as well, with many garnering thousands of views.

Hoarfrost formed on local plant life. Dec. 2015, St. Denis National Wildlife Area. Photo by Bruce Johnson, research technician.

Early in 2016 will be the deadline for the second annual GIWS Research Awards. These awards recognize outstanding member achievements in water research and advancement of U of S research activities.

The inaugural 2015 recipients were highlighted during our World Water Day celebrations last March. Dr. John Giesy was presented with the Water Security Research Excellence Award for his outstanding contributions to his field. Dr. Abdalla Karoyo received the Best Doctoral Thesis Award for the development of a new 'smart material' with the potential to significantly mitigate waterborne contaminants. I encourage all members to consider nominating an exceptional colleague or student for the 2016 awards.

Let me close by wishing you and yours a very happy holiday season and a healthy and prosperous 2016. I look forward very much to the collaborations to come during the year ahead.

Regards,
Howard Wheater
Canada Excellence Research Chair in Water Security
Director, Global Institute for Water Security

MOST facility prepares to open its doors

From left to right: Chris Gabrielli, Anna Coles, Dyan Pratt, Jeff McDonnell, Veva McDonnell and Willemijn Appels at the MOST Facility opening celebration on December 4, 2015.

The latest addition to the U of S's commitment to research is entering its final days of construction, and GIWS staff, faculty and students recently celebrated the impending unveiling of the Mine Overlay Site Testing (MOST) facility.

GIWS personnel gathered December 4th to commemorate the end of exterior construction on the MOST facility, a research station specializing in the development and commercialization of innovative mine waste cover systems. The centre, which is expected to be operational in early 2016, is the first structure of its kind in Canada.

"We're celebrating that we have the building completed, but we're not actually going to have the official ceremony yet," said Veva McDonnell, business development officer for the facility, adding that an official ceremony will take place once structures in the interior of the building have finished being installed and research officially has begun.

"We don't have all the inside of the building prepared quite yet. We're going to have a rainfall simulator, we're going to be doing a lot of things like that inside."

When mines cease operations, intricate cover systems are put in place to return the area to its natural conditions and prevent waste materials from seeping into the surrounding environment or beyond. The MOST facility is designed to save time and money by allowing researchers and mining companies to mimic the strain that will be placed on these covers on a small, controlled scale prior to their installation in the field.

"They go in and spend all this money — they put maybe membranes and soil on top, and plants — and they hope that it works. Now you might have roots that go through the membrane or animals that burrow in, making holes, and these things fail. The covers don't perform the way that they were supposed to," McDonnell said.

"We can do all of that testing in our research facility ahead of time. We can accelerate things that would happen outside in maybe ten years in one year."

Since the research taking place at the MOST facility will intersect between many areas, McDonnell said that the finished structure will present the chance for greater interaction between departments on campus.

"Here at GIWS we are mainly just water, but in our research facility we could very well be working with the soils group. We could be working with agriculture. We're going to be expanding collaboration between other research groups on campus, and I see that as a great opportunity," she said.

The MOST facility is a joint initiative between GIWS, Western Economic Diversification Canada, O'Kane Consultants, Syncrude Canada Limited and the Saskatchewan Research Council, with industry funding leveraged through the Natural Sciences and Engineering Research Council of Canada.

New faces to GIWS

Thuan Chu, PDF
Thuan's previous research used remote sensing and GIS techniques that apply to modelling natural disturbances, such as climate change and land use practices. Working alongside Karl-Erich Lindenschmidt, Thuan will apply those techniques to model river ice processes and flood risk, focusing on the study area of the Slave River and the South Saskatchewan River.

Bahareh Esfabod, data visualization specialist
As a member of the Watershed Systems Analysis and Modelling Lab, Bahareh reports to Saman Razavi. She joined GIWS in April 2015, while finishing her Masters in Computer Science from the U of S. System modelling is of particular interest to Bahareh and through her work at GIWS she hopes to apply that knowledge to have a positive impact in her community.

Dyan Pratt, research engineer
Dyan is currently completing her PhD and has joined GIWS to provide project management and engineering support for the MOST facility and for Jeffrey McDonnell's lab. She is excited for the opportunities available at GIWS to collaborate across many aspects of water security.

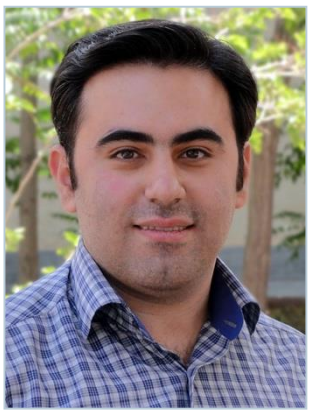
Amin Haghnegahdar, PDF
Prior to joining GIWS in June 2015, Amin was completing his PhD studies at the University of Waterloo. Supervised by Saman Razavi and as a member of the Watershed Systems Analysis and Modelling Lab, Amin is conducting research on hydrological modelling, model sensitivity and uncertainty assessment, and model calibration/validation.

HenryTye Glazebrook, Communications Coordinator
Henry is the part-time Communications Coordinator for GIWS and SENS. He graduated from the U of S with a BA in English, where he was Editor-in-Chief of its student newspaper, and spent the summer interning at The StarPhoenix. He has also done copywriting for Refresh Marketing and sits on the Canadian University Press board of directors.

Sopan Kurkute, PhD student
Following completion of his MSc in Atmospheric and Earth Sciences from York University, Sopan joined GIWS in January 2015 under the supervision of Yanping Li. He is currently studying the regional climatology of the Saskatchewan and Mackenzie River Basins using the high resolution Weather Research and Forecasting (WRF) model to assess how climate change might affect basin development and to explore the impact of climate change scenarios on water resource management.

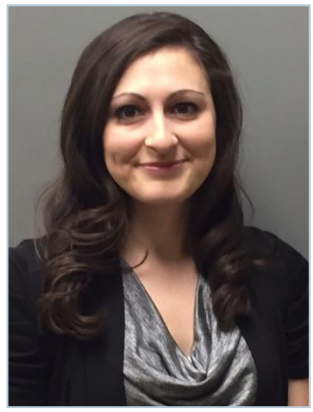
New faces to GIWS

Veva McDonnell, business development officer
Veva joins GIWS as the business development officer for the MOST facility. She holds a degree in accounting and worked for the last 21 years for a multinational corporation in a range of capacities including financial manager, controller, and regional operations controller. She is excited to work for a team of professionals who apply their knowledge to both aid industry and to protect the environment.



Razi Sheikholeslami, PhD student
Razi holds a MSc in Civil and Environmental Engineering from Amirkabir University of Technology and a BSc in Civil Engineering from the University of Tabriz, both in Iran. His PhD research, under the supervision of Saman Razavi, will examine watershed systems analysis and modelling. He was drawn to the atmosphere of interdisciplinary research taking place at GIWS.

Jeff Wong, PDF
Jeff holds a BSc and a MPhil from the Chinese University of Hong Kong and a PhD from the University of Bristol. He joined GIWS in June of 2015 under the supervision of Howard Wheater and Saman Razavi. His research supports development of large-scale hydrological models for use in Canada.



Michelle Martel-Andre, Executive Assistant, Director of Human Resources and Facilities
Michelle graduated from U of S with a degree in Sociology, has a certificate in Human Resource Management from the University of Calgary and brings with her varied career experience in business, environmental consultancy and the law.

Zhi Li, visiting professor
Professor Li has an appointment in the College of Natural Resources and Environment at Northwest Agriculture and Forest University in China. He will be with GIWS until July 2017 conducting research with Jeffrey McDonnell's watershed hydrology lab investigating groundwater recharge mechanisms based on tracer methods. He is looking forward, with some apprehension, to what he anticipates will be the coldest winter of his life.

Li Yi, visiting professor
Professor Yi joined GIWS for a one-year visit in August 2015. She is visiting from the Northwest Agriculture and Forestry University, China where she is a professor in the department of water resources and environment. During her time in Saskatoon she will be collaborating with Howard Wheater and others in GIWS on water-related research focused on climate change.

"I knew that my mathematical background would be useful in water systems modelling, but I decided to combine it with my knowledge in computer science to make a difference in the real world. ***GIWS gives me the opportunity to do something good for the community I live in.****"*

Bahareh Esfahbod, data visualization specialist, GIWS

Training future water innovators

The U of S has launched a new initiative that will see it taking a leadership role in water security graduate training.

The NSERC CREATE for Water Security program, which officially began summer 2015, is intended to steer graduate students and postdoctoral fellows toward becoming innovators in water issues both nationally and abroad.

"The program offers students enhanced training in water security issues, including policy training and social sciences, which they may not otherwise receive in a science masters or PhD program," said program coordinator Kathryn Lindsay.

Led by a $1.65 million award from the Collaborative Research and Training Experience (CREATE) program of the federal Natural Sciences and Engineering research Council (NSERC), the initiative is funded through more than $2.8 million in additional funds from GIWS and the University of Waterloo, University of Calgary, University of Manitoba, McMaster University and various industry collaborators.

"This major partnership investment will help prepare young scientists to address pressing global water security challenges such as flooding, drought and reduced water quality," said U of S vice-president of research Karen Chad. "This unique program fills a critical need for improved mentoring and training of leaders in water resource protection and underscores our university's national and international strength in water security research."

The program's faculty include GIWS members Howard Wheater, Helen Baulch, Cherie Westbrook, Jeffrey McDonnell, Bram Noble, John Pomeroy, Lee Barbour, Angela Bedard-Haughn and Ken Belcher. All will mentor students through the program, which consists of interdisciplinary courses, internships, lab exchanges and research. Other public sector agencies and industrial partners will contribute through work experiences and research collaborations. CREATE students receive full scholarships as part of the training program.

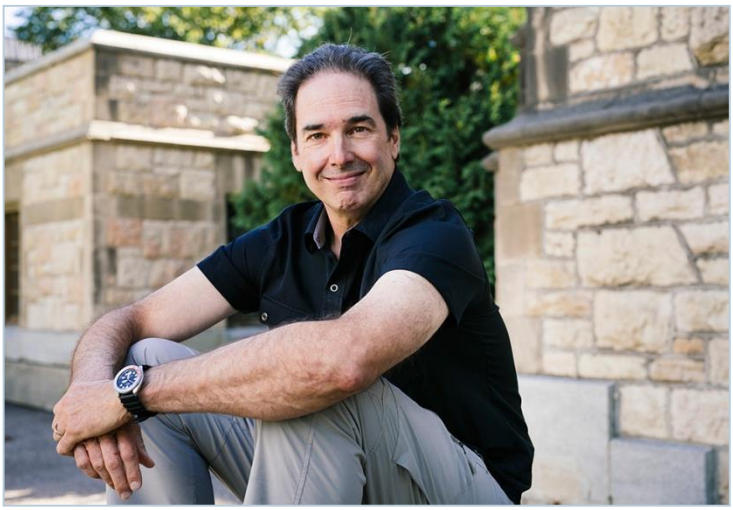
"There will be opportunities for students to gain professional training through seminars conducted by our government and private sector collaborators to better prepare them for a career in water-related industry," Lindsay said, adding that there is the opportunity for real-world experience through internships with industry partners and that funding is available on a competitive basis for travel for field work, conferences and short-courses.

"This experience may help students determine their career path and allows them the chance to network with industry and potential future employers."

There are currently 17 graduate students taking part in the program, nine at the masters level and eight pursuing a PhD, with another post-doctoral fellow slated to join in January. Approximately 15 positions are planned to be filled in 2016, though Lindsay said that more slots may be made available for exceptional cases.

For more information about the CREATE in Water Security, visit their website at www.research-groups.usask.ca/createwater.

Jeffrey McDonnell recognized for leadership and research excellence



The Global Institute for Water Security would like to congratulate associate director Jeffrey McDonnell, who has recently been honoured locally and nationally for achievement in his field.

At Fall convocation, the U of S presented McDonnell with the J.W. George Ivany Internationalization Award for his ongoing work in enhancing the visibility of the campus worldwide and inspiring students to take a global perspective in their research.

Karen Chad, vice-president of research, was on hand to present the award and highlighted how McDonnell's work has elevated the U of S on an international stage.

"As a world leader in his field, Jeff's presence opens doors between the U of S and global collaborators. Some scientists have called it a major milestone in their careers simply to work with him," Chad said.

"He is devoted to expanding the horizons of our students. Jeff's philosophy is to give Canadian students international experience and international students Canadian experience. Jeff's interdisciplinary lab is a mosaic of genders, cultural backgrounds and scientific specialties. Dozens of the world's top students in civil engineering, soil science, biology, geology, geography and geochemistry have sought out his renowned supervision. They have gone on to receive many international awards."

McDonnell's international work includes time spent as a visiting professor at various campuses across the globe, including time at Universidad Austral de Chile in 2015 and an upcoming 2016 term at University of Victoria's Institute of Geological and Nuclear Science in Wellington, New Zealand.

GIWS director Howard Wheater said that McDonnell's time with students has turned him into a mentor and inspiration for a generation of young scientists.

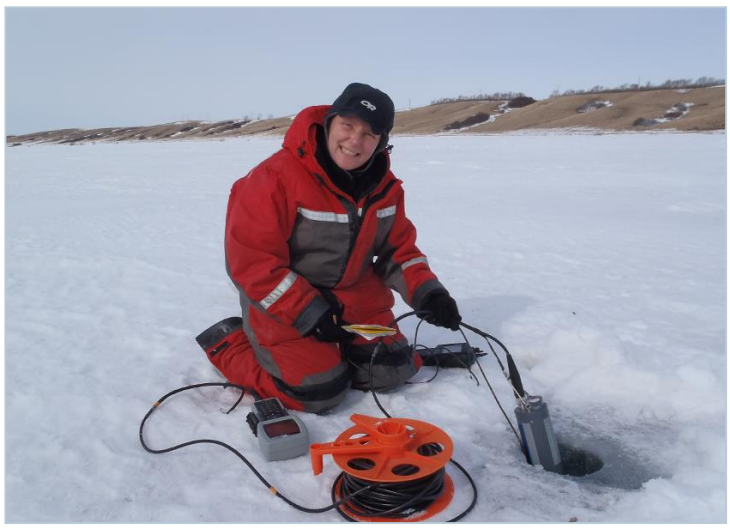
"He stresses the importance of expanding horizons for our students, and encourages them to conduct studies at his international research sites and working with partner institutions," Wheater said, counting the Distinguished Lecture Series, the new Master of Water Security degree program, and the How to Launch an Academic Career workshop among the prestigious projects that McDonnell has spearheaded during his time with GIWS.

"He places importance on mentoring and launching the research careers of his team members and ensuring they have the skills to succeed in their field."

McDonnell was esteemed further in September when he was elected as a Fellow of the Royal Society of Canada. The honour is one of the highest available in the country, and saw McDonnell join more than 2,000 other Canadian scholars, artists and scientists who have been peer-elected into the group as authorities in their area.

Congratulations to Jeffrey McDonnell for these inspiring achievements. GIWS is proud to have you as a part of the team.

Lake Diefenbaker water quality may go with the flow



Rebecca North

A team of U of S researchers studying the health of Lake Diefenbaker over the last few years has found that water flowing in from the South Saskatchewan River may be the principal factor affecting the lake's water quality.

The GIWS researchers contributed to a special issue of the *Journal of Great Lakes Research* that showed what happens upstream has the most impact on the reservoir's water quality. Of the 15 articles in the special issue, the U of S contributed 13 papers studying the physical, chemical and biological properties of Lake Diefenbaker and assessing the reservoir's susceptibility to increasing stress.

"It appears that the flow into the reservoir has the greatest impact on water quality," said Rebecca North, GIWS research associate and lead guest editor of the journal. "This could be a concern with increasing temperatures and lower water flows due to climate change."

More than half of the papers in the special issue identified changes in hydrology as a principle factor affecting water quality. While there has been public concern about the potential for declining Lake Diefenbaker water quality, especially related to surface algal blooms, the researchers found little evidence that supported this perception.

"Algal blooms do occur in a portion of the reservoir—the Qu'Appelle arm—but in the rest of the lake, blooms are generally infrequent and even less frequent than other lakes with similar nutrient concentrations," said North.

North explained that the low frequency of algal blooms may be attributed to the mixing effect of windy lake conditions and a combination of high water flows for the study period, low light penetration due to murky water and low phosphorus in the upper water column of the reservoir.

"The risk of algal blooms may be more prevalent during years of lower water flow, which we will continue studying in order to fully understand the factors affecting the water quality of Lake Diefenbaker."

North added that for Lake Diefenbaker, it is the upstream activities and precipitation patterns in the Saskatchewan River basin that primarily dictate what happens to the flow levels and the potential for algal blooms.

"Based on the data we have to date, it is not the individual activities in the lake that pose a significant risk to water quality, it's the activities and weather patterns upstream," said North. "Phosphorus input is of particular concern because under the right environmental conditions, fertilization due to phosphorus can create large-scale algal blooms."

North said the findings suggest that land-management practices and efforts to reduce nutrient input should be focused at sites upstream to Lake Diefenbaker.

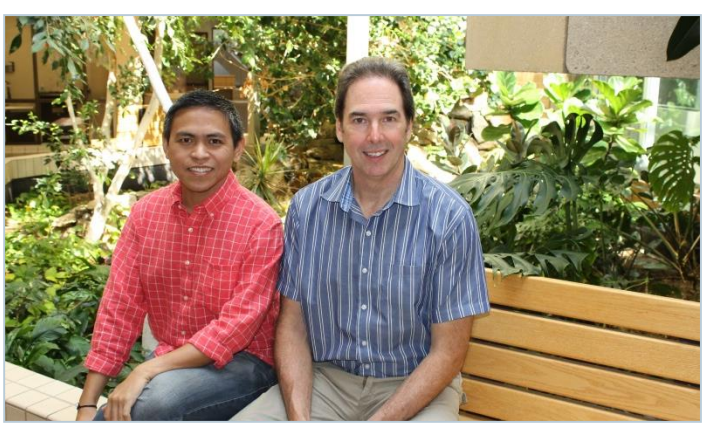
"Of all the factors influencing the lake, the water coming from the South Saskatchewan is the most important. The less nutrients in that water, the better."

The Lake Diefenbaker program represents a major research effort initiated by GIWS researchers in collaboration with the Saskatchewan Water Security Agency and scientists from the Universities of Regina, Waterloo, Minnesota and Oregon.

GIWS in the news

Select news stories from the past six months.

Helen Baulch was featured in several prominent Saskatchewan news providers as a leading expert on the water problems faced this summer by the Buffalo Pound Lake Water Treatment Plant just north of Moose Jaw. Baulch's research team has been monitoring the lake in the spring and summer months, and highlighted the potential risk of repeat algal blooms in future years, particularly with a warming climate.



PhD student Jaivime Evaristo is only in the third year of his studies, and already is making an impression in the water research world. This September, Evaristo published a paper in *Nature* that sheds new light on how water moves through soil to nourish plants, recharge water stocks and discharge in streams. His research shows that around the world, water is compartmentalized, with plants using soil water that does not contribute to groundwater recharge or stream flow. Evaristo's findings were covered in local media and also garnered interest from reporters at The Globe & Mail and The New York Times.

Howard Wheater was profiled in a Toronto Star piece on a reversal of "brain drain," a phenomenon of the 1990's which had many fearing that Canada would lose its top minds to opportunities stateside. Applauded for his Canada Excellence Research Chair position and leadership, Wheater was among 14 profiled as the country's academic elite.

This summer, Howard Wheater, Toddi Steelman, John Pomeroy and Jill Johnstone were repeatedly sought out by local and national news sources to discuss the 2015 drought and resulting wildfires that plague Western Canada as the result of a changing climate. The four focused on the weather's adverse effects on local communities, how other regions' could be studied for preparedness measures, the best strategies for handling wildfires, and the reasons the region was experiencing drought.

Water News is produced and distributed biannually (winter and fall) by the Global Institute for Water Security at the University of Saskatchewan.

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