



# Welcome

From Howard Wheeler

This month, we look forward to lengthening days, a new field season, and another productive year for the Global Institute for Water Security. The warming climate continues to surprise us – after unprecedented 2014 summer rainfall floods, we found ourselves with a January snowmelt event, and temperatures in Saskatoon warmer than the UK! It will be interesting to see how the 2015 flood season plays out.

The Fall of 2014 was as hectic as usual. We issued our annual research report (available electronically or as hard copy on request), which is an impressive summary of our members' activities, and enjoyed entertaining and learning from a host of distinguished visitors. Philippe Van Cappellen, Canada Excellence Research Chair in Ecohydrology from the University of Waterloo, joined us for a few days in September to enhance engagement between our research chairs, tour field sites and explore collaborative opportunities.

We held another successful Distinguished Lecture Series this Fall which welcomed ten world-renowned experts in water science. Lectures were simulcast for viewing around the globe and archived to the GIWS YouTube channel, so if you missed some of the great talks, there's the chance to catch up.

I would like to thank our associate director Jeffrey McDonnell for inviting each presenter, coordinating their visits, leading the student seminars and ensuring our guests enjoyed their time in Saskatoon. The annual series is invaluable for introducing an international audience to the high quality interdisciplinary water research conducted here at the U of S. Plans are now underway for this year's series.

In December, we launched three new research awards open to GIWS membership, to recognize achievements and support innovative interdisciplinary research to advance water security. Winners will be announced on World Water Day 2015.



*Ice shines under a bright winter sun, March 2014, St. Denis National Wildlife Area. Photo by Emily Cavaliere, graduate student.*

We continue to build our international presence, and at the American Geophysical Union Fall Meeting in December, GIWS members presented 48 papers and convened seven sessions. We look forward to welcoming colleagues to Canada this May for the joint AGU/Canadian Geophysical Union meeting in Montreal, and will be supporting our Toxicology Centre in hosting a major international meeting here in October.

Our publications are at the core of our international reputation, and while we are working on an automated system to keep track of members' papers, this will take a while, so please keep us up to date with your latest published work. It is very pleasing to see a major Special Issue about to come out on the GIWS Lake Diefenbaker research.

Let me close with very best wishes to all our members for a productive and enjoyable 2015.

Regards,  
Howard Wheeler

*Canada Excellence Research Chair in Water Security  
Director, Global Institute for Water Security*

# The Snow Enthusiasts

*Contributed by Sun Chun and Willemijn Appels, postdoctoral fellows in the School of Environment and Sustainability and GIWS associate members.*

Have you ever thought about how the snow depth changes outside your house over winter? For the second year in a row, a group of young scientists from the U of S are exploring the dynamics of snow conditions in the urban environment.

Every day, GIWS graduate students, postdoctoral fellows and other staff record snow depths, snowfall and snow density in the field across the road from the National Hydrology Research Centre at Innovation Place. Having received their formal training in a wide range of environmental fields and coming from all over the globe, not everyone was familiar with the characteristics of snowfall or with the issues associated with measuring snow.

As snow processes involve complex dynamics of energy and water balance, changing snow conditions data are useful information to measure environmental fluctuations. Apart from snow amounts, stable precipitation isotopes are also measured in the project to provide leading edge tracer information for understanding regional water sources. The group is not only gathering interesting data sets, the project also prompts the young scientists to explore good field monitoring practices with federal scientists and to understand values of continuous measurements.

Results that excited the team last winter were:

- the increase of spatial differences of snow depth from 1 cm at the beginning of the season to more than 15 cm right before snowmelt,
- the heterogeneity of the snowpack, with densities varying from 10 to 30% water content
- finding out that the daily snowfall amounts did not add up to the total amount measured in the snowpack by the end of winter. At all! The team has improved their measuring tools this year to reduce the amount of measured snow lost to wind and other factors.



*From left to right: Emily Cavaliere, Michael Kehoe, Patricia Pernica, Willemijn Appels and Sun Chun.*

What started as a team-building effort to pull the group through the long winter ended up sparking heated debates during lunchbreaks. Not just among the participants about how to standardize the squatting height to minimize the measurement error – snow depths are measured with rulers that are fixed to wooden posts – but, also with Environment Canada colleagues about the difficulties of getting reliable daily snowfall data from manual and automated stations.

In order to make the daily dataset more reliable and to improve their measurements of daily snowfall, a nipher gauge and wind meter were added to this year's experimental setup. A nipher gauge captures snow and has a shape like an upside down bell to reduce the amount of snow lost to wind. The snow is then weighed to estimate its water content.

Still, measuring snow is not without difficulty. Even with over 20 participants in the group, volunteers are hard to find for weekends and public holidays, especially when temperatures plummet. However, gaps in the rotating schedule are usually filled by some enthusiast, even on New Year's Day. The team hopes this campaign will reach the same level of coverage as last winter and mark the start of an office tradition.



# New faces to GIWS



## **Anna Meissner, masters student**

Anna holds a Bachelor of Arts in environmental studies from the University of Alberta. Prior to starting her Master of Environment and Sustainability in May, Anna spent time studying in Santiago de Cuba and volunteering with a wildlife rehabilitation centre in Belize. With supervisor Karl-Erich Lindenschmidt, she is using geospatial modelling in the Qu'appelle and Slave rivers to study macroinvertebrate habitats.



## **Natalie Orlowski, PDF**

Natalie joined GIWS in June to work with Jeffrey McDonnell's watershed hydrology lab studying stable water isotopes. She completed her PhD at the Justus-Liebig University in Germany studying cryogenic water extraction methods to understand runoff-generation processes in a developed landscape. She chose to study at GIWS due to the excellent high-level research staff, the well-equipped lab environment and the international working group.



## **Liang Chen, PDF**

Liang Chen was previously an assistant professor with the Institute of Atmospheric Physics, Chinese Academy of Sciences. He joined Yanping Li's research group in July and is working on the development and application of coupled regional climate models, land surface models and hydrology models.



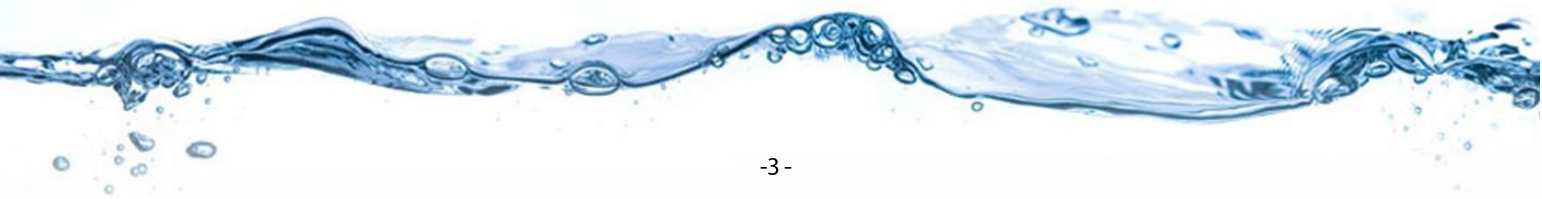
## **Gonzalo Sapriza Azuri, PDF**

Gonzalo is working with Howard Wheater on large-scale hydrological modelling of the Mackenzie River Basin as part of the Changing Cold Regions Network. He holds a PhD from the Technical University of Catalonia in Spain.



## **Julie Terry, PhD student**

Prior to joining GIWS in June, Julie was working as an Environmental Scientist for the UK Centre of Ecology and Hydrology. She is working on her PhD in environment and sustainability with Karl-Erich Lindenschmidt on water quality modelling with the Buffalo Pound Lake research team.



# New faces to GIWS



## **Laleh Moradi, research associate**

Laleh joined GIWS in November to assist with data analysis. She holds a Master of Mathematics from the University of Saskatchewan and is working with GIWS data manager Branko Zdravkovic.



## **Michael Kehoe, PDF**

Michael holds a PhD from the University of Queensland and completed a post-doctorate with the University of Amsterdam. He is studying the aquatic biogeochemistry and ecology of Buffalo Pound Lake. He was drawn to GIWS due to the Canadian reputation for producing high quality limnologists and ecologists, and for the opportunity to work with Helen Baulch.



## **Chrystal Mantyka-Pringle, PDF**

Chrystal joined GIWS in September to develop a decision theory model for examining environmental change in the Canadian River Deltas. She holds a PhD from the University of Queensland and previously worked for the Australian Government Department of Environment and Resource Management.

## **GIWS by the numbers**

*\*from the GIWS Annual Progress Report 2013 - 2014*

- 192 members in total
  - 69 members
  - 18 associate members
  - 3 affiliate members
  - 102 student members
- 209 journal articles published
- 158 papers presented
- 101 plenary, keynote and invited lectures given
- 33 book chapters published

## **Stay tuned!**



GIWS invites you to take a virtual tour around the Saskatchewan River Basin. Early 2015 will see the release of a suite of ten short videos filmed at research sites in Alberta and Saskatchewan. The release will also include a comprehensive e-book. These tools will help the institute train students and researchers about the challenges faced across the river basin and expose them to the research conducted there.



# Predicting Extreme Events



On a geographical scale, Yanping Li's research field is expansive. She deals with convective weather patterns high above us and soil moisture gradients deep below us. Li is a hydroclimatologist – a scientist that studies the moisture in the atmosphere and the water in and on the surface of the Earth. Important knowledge to have when considering whether the future brings drought or floods to a particular region.

"My goal is to get a fundamental understanding of how global warming affects the hydrological cycle and clarify the possible effects of climate change on regional water resources," said Li. "What inspires me is to help address public concerns about whether or not severe storms and flooding – such as the June 2013 floods in Alberta - are more likely to occur and become more severe in the future."

Originally from southeastern China, Li joined the Global Institute for Water Security in January 2013 as assistant professor in the School of Environment and Sustainability. She came to Saskatoon from the United States National Centre for Atmospheric Research where she still has an active research collaboration. She holds a Bachelor of Science from Sun Yat-Sen University in China where she did a double major in atmospheric science and computer science, and a masters and PhD in atmosphere, ocean and climate dynamics from Yale University.

"The U of S offers an ideal environment to grow my research program. I benefit a lot from the highly interdisciplinary environment of SENS and the exceptional concentration of expertise in water research at GIWS," explained Li. "My research group also collaborates closely and interacts actively with researchers at Environment Canada and with academic units across campus."

Over the next few years, Li's research plans are to understand the important physical mechanisms that control the initiation, frequency and severity of thunderstorms over the Prairies. Li and her research group run observational data gathered at GIWS stations throughout the Boreal Forest and Prairies through giant supercomputers specializing in climate modelling. As certain inputs are tweaked, like past precipitation and soil moisture, the group can predict how often thunderstorms may arise, and the amount of rain they may dump on the Prairies.

"With the understanding of how climate change will affect storms and extreme events, we can help communities plan their infrastructure and adapt to global warming. I hope my research will increase public enthusiasm for living more sustainably."



*From left to right: Sopan Kurkute (PhD student), Yanping Li, Lucia Scaff (PhD student), Liang Chen (postdoctoral fellow) attend meetings at the National Atmospheric Research Centre in Boulder, Colorado, January 2015.*

# Member Awards and Accolades

Jeffrey McDonnell, GIWS associate director, has been elected to serve as the President of the Hydrology Section of the American Geophysical Union. Prof. McDonnell was also elected a Fellow of the Geological Society of America.



Graham Strickert, GIWS research associate, was presented with the U of S Award for Distinction in Outreach and Public Service at Fall Convocation.

Chris Gabrielli, PhD candidate in the School of Environment and Sustainability with Jeffrey McDonnell, received the prestigious American Geophysical Union Horton Research Grant. The award recognizes the best PhD proposal in hydrology worldwide.



Saman Razavi was appointed to a Canada Excellence Research Chair faculty position in watershed modelling. GIWS welcomes Saman as assistant professor with the School of Environment and Sustainability.

John Giesy, Canada Research Chair in Environmental Toxicology was conferred with the title of Fellow of the Society for Environmental Toxicology and Chemistry at the organization's annual meeting in November.



Maureen Reed, professor in the School of Environment and Sustainability was shortlisted for a Social Sciences and Humanities Research Council Connection Award for her research focused on biosphere reserves.



Matt Lindsay, assistant professor in the department of Geological Sciences was named the Natural Sciences and Engineering Research Council-Syncrude Industrial Research Chair in Mine Closure Geochemistry.

Karsten Liber, distinguished professor and director of the Toxicology Centre, was appointed as Vice-President and future President of the Society of Environmental Toxicology and Chemistry North America.





# GIWS in the news

*Selected news stories from the past six months.*



Helen Baulch and her research team were profiled in Saskatchewan and industry media for a project that is the first of its kind to use in-lake sensor technology to inform drinking water treatment and source water protection planning in Canada. The team deployed an observatory buoy on Buffalo Pound Lake that transmits data in real-time to researchers and water treatment plant managers.



Colin Whitfield, Helen Baulch, Cherie Westbrook and Sun Chun's research paper on beaver-mediated methane emissions was featured in national and international media in December. The team found that valuable habitat area has been established by the growth in global beaver populations during the last century. While this habitat contributes to global methane emissions, the magnitude of the source is lower than many other natural sources and unlikely to be a dominant climate-change driver.

Howard Wheeler and the institute have been profiled in Saskatchewan and international media, including a multi-page article distributed throughout the Postmedia News Network in Canada in October. Dr. Wheeler also discussed the challenges to groundwater research in Saskatchewan and the institute's progress towards a groundwater research strategy for the province in *On Campus News* and *Saskatoon Express*.



John Pomeroy and the Changing Cold Regions Network were featured in Alberta media following analysis of the 2013 Calgary floods and critique of forecasting tools. Dr. Pomeroy was also featured prominently in local, national and international media following the release of a Centre for Hydrology report on flooding and wetland drainage.

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