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CAT TALES

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Institute for Catastrophic Loss Reduction

Building resilient communities

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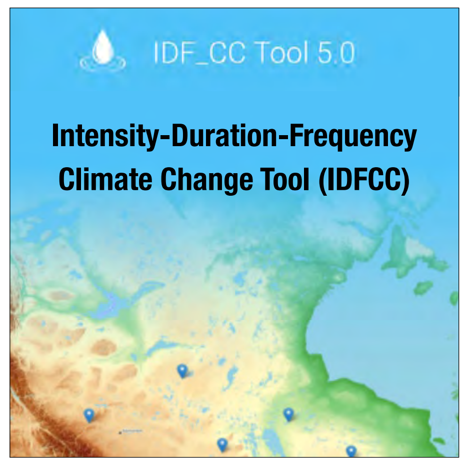
ICLR Board of Directors

Major milestone for IDF_CC tool

By Slobodan Simonovic, Ph.D, P.Eng



Ten years ago, I had an idea for translating our research into the impacts of climate change on Intensity Duration Frequency (IDF) relations (graphical tools that describe the likelihood of a range of extreme rainfall events) into a tool for practicing professionals. The opportunity came from the Canadian Water Network's *Evolving Opportunities for Knowledge Application Grant*, and the rest is "history." The creation of a web-based tool required the development of an original methodology, professional web-tool development and intense collaboration with the user community. The team was established and work started with modest funding from the Canadian Water Network. Work within the academic research environment and collaboration with future users (in the form of representatives from the City of Toronto and Hamilton) resulted in a tool that has been developed by using (a) an original methodology; and (b) a user-friendly interface. Ongoing financial support and a home for the tool were found at ICLR, which is supporting maintenance and upgrade of the tool. The need for this assistance was supported by four user workshops organized across the country with the support of the Institute.

After extensive testing, verification and validation, the tool was released to the public in February 2015. Our expectation that municipal engineers would makeup the primary user group was plain wrong. Users, instead, came from consulting engineers, governments and academia. Upon launch of the tool, the number of registered users quickly skyrocketed.

This article is being written to celebrate the 5,000th active and registered user of the tool.

Today, the tool supports the development of IDF relationships for gauged and ungauged sites. The tool's database >

includes 104 up-to-date climate models (GCMs) and rainfall observations from more than 700 stations maintained by Environment and Climate Change Canada (ECCC), and now allows the use of user-provided observations.

A chronology of the development of the IDF_CC tool is as follows:

Version 1 – February 2015. Use of 24 GCMs, use of Gumbel distribution and quantile matching algorithm for downscaling precipitation data.

Version 2 – August 2017. Update of the user interface, Google maps replaced by Leaflet and OSM, and addition of 9 bias-corrected GCMs (corrections of the projected raw daily GCM output using the differences in the mean and variability between GCM and observations in a reference period), methodological modifications, limiting use of Gumbel distribution only for historical IDF curves, the introduction of Generalized Extreme Value (GEV) distribution, and modification of Quantile Matching Algorithm for updating IDF curves.

Version 3 – January 2018. Addition of the new module for ungauged locations, and new methodology for ungauged locations.

Version 4 – August 2019. Addition of 24 new bias-corrected climate models from the Pacific Climate Impacts Consortium (PCIC) at the University of Victoria.

Version 5 – July 2021. Addition of 30 new climate models from CMIP6 (with shared socioeconomic pathways – SSP scenarios) and update of ECCC's dataset (precipitation until 2017; new stations; change of names and station IDs).

Version 6 – August 2022. Addition of a new dataset of 26 bias-corrected climate models produced by PCIC at the University of Victoria from the Coupled Model Intercomparison Project phase 6 (CMIP6).

With the continuous support of ICLR, we are looking to many more years of the tool's use and many more users.

New digs for ICLR

Effective January 1, ICLR has changed Toronto head offices to a Duncan Street location.

The Institute will be sharing space with Cookhouse Labs, an insurance industry-focused innovation hub. Since its beginning in 2017, Cookhouse has created a community of innovators focusing on the insurance industry from around the globe to join in co-creating and developing solutions to tackle current and future challenges being faced by the insurance industry.

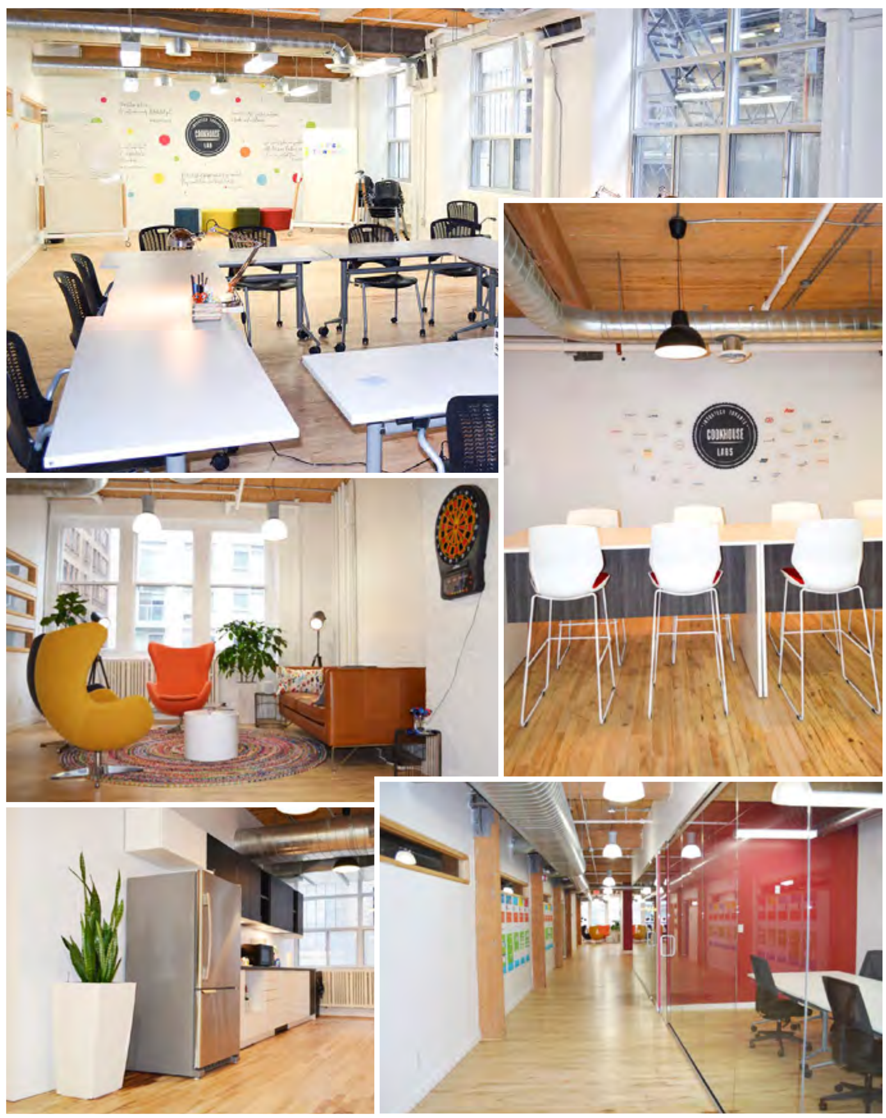
ICLR moves out of its 20 Richmond Street office, home to the Institute for close to 20 of its 25 years.

Richmond Street – the Confederation Life building completed in 1892 – has been a favourite for many visitors to ICLR due to its exposed brick archways and rustic charm.

ICLR can now be found at:

30-34 Duncan Street, Toronto, ON, M5V 2C3

The main phone number remains (416) 364-8677 ext. 3219



We have to get off the disaster hamster wheel

By Glenn McGillivray, Managing Director, ICLR and Keith Porter, Chief Engineer, ICLR

A tornado ripped through Barrie, Ont., in July 2021. (Duckdave/Wikimedia), CC BY-SA.

Canada is an interesting case in that those who are involved in the many facets of disasters (like first responders, governments, insurers, disaster restoration contractors, academics and others) are seeing the environment change before their very eyes. Countries like the United States have experienced regular large, impactful disasters since forever, but this hasn't been the case here. Sure, we got our share of smaller events, but these tended to be spread out over the course of many (often many many) months. This made it quite easy to deal with them, as they tended not to tax any one entity's resources. We could apply whatever people power, financial resources and expertise needed to recover, then get a break before the next one.

The only real exception was the Eastern Canada Ice Storm, the country's first billion dollar insured loss event. Prior to this storm in the opening days of 1998, the country never experienced a loss of this magnitude – not even close. What's more, that loss loomed large for 15 years until the damage was surpassed by the Southern Alberta floods in June 2013. From the standpoint of probability, the ice storm was considered an "outlier" – a statistical oddball.

But things aren't playing out this way anymore, as loss events are starting to pile up like cordwood, placing immense pressure on those whose job it is to respond.

Losses from floods, severe winds, wildfires, and other perils are currently costing Canada about $6 billion annually; about $2.2 billion is insured while the rest is uninsured. That's two per cent of the value of construction put in place annually, equivalent to eight days of nationwide construction.

To put it another way, Canadian catastrophe losses are growing nine per cent annually, three times faster than GDP, six times new construction, and 10 times faster than the population.

We are seeing significant disasters occurring in (at least) two places simultaneously, like the bookended atmospheric rivers on both the west and east coasts in November 2021 that necessitated the deployment of Canadian Armed Forces personnel in both places at once.

We are seeing significant disasters occurring within short intervals of each other, like the heat wave, wildfires and atmospheric river event that came in quick succession in B.C. last year, or the June 2013 Southern Alberta floods that were followed by the July 8, 2013 Toronto flood three weeks later (Canada's first-ever back-to-back billion dollar loss events).

And we are hearing reports of the same Canadian households getting hit by more than one disaster in short order. For example, many households hit by the July 2013 flooding in Toronto were also hit by the Southern Ontario ice storm in December of that year. Many households that were evacuated in B.C. in summer 2021 due to the active wildfire season (the third worst season for area-burned in the province's history) were also impacted by the atmospheric river flooding just a couple of months later. And if they weren't directly affected, they were indirectly impacted by cut-off roads, broken supply chains and the gas rationing that had to take place as a result.

All of this should worry us.

Ordinary Canadians pay for these mounting losses in one way or another. Insurers pay the insured part, but that money ultimately comes from customer premiums. The rest comes from homeowners, tenants, businesses, and the taxes they pay.

As losses grow faster than the population, new construction, and GDP, they eat up a larger and larger share of the value that otherwise feeds, houses, and improves >

our lives, until we begin to spend as much (or more) recovering from disasters as we do building for the future.

The trend is also worrisome because it says that, as we build, we create new risk rather than reduce it. New buildings ought to be more resilient than older ones so as we build new buildings and replace old ones, per capita losses should decrease. But that's not happening.

Something is wrong with what we are building, how we are building and where we are building. Climate change is partly to blame, but we should be designing for that – but we aren't.

We need to understand what we are doing wrong with new construction if we want to stop paying for ever-larger catastrophes. Only by doing so can we hope to navigate costly decisions about how to do better and how to fairly share the cost.

This article originally appeared in Avert, *November 24, 2022*

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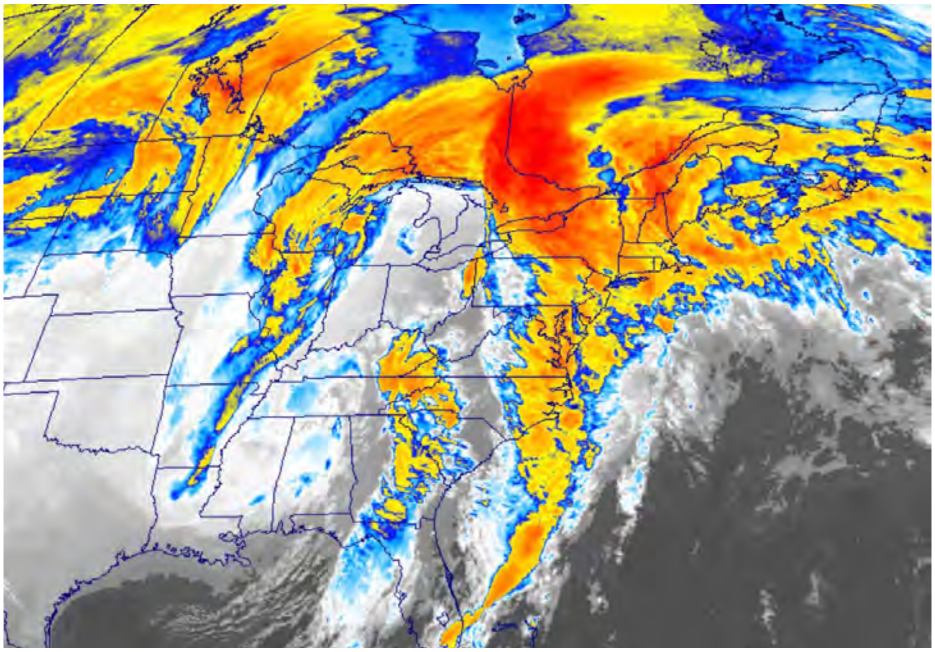
25 years on: What we learned from ice storm '98

By Glenn McGillivray, Managing Director, ICLR

From late Sunday, Jan. 4, to Saturday, Jan. 10, 1998, freezing rain lashed eastern Ontario and southwestern Quebec before heading into Canada's Atlantic provinces. In Ontario, the storm dumped 85 millimetres (mm) of freezing rain on Ottawa, 73 mm on Kingston and 108 mm on Cornwall. In Quebec, 100 mm ravaged Montreal and parts of the province's south shore. By Jan. 18, 25 Canadians were dead with a total of 35 lives lost by the time it was all over. Almost 1,000 were injured.



The ice storm's devastation stretched more than 300 kilometres from Ottawa/Carlton through Montreal to Drummondville, Que. Photo: National Climatic Data Center of United States.

Emergency crews worked around the clock responding to reports of trees pulling down hydro poles and ice toppling transmission pylons. By some estimates, roughly 1,000 transmission towers and 30,000 utility poles were destroyed or damaged. This is to say nothing of transformers, crossarms and other power infrastructure.

Close to 110,000 homes, farms and businesses in eastern Ontario were without electricity. In Quebec, 1.4 million locations lost power – translating into roughly three million people or half the province's population at the time. At the storm's height on Jan. 9, more than 10 per cent of Canadians were without electricity with some not having service restored for more than a month.

The worst of the devastation stretched more than 300 kilometres from Ottawa/Carlton through Montreal to Drummondville, Que. Scores of municipalities and townships in the >

Economic damage, which includes insured damaged plus everything else, was estimated at $5.4 billion.

affected area declared a state of emergency and the federal government mobilized over 15,500 soldiers in the biggest peacetime deployment of the Canadian Armed Forces in the country's history.

The severity of an ice storm depends largely on the accumulation of ice, the location and extent of the area affected and the duration of the event. By all of these measures, the 1998 eastern Canada ice storm – also known as The Great Ice Storm or Ice storm '98 – remains the worst freezing rain event on Canadian record.

Previous major ice storm events in Canada resulted in about half the ice accretion experienced in this event. Further, previous events largely impacted fairly localized, rural areas. But this event ravaged one of the largest metroplexes in North America. Finally, aside from the huge area affected, the '98 ice storm was unusual because it went on for so long. At the time of this event, Ottawa and Montreal historically experienced freezing precipitation 12 to 17 days a year with each episode generally lasting for only a few hours for an annual average total of between 45 and 65 hours. During this event, the number of hours of freezing rain and drizzle was in excess of 80 – nearly double the normal annual total for many places.

Insured losses from the event topped $1.38 billion (equivalent to $2.15 billion in 2021), making it Canada's costliest insured loss event by far. It remained so for 15 years, until the June 2013 flooding in Southern Alberta. When including both Canadian and U.S. claims, the event broke the international record for most insurance claims filed from a single event – more than 800,000 – overtaking 1992's Hurricane Andrew.

Most Canadian companies that insure homes, cars and businesses purchase their catastrophe reinsurance (i.e. insurance for insurance companies) for the calendar year (i.e. beginning on Jan. 1 and expiring on Dec. 31). Many Canadian insurers impacted by the ice storm used up this reinsurance in the first week of the year and either had to purchase costly "reinstatement covers" (i.e. more reinsurance) or "go bare" (i.e. risk going through the rest of the year without reinsurance). This had never happened in Canada prior to 1998.

The storm woke a lot of people up to the fact that Canada could experience billion-dollar loss events that fall outside of a major earthquake in the Lower Mainland of British Columbia. Indeed, since 1998 Canada has experienced several billion-dollar loss events including flood, wildfire, hail and summer storm.

The event underscored the fact that neither the Government of Quebec nor affected municipalities had disaster plans in place (the latter weren't required to at the time, this has since changed).

While approximately 600,000 people were temporarily displaced by the storm, almost the entire island of Montreal came extremely close to being completely evacuated as there was no emergency power for the island's water supply.

It also drew great attention to the vulnerability of the electrical grid, particularly in the Greater Montreal area, where a post-mortem of the storm revealed a number of major engineering and design issues with the electrical distribution system.

Could it happen again?

While a December 2013 ice storm in Eastern Canada (including the Greater Toronto Area) cost insurers over $200 million (2013 dollars), an analysis conducted by catastrophe modeler AIR Worldwide for a 2016 ICLR webinar (see the replay here) indicated that another 1998 ice storm event squarely over Toronto could cost as much as $26 billion in damage.

It's important to note that no two disasters are completely alike and the meteorological conditions that came together in early January 1998 to cause this event were quite unique.

But never say never. We often say in insurance that if something has happened once, it can happen again.

This article originally appeared in Avert*, January 4, 2023*

Institute for Catastrophic Loss Reduction

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.

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