Institute for Catastrophic Loss Reduction

CATtales

e-newsletter of the Institute for Catastrophic Loss Reduction

Volume 10, Issue 1
January/February 2016

IRDR ICoE
Integrated Research on Disaster Risk International Centre of Excellence

Inside this issue

PEI municipalities developing new subdivisions required to use new climate change tool

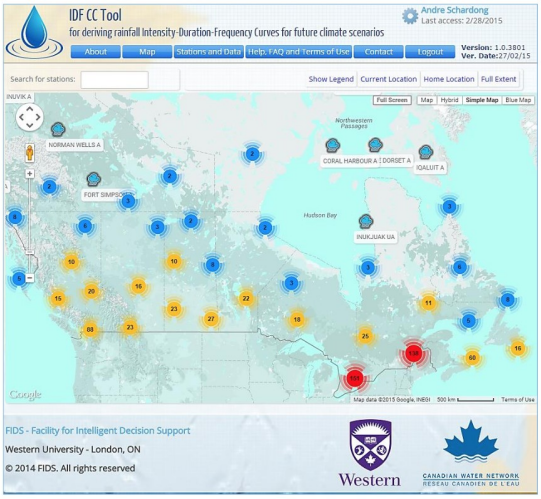
All municipalities in Prince Edward Island (PEI) developing new subdivisions will now be required to use a specific web-based tool for incorporating climate change as part of their design and site evaluation processes.

The climate change tool was created by professor Slobodan P. Simonovic at Western University in London, Ont. Simonovic is also director of engineering studies at the Institute for Catastrophic Loss Reduction (ICLR), which has offices in Toronto and at the university.

PEI's Department of Communities, Land and Environment and the Department of Transportation, Infrastructure and Energy informed Simonovic and his collaborators at the Canadian Water Network (CWN) of the decision to use the tool last week, said information from the university. The research and development team included Simonovic; Roshan Srivastav and Andre Schardong, post-doctoral fellows at the university; and Dan Sandink, manager of resilient communities & research at ICLR. Partners include the ICLR and the Insurance Bureau of Canada.

Last year, Simonovic, a professor in Western University's Department of Civil and Environmental Engineering, completed a project funded by CWN and titled, *A Web-Based Intensity-Duration-Frequency Tool to Update and Adapt Local Extreme Rainfall Statistics to Climate Change*. Already, more than 400 registered users, including municipalities, governments, consultants and academics, have subscribed, the university reported.

The web-based user tool assesses potential shifts in extreme rainfall at the local level using a combination of global climate modelling outputs and locally observed weather data. Global climate models are used to capture a range of potential changes in climatic conditions. The tool uses multiple climate change scenarios, representing the range of possible future climate conditions for each potential development. ►



PEI municipalities required to use new climate change tool *cont...*

The tool also integrates a user interface with a GIS (Geographic Information System). By creating or selecting a rain station, the user is able to carry out statistical analysis on historical data, as well as generate and verify possible future change based on a methodology using a combination of global climate modelling outputs and locally observed weather data.

Information from the university noted that municipal water management in Canada is heavily dependent on the use of intensity-duration-frequency (IDF) curves in planning, design and operation of municipal water infrastructure. As well, many watershed management activities rely on the use of IDF curves, including those related to water supply, water quality management and flood control.

"While there is a need in almost every Canadian municipality to adapt to changing climatic conditions, there is a lack of necessary expertise within municipalities for implementing current research related to the impact of climatic change on IDF curves," the information said. "The developers and supporting agencies believe that a freely available, computerized IDF update tool will aid in the selection of effective climate change adaptation options at the local level, advancing the decision making capabilities of municipalities, watershed management authorities and other key stakeholders. The tool will also provide a direct link between Canadian municipalities and the research community, creating opportunities for further research and innovation."

Dr. Slobodan Simonovic, Professor of Civil and Environmental Engineering, Western University and Director of Engineering Studies at ICLR.

PEI's use of the tool, Simonovic concluded, is "great recognition for our work and emphatic confirmation of the practical impact of this tool that will be shaping development in Canada for years to come." **CT**

Second National Wildfire Community Preparedness Day in Canada launched

Building upon the success of the inaugural event in 2015, the second National Wildfire Community Preparedness Day in Canada will be held on May 7, 2016.

During Wildfire Community Preparedness Day, communities across Canada are encouraged to participate in local mitigation projects to help reduce the risk of wildfire damage to their homes and neighbourhoods

The announcement was made on January 25 by Partners in Protection/FireSmart Canada, in collaboration with the National Fire Protection Association (NFPA), the Institute for Catastrophic Loss Reduction (ICLR) and The Co-operators.

During Wildfire Community Preparedness Day, communities across Canada are encouraged to participate in local mitigation projects to help reduce the risk of wildfire damage to their homes and neighbourhoods. As well, groups and individuals are encouraged to apply for funding to support local events to be held on May 7.

Up to 30 projects will be sponsored. Project ideas could include things such as clearing leaves, pine needles and combustible debris from the roofs and gutters of neighbourhood homes, developing a phone/text tree that can be used for fire evacuation alerts or working with local emergency management authorities to develop and practice a neighbourhood evacuation plan.

Paul Kovacs, executive director of the ICLR, the centre of excellence for disaster loss prevention research and education, noted that "many of the steps that homeowners can take to protect their homes and neighbourhoods from wildfire require nothing more than a small amount of funding, access to the right information and a little bit of elbow grease."

A list of contest rules and project ideas for National Wildfire Community Preparedness Day can be found at www.firesmartcanada.ca. **CT**

Let's shake things up

By Veronica Scotti, President and CEO, Canada, Swiss Re

"It's not that bad," or "it's not my responsibility."

There's a reason I started this article with those statements. If someone said those things to me - regardless of the circumstances - I'd say they have their head in the sand and prefer not to face reality.

That's precisely the sentiment - spoken and unspoken - many have towards earthquakes. Otherwise, why would only 4% of residential dwellings in Montreal and 60% of dwellings in Vancouver be insured against earthquake? It stems from a feeling people have that "the big one" won't happen even though they live in an active seismic zone, or if it does, the government will pay them to rebuild.

In the last few days of 2015 a magnitude 4.7 quake struck about 20 kilometres north of Victoria and while thankfully no one was hurt and there was no damage it got me thinking about Canada's property insurance gap - a difference of about $2.1 billion between insured losses and economic losses, assuming an average catastrophe loss year.

Putting that in the context of an earthquake, the Insurance Bureau of Canada (IBC) estimates the overall costs from a 9.0-magnitude quake in British Columbia at nearly $75 billion. A 7.1-magnitude quake in the Quebec City-Montreal-Ottawa corridor would cause an estimated $61 billion in economic losses. Clearly, insurance coverage in-force would be inadequate to foot that bill.

But insurance is only part of the issue. Rather than point fingers (or throw our hands up in the air) we need to recommit ourselves to what I call "communal resilience." I recently participated in 6th Annual National Roundtable on Disaster Risk Reduction in Calgary, where officials from emergency management, public safety, research and finance discussed how to construct a "whole of society" approach to managing risks and consequences of disasters.

This approach is based on three pillars of resilience: physical, social and economic. The stakeholders come from local and national government as well as the private sector and each must play its role in upholding those pillars:

- Physical: enacting risk mitigation strategies, building codes and investing in infrastructure

- Social: ensuring that vulnerable populations are appropriately cared for; also an acculturation of sorts, where citizens take responsibility for and invest in the soundness of their property and personal safety

- Economic, because where our physical resilience ends, our financial resilience must begin.

Canadians are proud of their natural resources and I share that love of and sense of stewardship for not only this country's natural beauty but its utility to society. Likewise, we shouldn't ignore our man-made, physical assets. They too are precious. And as a nation we must take the threat of earthquakes seriously in order to protect those assets: the places where we work, where our children attend school, where we shop and enjoy cultural and recreational activities and maybe most importantly, the places where we live.

We won't get to a state of resilience until we recognize that earthquake preparedness in all its forms is a collective responsibility. **CT**

Flood governance in Canada: Who's minding the store?

By Glenn McGillivray, Managing Director, ICLR

A recent article published in The Guardian about flood governance in the UK got me thinking about the issue here at home. And while I wouldn't go as far as that article and call the oversight and management of flood in Canada a mess, I would say that the diverse, multi-tiered, sometimes almost ad-hoc nature of flood management and oversight in Canada is problematic on at least a couple of fronts.

First, consider the number of ministries, agencies, departments, authorities, councils and so on that are responsible for managing flood in many provinces.

Take Ontario for instance. Depending on location and type of event being considered (eg. fluvial or riverine vs. pluvial or urban), flood in the province is managed by no fewer than 36 conservation authorities (with the addition of Conservation Ontario as an umbrella organization), the provincial Ministry of Natural Resources, and a total of 444 municipalities of the upper, lower and two-tier variety. One must also consider the federal government, which is responsible for some waterways in the province (such as the Trent -Severn, Rideau Canal and St. Lawrence Seaway) as well as floodplain mapping in First Nations/Aboriginal communities. On top of this, one must also include the owners of private flood management infrastructure, of which there are a surprisingly large number.

Across the rest of Canada, there is a similar dog's breakfast of provincial ministries, federal, provincial and municipal agencies and departments, basin and watershed planning and advisory councils and private flood management infrastructure owners, with all having varying levels of (sometimes contrasting and conflicting) responsibilities and authority. (Against this backdrop, a comparatively simple task like collecting all existing flood maps in the country and putting them in one place becomes very complex and time consuming.)

Beginning with the big picture, in many jurisdictions in Canada there is little or no coordination between those responsible for riverine flooding, municipal storm water management, and groundwater monitoring. And while there are sound reasons why these areas have largely worked independently from each other over the decades, there are a growing number of reasons why the three need to work together more often going forward (particularly as our understanding of flood is improved and the interconnections between riverine flooding, storm water management and groundwater monitoring are better understood and appreciated).

Along with the macro side of the silo issue is the problem of silos within silos.

In most jurisdictions (federal, provincial, municipal and watershed) there is no single person and no single agency or department that is in charge of flood. What's more, within larger entities, there are separate departments or groups that deal with flood mapping, hydrology and flood modelling, flood defense, conservation and disaster assistance.

The long and short of it is that players in the flood arena in each province often aren't talking amongst themselves. And, for the most part, they aren't really talking to the federal government about flood, either.

On this second point, at least part of the problem lies with the winding-down of the federal Flood Damage Reduction Program (FDRP) some years ago. This leads us to the second major issue with flood management/oversight in Canada.

According to an archived webpage on the Ministry of Environment and Climate Change Canada's website, the FDRP "…represented a significant change in approach from an ad hoc structural response to flooding to a more comprehensive approach focusing on prevention and non-structural measures. It was also more equitable."

And while the FDRP was not a coordinating body per se, it was a standards setting and cost sharing program, which acted as a coordinating body – at least for the purposes of setting minimum national standards for flood plain mapping and for homogenizing approaches to disaster assistance. The FDRP played an important role in getting the provinces and the federal government largely on the same page regarding flood mapping, flood defence, flood risk reduction, and disaster assistance.

Alas, the program was wound down in the late 1990s.

So, in nutshell, flood management and governance in Canada is plagued by (at least) two major issues.

First, flood is the responsibility of a patchwork quilt of entities that not only have a hard time communicating and coordinating between themselves, but often have a hard time communicating and coordinating within themselves.

Second, the winding down of the FDRP has almost completely put an end to provincial/federal discussions and coordination related to flood management. Much of the only remaining communication that takes place deals with the application for and payment of disaster assistance from Ottawa to the provinces via the Disaster Financial Assistance ►

Sewer backup: Blaming infrastructure for the wrong reason

By Glenn McGillivray, Managing Director, ICLR

When sanitary sewers back up into basements, the knee-jerk reaction by homeowners (and many insurers) is to blame the state of the local public infrastructure. Homeowners will almost always point the finger at their local government, even before they know the real cause of the backup.

But while it may not be wrong to blame public infrastructure for sanitary sewer surcharge (assuming that the backup wasn't due to a problem on the private lot, as it so often is), it is commonplace to misattribute the cause as being one of pipes that are too small to handle the load (though, in a manner of speaking, this is partly right).

Critics often call for larger sanitary pipes, but this is largely a red herring.

It is not that the pipe is too small (chances are it was sized properly for the amount of sanitary sewage that was expected to go through it), the problem is that the pipe wasn't designed to handle sewage plus the large amount of extraneous storm and ground water that makes its way into it from various sources.

The issue is one of Inflow and Infiltration, what those in the trade call 'I&I'.

According to Dr. Ted Kesik, Professor, John H. Daniels School of Architecture, University of Toronto, in the ICLR study *Best practices guide: Management of inflow and infiltration in new urban developments*: "In the simplest terms, inflow involves the entry of storm water from rainfall and snowmelt events entering the sanitary sewer system directly from the surface or indirectly from storm water drainage system connections to sanitary sewers. Infiltration involves the entry of groundwater into the buried sanitary sewer system."

On the inflow side, extraneous water entering into the sanitary system can be sourced from downspouts, foundation drains and sump systems that are connected directly into the sanitary system (practices that are largely no longer allowed in Canada); leaky manhole covers or covers with grated tops or pick axe holes; and accidental and intentional cross connections between storm sewers and sanitary sewers, to name a few.

Infiltration into the sanitary occurs when water enters via defective pipes; leaky pipe joints; poor connections between sewer system components; and damaged, deteriorated or defective maintenance holes.

Sanitary sewer systems just aren't designed to handle the extra load caused by extraneous water entering the system, and designing them to do so would add significant costs from at least two fronts. First, there would be the cost of installing higher capacity pipes and second, there would be the cost of processing the extra amount of sanitary water entering water treatment plants (which, over the long run, would likely be the bigger number of the two, as extra processing capacity would likely have to be added to these facilities).

Most underground storm sewer systems in Canada were designed to handle 2 year, 5 year and, sometimes, 10 year events (i.e. events whose probability of occurring are 1 in 2, 1 in 5 and 1 in 10 in any given year, respectively). In some (fairly rare) cases, a few municipalities are replacing old underground systems with new infrastructure that can handle 1 in 100 year events (Toronto is a prime example).

Sanitary sewer systems, on the other hand, are not built with a return period in mind but, instead, are designed according to actual or projected numbers of users connected into the system as well as other considerations, including a small amount of I&I.

The trouble is, many sanitary sewer systems are experiencing I&I that is well above this allowable limit.

Says Kesik: "Ideally, a sanitary sewer system would only convey sewage from connected laterals to the sewage treatment facilities and no external sources of water would inflow or infiltrate the wastewater conveyance network. In reality, a certain amount of I&I is unavoidable due to factors such as: 1) local climate, soil and groundwater conditions; 2) imperfect design, materials and workmanship; 3) the settlement and deterioration of piping, connections and maintenance holes; and 4) the connection of storm water and foundation drainage sources to the sanitary system, unintentional and otherwise. Put simply, it is not practically possible to maintain a perfectly watertight sanitary sewer system over its life cycle."

The good news is that "many jurisdictions have demonstrated it is possible to cost effectively manage I&I within acceptable limits."

One of the key issues (and something that ICLR is working diligently to change) is the lack of best practices for I&I management in new developments. With such best practices in place, "municipalities will be able to direct scarce resources toward the remediation of I&I in older existing developments to better manage assets."

To this end, ICLR commissioned the above-noted study, which was published in February 2015. Later this year or early next, the latest ICLR commissioned research will be completed that will look ►

Flood governance in Canada *cont...*

Arrangements.

Both of these shortfalls need to be addressed in order for the country to be able to move forward with a well coordinated approach that looks at flood holistically.

To address the first problem, each province is best advised to take what is essentially an enterprise risk management approach to flood, perhaps starting with the establishment of a directorate or centre that would serve as a central hub or one-stop-shop for riverine flood management and oversight (though including urban flooding in such a body would likely not be feasible due to its multifarious nature). At least then, when the federal government, (re)insurance industry or other body needs to approach a given province on the issue of flood, they would know where to start.

Next, the federal government may wish to seriously consider re-establishment of a FDRP to restore flood-related communication and coordination, standard-setting, and cost-sharing with the provinces. While the new National Disaster Mitigation Program (NDMP) could fill gaps left by the now defunct FDRP, it remains to be seen whether the NDMP will play the same roll and have the same reach as the FDRP. If it does, it is welcomed. If not, the federal government may consider forming a singular, flood-focused entity – staffed by flood experts – to aid in the creation of a holistic, risk management-based national flood management program for the country.

Currently, each of the parts do a very good job of managing and governing flood in their respective areas of operation. But the parts currently do not make add up to what's needed for an effective whole.

It is largely a matter of building the proper institutions to facilitate better communication, coordination and cost-sharing.

Build it and they will come. **CT**

Sewer backup: Blaming infrastructure *cont...*

deeper into the area of reducing the risk of urban flooding through application of measures at the time of construction of urban subdivisions. Part one of this work will identify practical measures municipalities and developers can apply to reduce the risk of I&I over the service life of subdivisions, and part two will identify progressive measures that can be applied to manage storm water in urban subdivisions.

Parallel to these efforts, ICLR will continue to work with its insurance industry members (through the Institute's Insurance Advisory Committee) and municipal government contacts to inform homeowners of the actions they can take to 1) reduce the amount of extraneous water they are directing into the sanitary sewer system via connected downspouts, foundation drains and sump systems (this is key because, as Kesik notes, it is commonly reported that most I&I problems originate from the private side of the sewer system), and 2) protect their homes from sewer back up and basement flooding through the implementation of risk reduction measures.

I&I in sanitary sewer systems is large scale problem that is costing Canadian homeowners, municipalities and insurers a great deal of money. Alongside the overt, widely experienced problem of sanitary sewer backup into homes comes the expense associated with the processing of extra sanitary sewer flows in water treatment facilities (a large cost being absorbed by ratepayers).

As noted by Kesik: "In many ways, inflow and infiltration in new sanitary sewer systems are a barometer of the quality, care and stewardship underlying the municipality, its system of governance, the community's planning vision and its infrastructure engineering excellence. What can be said about a 21st century civilization that cannot properly design, construct and sustain its vital infrastructure? Hopefully, it is a question that should not have to be answered by future generations of Canadians."

The problem of I&I must be understood by all it touches, and addressed. **CT**

Institute for Catastrophic Loss Reduction

20 Richmond Street East
Suite 210
Toronto, Ontario
M5C 2R9
Tel: (416) 364-8677
Fax: (416) 364-5889
www.iclr.org
www.basementfloodreduction.com

Mission
To reduce the loss of life and property caused by severe weather and earthquakes through the identification and support of sustained actions that improve society's capacity to adapt to, anticipate, mitigate, withstand and recover from natural disasters.

Western University
Boundary Layer Wind Tunnel
1151 Richmond Street
London, Ontario
N6G 5B9
Tel: (519) 661-3338
Fax: (519) 661-3339
www.iclr.org
www.basementfloodreduction.com