Bringing Research to LIFE

In Brief

Heaman honoured

The Faculty of Nursing's Maureen Heaman, alongside six other researchers from different universities, was awarded a research chair in New Perspectives in Gender, Sex and Health by the Canadian Institutes of Health Research (CIHR).

The announcement was made in Vancouver on March 4 by CIHR's Institute of Gender and Health (IGH).

"The chairs have already made significant progress in their respective fields to increase the profile of gender and sex in health research," said Dr. Joy Johnson, Scientific Director of the Institute of Gender and Health.

"The chairs translate cutting-edge research into tools that can directly improve the health of Canadians, such as Dr. Heaman's research on access to prenatal care and pregnancy outcomes. Examples of her recent work include studies on inadequate prenatal care among inner-city women in the Winnipeg community and on characteristics and birth outcomes among Canadian Aboriginal women."

The program is intended for health researchers who have developed a reputation for excellence in research, and to support outstanding research programmes that enhance the health of Canadians.

Upcoming

Research Forum:

The Canadian Longitudinal Study on Aging

Monday, March 30, 2009

12:00 PM

Theatre A

Basic Medical Sciences Building

Bannatyne Campus

For more information:

Phone: (204) 474-9854

Speaker Series:

A Day in the Life of a Storm Chaser

By John Hanesiak

Wednesday, April 16, 2009

7:00 PM

Robert B. Schultz Lecture Theatre

St. John's College

For more information:

Phone: (204) 474-9020

Building a better sandbag dike

BY SEAN MOORE

How to build a sandbag dike, step one: learn how to build a sandbag dike.

"I searched high and low and couldn't find any scientific studies on sandbag behaviour, and yet they are used all over the place," civil engineer James Blatz said. "Nobody could answer a fundamental question: how tall can you build them with the design we use? So we started to look at them and we've learned a tremendous amount."

Funded by the Natural Sciences and Engineering Council of Canada (NSERC), Blatz and master's student Ray Offman have studied sandbag dike performance under various conditions, from how they fare against waves to how they do when sitting on grass or snow covered surfaces.

As of press time, the City was indicating approximately 300 Winnipeg homes would require sandbag dikes to protect against the impeding flood water. But the dike-building blueprint the city has historically given to the public is not always appropriate, Blatz's lab has found.

So the city has adopted their findings, one of which notes that the City's old design is effective only up to five feet when built by the public (who build dikes like everyday folk, unlike engineers). Above five feet, the quality of constructions becomes increasingly important so trained supervisors need to watch over things.

Offman also found sandbag dikes perform worse when standing atop snow so, ideally, as much snow as possible should be removed before construction.

The lab also noticed that a dike shrinks when it comes into contact with water; an obvious finding perhaps, but nevertheless a previously unrecorded one. This happens because the woven plastic bags allow water in, which makes the sand wet and denser, so the structure drops in height. Knowing this, they re-wrote the rule of thumb: don't add an arbitrary two feet above the suspected water crest, rather take the dike's height and add five per cent.

Photo by Sean Moore

Civil engineers Ray Offman (left) and James Blatz study the performance of sandbag dikes. To help monitor dikes, Blatz developed a sensor that can be placed in the bags.

What is more, when Offman subjected the dikes to wave tests to observe their stability he saw, as the first wave hit, a sand plume form in front of the structure. The bags and water were cleaned beforehand, so the sand was being pulled out of the bags thus weakening them.

In most sandbag dikes, a polypropylene sheet stretches behind these frontline bags, holding the water back. If these bags weaken too much, the plastic can become exposed and the water can pull it out, breaking the dike.

One solution Offman has tested as a proof-of-concept is a new, unwoven sandbag that stands up better to the pushing and pulling forces of waves and currents. He hopes to test it further.

Sandbag dikes are inherently risky, but one way to reduce that risk is monitor them. Dikes are currently monitored for weaknesses by people who walk atop them. This is not ideal as problems begin as miniscule structural changes that can go overlooked. Or, the dike can move between examinations.

"The point is you don't have a continuous monitoring system that tells you what's going on. That's what this is for," Blatz said pointing at a grey rubber box that's slightly larger than a hockey puck. Working with the Technology Transfer Office (TTO), he has applied for a patent.

You can toss the sensors into the dike every so often and they provide continuous, wireless, feedback on the dike's performance, allowing preventative action if a dike were to start failing.

Solving an aquatic mystery

BY SEAN MOORE

Western Canada has the highest concentration of saline lakes found anywhere in the world, but all is not well on this spangling landscape. Of the millions of lakes, some are disappearing, some are flooding, and some are turning climate history on its head.

"Most of us would say 'so what?' to this," geological sciences' Bill Last said. "But these lakes are saline and they're in closed basins so think of them as bathtubs; if you fill one up it will spill into another lake that may not be saline or it may have a different salinity. So you're affecting the ecological system. You're affecting fisheries. And you're affecting recreational uses."

So why are some lakes getting shallower, while others have a trend towards rising?

"It can't be just climate change's doing because how can you possibly have a situation where some rise and some fall if it's all climate related. So that's what got us started on this project."

Last has been studying Prairie lakes since the 1980s, but in 2008 he launched a study called Disappearing and Flooding Prairie Lakes: Solving an Aquatic Whodunnit. The two main suspects are humans and nature, and they could be in cahoots with each other.

The study examines Manitou Lake in western Saskatchewan and Antelope Lake in southern Saskatchewan, both of which are receding. And Waldsea and Deadmoose lakes, brimming lakes in south-central Saskatchewan.

These lakes were chosen because of their limnology and readily-available historical records. Even so, though, the data are based on only a few cores and some records that are only 150-odd years old. Enter the snitch.

Detectives love informants and Last has a remarkable set: stromatolites, mounds formed in shallow water by algae and microbes. Their mineralogy and stable isotope composition tells Last the history of the lake's chemistry and water levels in fine detail.

Here's the catch, the ones they've found contain ikaite, a rare mineral that can only form in water 0 C and cooler; it is usually found only in saline Arctic environments, but Last and Fawn Ginn, a PhD student, were the first to report ikiate in the Prairies. What this means is it was colder – at least in the Manitou lake area – 2,000 years ago than previous paleoclimate analyses suggests.

"The implications of this are over my head," Last said. "Everything we know suggests the temperature in Western Canada was generally consistent. To see this cold water phase that lasted 500 to 600 years was a big surprise. I haven't wrapped my mind around it yet from a hydrological standpoint. But from a global change standpoint, I think it means we have to start thinking about rapid climate change potentially affecting the Prairies."

Adding to the mystery of all this: why do these stromatolites form in only a few Prairie lakes and not others with similar chemistries and limnology? Last and Ginn do not yet know.

Nevertheless, the stromatolites, by revealing history, are revealing clues in this whodunnit. Right now, Last suspects a lot of could-be culprits, from industry pulling water out of basins, to farmers draining swamps into lakes, to groundwater seeping in or out of basins.

"Whatever it is though, we'll find the culprit."

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