Cat tales

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RAC I & II: Program measures In Support Of the Government's Clean Air Agenda

In December 2007, the Government of Canada announced a federal investment of $85.9 million under the Clean Air Agenda for programming to help Canadians adapt to the impacts of climate change on health, infrastructure and communities. This investment included $30 million for Natural Resources Canada (NRCan) to establish Regional Adaptation Collaboratives (RACs) through its Climate Change Impacts and Adaptation Division. The program ended in March, 2012.

The RACs program was designed to recognize the need for a regional approach to adaptation and the considerable groundwork of adaptation knowledge and expertise that exists among Canadian government and non-government decision-makers and technical experts. Specifically, the program is a collaboration between the federal government and the provinces and territories, and it engages local governments, communities, business, academia, Aboriginal and non-governmental organizations, and others who are recognized as playing a role in adaptation.

Six RACs were established, in British Columbia, the Prairies, Ontario, Quebec, Atlantic Canada, and the North. While five of them include some form of water management (the exception being the Northern RAC), each has additional priorities. British Columbia also focuses on forest and fisheries management and community adaptation, the Prairie RAC on drought and forest and grassland ecosystems, Ontario on extreme weather risk management and community development planning, Quebec on the built environment, forestry, agriculture, tourism and recreation, Atlantic Canada on community planning for flood and coastal areas and enhancing capacity of practitioners, and the North on assessment of the vulnerability of Nunavut's mining sector to climate change and documentation of good environmental practices for exploration and mining.

Initiatives under the RACs address targeted climate change issues that were identified through *Impacts to Adaptation: Canada in a Changing Climate 2007,* a report produced by NRCan which reflects scientific advances in understanding Canada's vulnerability to climate change during the past decade.

Key conclusions arising from this Canada-wide assessment of climate change impacts and adaptation include the following:

- The impacts of a changing climate are already evident in every region of Canada;
- Climate change will exacerbate many of the current climate risks, while presenting new risks and opportunities with significant implications for communities, infrastructure and ecosystems. ►

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- Impacts of recent extreme weather events highlight the vulnerability of Canadian communities and critical infrastructure to climate change;
- Climate change impacts elsewhere in the world, and adaptation measures taken to address them, will impact Canadian consumers, the competitiveness of some Canadian business sectors, and Canadian activities related to international development, aid and peace keeping;
- Adaptive capacity in Canada is generally high, but it is unevenly dispersed between regions and within populations;
- Some adaptation is occurring in Canada, both in response to, and in anticipation of, climate change impacts;
- Integrating climate change into existing planning processes using risk management approaches is an effective approach to adaptation;
- Barriers to adaptation action need to be addressed, including limitations in awareness and availability of information and tools;
- Although further research will help reduce uncertainties and address specific knowledge gaps and adaptation planning needs, in most cases existing knowledge is sufficient to begin undertaking adaptation activities.

More detailed information on the RACs can be accessed at the NRCan website, http://adaptation.nrcan.gc.ca/collab/index_e.php

ICLR has been fortunate enough to be included in both RAC I and RAC II. NRCan employed a two-stage process to select its RAC partners. First, ICLR was required to submit a letter of interest that outlined the intended focus of the study (i.e., the specific climate adaptation issues to be addressed and how the project would build on previous work), ICLR's role in the study, a brief description of specific activities, and the total funding requirement to complete the project. Second, on the recommendation of a review committee that screened each letter of interest, ICLR was invited to submit a full proposal that provided more detail on the project deliverables, including a description of individual tasks included in the project, the proposed budget for each task, a detailed timeline to complete each task, and a list of project participants.

RAC I

Under RAC I, *Increasing Building Resilience*, ICLR carried out a more than two-year project to provide information in support of future updates to the National and Ontario Building Codes; improve communication and exchange of ideas between ICLR and the building community, building code designers, and code enforcement; and develop materials to inform homeowners of actions they can take to protect their homes from the risk of more frequent and severe natural disasters due to urban flooding, wildfire, severe wind, and snow storms.

As a result of RAC I, ICLR produced a *Best Practice Guide* for new homebuilders; established a dialogue with homebuilders, building code officials and other stakeholders to encourage adoption of these best practices in Ontario; and crafted homeowner guides in both official languages for basement flooding, wildfire, severe wind, and snow and ice. ICLR also worked with Western University to make three submissions to improve the Ontario Building Code, including a requirement for sewer back-up valves in all new homes, a requirement to use hurricane straps in garages in new homes, and a requirement to place nails every six inches (instead of every twelve inches) for roof panels on new homes.

RAC II

Under RAC II, ICLR undertook three additional projects—

- Adapting Building Codes to Increase Resilience to Severe Weather;
- Involving Homeowners in Urban Flood Risk Reduction, and;
- Protecting Homes from Wildfire in a Changing Climate

The first project, *Adapting Building Codes to Increase Resilience to Severe Weather*, involved holding workshops in Toronto, Halifax, Montreal, Edmonton and Vancouver in January and early February 2012. The goals were to explore the link between climate adaptation and building practices among key homebuilding stakeholders and to identify regional climate and extreme weather challenges to building more resilient homes. For many participants the workshops represented their first formal engagement with other stakeholders to discuss climate change and climate adaptation. What emerged was a sense that Canadians from all regions are experiencing severe weather challenges, but that ►

these challenges are distinct and necessitate different infrastructure priorities and provincial building code adjustments. At a macro level, findings suggest that stakeholders wish to chart a path that will help them engage in a deep and ongoing dialogue with each other about resiliency, that they support more research on severe weather impacts on building design, and that they are willing to take the time necessary to 'get it right' in terms of adopting new building practices that are achievable and make people safer in their homes. From the workshops ICLR crafted a preliminary report that describes major findings, and a final report that charts a plan forward in adapting building practices to severe weather of the future.

The second project, *Involving Homeowners in Urban Flood Risk Reduction*, created a website and five web-based videos for use by municipalities, insurers and other stakeholders to communicate with homeowners about urban flood reduction actions. Specific video topics include why basements flood, reducing basement flooding through lot grading, reducing infiltration flooding and overland flood entry points, plumbing measures for basement flood reduction, and homeowners taking action to reduce the risk of basement flooding. Also included in the website are six unique animations to show how overland flooding, infiltration flooding, and sewer back up can occur, as well as a web quiz, which is an interactive version of the risk evaluation form included in the basement flood reduction booklet that was produced as part of RAC I. ICLR will continue to work with municipalities and insurers to customize the website and videos to ensure they can be applied effectively in specific urban areas across Canada.

For the third project, *Protecting Homes from Wildfire in a Changing Climate*, ICLR joined with *Partners in Protection* to host a full-day national workshop in Toronto on March 20, 2012. The 77 attendees included provincial and municipal officials, building association representatives, insurance industry professionals, scientists, fire managers, and the Canadian Forest Service. The workshop explored current knowledge about the expected impact of climate change on wildfire risk and identified best homeowner and community practices and approaches to reduce the risk of loss from wildfire, including how these practices may need to change to accommodate climate change. From the workshop ICLR created a preliminary report that describes major findings, and a final report outlining a national program that integrates regional best practices for addressing climate adaptation challenges.

ICLR is grateful to NRCan for making this multi-year funding commitment to support initiatives that will help to inform homeowners about climate-related risks and develop a greater understanding of best practices to mitigate some of the risks. As the lessons learned from all of the RAC projects are shared among adaptation networks, Canadians in all regions of the country will be better prepared to manage the impacts of climate change.

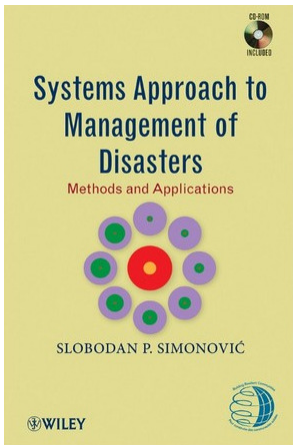
ICLR published textbook translated into Chinese

Western University Professor Slobodan Simonovic's book *"Systems Approach to Management of Disasters: Methods and Applications"* published by John Wiley in 2011 with the support of ICLR will soon be available in Chinese.

The text is currently being translated by researchers from the School of Economics and Management, Tongji University in Shanghai, with support from the National Natural Science Foundation of China as a major part of the project entitled "Study of Unconventional Emergency Management." The book will be published by China Science Publishing and Media Limited and launch is planned for November.

The Chinese version of the book will be used as a key text for college students across China. Professor Simonovic will visit Tongji University, attend the book launching ceremony and deliver a special lecture during the visit.

Publication of the ICLR book in Chinese will open the door for future collaboration between the research team of Professor Simonovic and Tongji University, on the new large-scale research project aimed at restructuring Emergency Management in China, with a particular focus on the use of systems approach.



ICLR retrofits Moncton home to reduce the risk of basement flooding

On May 16, the Institute for Catastrophic Loss Reduction (ICLR), with support from the City of Moncton, retrofitted a Moncton home to reduce the risk of basement flooding.

Approximately 160 homes experienced basement flooding in the Moncton area during an intense rainfall event associated with tropical storm Danny in late August 2009. However, Moncton is not alone in experiencing basement flooding, as many cities across Canada have been impacted by significant urban flooding events over the past few years.

"Basement flooding, caused by overland water flows, infiltration and sewer backup, is a major concern for many urban municipalities in Canada," says Dan Sandink, ICLR's Manager of Resilient Communities & Research. "With the increase in the frequency and intensity of rainfall events, along with urbanization and aging infrastructure, more homeowners are experiencing basement flooding. What's more, the proliferation of finished basements means that individual damage figures can be quite high. Effective management of flood risks requires investment and upgrading of municipal sewer infrastructure -- along with educated homeowners who take action to prevent flooding. Protecting properties from flooding is a shared responsibility .This retrofit demonstrates a number of ways that property owners can help guard against it."

"We are pleased ICLR chose a home in Moncton to showcase what homeowners can do to reduce their risk of experiencing flood damage," said Jack MacDonald, General Manager of Engineering and Environmental Services with the City of Moncton. "As our climate continues to change it is now more important than ever, for homeowners to take the shared responsibility of flood prevention and focus on reducing the risk of basement flooding. We encourage all homeowners to install a backwater valve in their home—this is one of the best ways to reduce the risk of flooding."

The subject house after severe rainfall from tropical storm Danny, August 2009

For over a year now, the City of Moncton has had a Backwater Valve Incentive Program, assisting homeowners in reducing their risk of basement flooding from sewer backup. The Backwater Valve Incentive Program provides a $500 rebate towards the installation of an approved backwater valve. In order to qualify for the rebate, all work must be performed by a licensed plumber under the terms and conditions of a plumbing permit and inspected by the Building Inspection Department. To get started, interested residents should call a licensed plumber who will assess their needs and advise on how to claim the $500 rebate.

More information on the City of Moncton's Backwater Valve Incentive Program can be found at: http://www.moncton.ca/Government/Departments/Building_Inspection/Backwater_Valve_Incentive_Program.htm

Among its many resources, ICLR has issued a "*Handbook for Reducing Basement Flooding*," a publication that addresses the concerns of homeowners, local governments and insurance companies of the increasing instances of basement flooding. The booklet provides comprehensive information on how to mitigate flood risk for individuals and communities. It contains 20 measures that homeowners can take to reduce their risks and their neighbourhoods' risk of basement flooding. Many of the measures are simple and relatively inexpensive -- for example, downspout disconnection, and sealing any cracks in foundation walls and basement floors.

ICLR has also produced a smaller, more readable version of the handbook that is more manageable for the average homeowner. The Institute has also produced a series of five 'how to' videos on reducing the risk of basement flooding, as well as six animated narrations. These videos can be viewed on ICLR's YouTube channel at www.youtube.com/iclrinfo

Estimating future IDFs for IBC's MRAT project

ICLR has been engaged to assist in the development of future Intensity Duration Frequency curves (IDFs) for Insurance Bureau of Canada's Municipal Risk Assessment Tool (MRAT). Once rolled out, MRAT will help insurers measure wastewater infrastructure vulnerabilities and will bring greater precision to underwriting with regard to basement flood risk.

Western University Professor Slobodan Simonovic is leading a project that will develop future IDF curves for the five selected municipalities: Moncton and Fredericton, New Brunswick; Hamilton and London, Ontario; and Winnipeg, Manitoba.

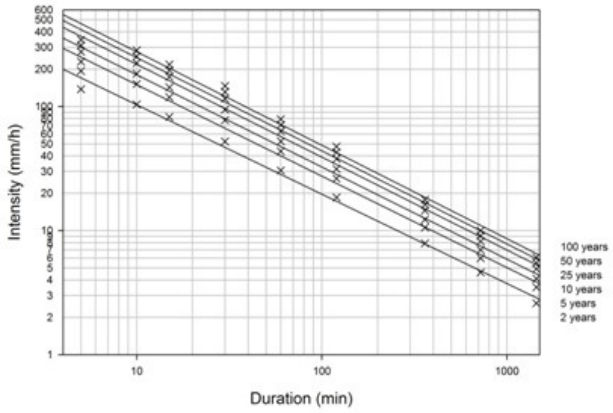
The estimation of future IDFs will be based on a set of selected global climate models/ emission scenarios for 2020 and 2050.

The estimation of future IDFs will be done according to the methodology developed by Professor Simonovic and his research team and tested with the City of London case study. Future IDF curves will be developed by integrating global climate data with local precipitation observations.

The *first step* of the process involves climate analysis. Global climate information is provided by global climate models (GCMs) for various emission scenarios. This information is used with historical data as input to the weather generator (WG) tool that provides for downscaling data to local scale.

In order to address the uncertainties involved in the selection of a GCM and emission scenarios, the analysis for each city location will be provided for three future climate scenarios.

The first scenario will include the historic climate, to be obtained by perturbing and shuffling locally observed data. Two other climate scenarios, named 'lower' and 'upper bound' of climate change will be derived by perturbing and shuffling historical data using inputs from global climate models (GCMs).



Example of an Intensity-Duration-Frequency (IDF) curve for the City of London, Ontario, produced with data collected at the London Airport Station for one climate change scenario. Rainfall magnitude and intensity for a range of durations and return periods (labelled on the right hand side) are provided. An IDF curve tells you how rare a given rain storm is. While it may be intuitive to understand the idea of how many millimetres of rain falls in a storm, it's not quite as easy to say how often a storm might occur: Every 1 year? 2 years? Maybe it was a 1-in-10 year event? An IDF curves helps to quantify that. The curve is a graphical representation of the probability that a given average rainfall intensity will occur. Rainfall Intensity (mm/hr), Rainfall Duration (how many hours it rained at that intensity) and Rainfall Frequency (how often that rain storm repeats itself) are the parameters that make up the axes of the graph of IDF curve.

The second step of the process involves downscaling precipitation information to local scale. The k-nn weather generator developed by the University of Waterloo and the University Western Ontario will be used to generate 120 years of future daily precipitation of various durations (from 5 minutes to 24 hours) for three climate scenarios (historic, lower and upper bound) and two future periods (2020 and 2050).

The third step of the process involves statistical analyses of the obtained future data. The yearly maximum values will be extracted for 120 years and for all durations. Then the yearly maximum values will be fit to the Gumbel distribution (used by Environment Canada for development of IDF curves).

The final product will include tabular and graphical presentation of future IDF curves for all durations and six return periods (2, 5, 10, 20, 50 and 100 years).

The project results will be submitted to IBC by the end of September.

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

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