Annus horribilis

Anna Contini helps pick through the rubble after a tornado hit four farms on Friday, August 19, 2005 outside Fergus, ON. Injuries were minor. (CP PHOTO/Guelph Mercury-Nathan Denette)

The owner of an SUV looks around (on right in green) as tow truck driver Derrick Holmes (in white) reaches under to attach a tow rope after two cars were carried into a flooded ditch on Bayview Avenue, south of Steeles Ave. in Toronto on Friday, Aug. 19, 2005 following a brief but intense storm. They were able to pull the car out. (CP PHOTO/Toronto Star-Richard Lautens)

By Glenn McGillivray, Managing director of the Institute for Catastrophic Loss Reduction

Many around the world were happy to see the end of 2005. North Atlantic hurricanes, the Kashmir earthquake, flooding in Europe and a litany of other events teamed up to ensure that 2005 will go down as one of the worst years on record for loss of life due to natural catastrophes. It will also be the worst year ever, by far, for insured and economic losses. According to ISO November 28, U.S. property and casualty insurers alone are expected to pay more than US$50 billion from 22 natural loss events, with the lion's share caused by the 'Big Three' – Hurricanes Katrina, Rita and Wilma. Together, the trio account for more than US$45 billion (or 90%) of the total – a figure that will likely get bigger, according to ISO.

The US$50.3 billion noted by ISO represents a new worldwide record for natural catastrophe losses. According to Swiss Re, insured losses for both natural and man-made events in 2004 reached a then-record US$49 billion. But the US$50.3-billion figure does not include losses experienced outside the United States. These include two large flood events in Europe, typhoons in Asia, plus hurricanes in the Caribbean and Mexico, as well as the normal raft of storms, floods, forest fires, and earthquakes. All of these events will add to the misery – and to claims to be paid worldwide by the property and casualty industry.

In all, Munich Re reported at the Dec. 6 United Nations Climate Change Conference in Montréal that total economic losses are expected to exceed

US$200 billion for 2005 – a marked increase from the US$145 billion in losses over the same period last year. Insured losses are likely to total more than US$70 billion, according to Munich Re.

THINK GLOBAL, THINK LOCAL

Canada did not walk away from the year unscathed. Heavy downpours and flooding in Alberta in June 2005 triggered an estimated Cdn$275 million in insured damage. And a November 2005 tornado in Hamilton, ON, left several homes uninhabitable. The Hamilton twister did not trigger large insured losses. (No aggregate numbers are available, but we know one school roof will require about Cdn$10 million to replace.) Nevertheless, it proved to be interesting because it touched down so late in the season. Based on a review of every annual storm season in Canada, this was the third-latest storm to touch down in Canadian history. The second-latest tornado touched down in November, in Leamington, ON, during the 1919 storm season. The latest touched down in December 1946 in Exeter, ON. The F1 tornado in Hamilton was weak compared to the F4 that hit Edmonton in July 1987, or the F3 that ripped through a trailer park in Pine Lake, AB in July 2000. But it was still powerful enough to drive a cotton Q-Tip into the aluminum siding of a house.

In addition to these events and others – including January rainstorms in Vancouver and area, and May rainstorms in the Maritimes – 2005 also delivered the costliest natural catastrophe in Ontario history (and the second-most expensive on record for the country).

On Aug. 19, 2005, at least 153 mm – and by some accounts, up to 175 mm – of rain fell on parts of northwest Toronto in a two- to three-hour deluge that impacted a wide swath of real estate from Kitchener-Waterloo to Durham Region. As a result of the torrential downpour, infrastructure was washed away, basements were flooded and cars were damaged by falling trees and rising flood waters. What's more, two tornadoes touched down in the Salem/Fergus area of Ontario, damaging several properties. A rare tornado warning was issued for Toronto. The Insurance Bureau of Canada (IBC) said the insured damage from the storm would likely exceed Cdn$400 million and may reach as high as Cdn$500 million. Prior to the Aug. 19 storm, the 1991 Calgary hailstorm was the second-most costly natural catastrophe in Canadian history at Cdn$416.5 million.

AUGUST 19

A Special Weather Summary issued Aug. 20 by Environment Canada described the storm as follows: "Severe thunderstorm activity associated with a warm front tracked from southwestern Ontario into southcentral Ontario Friday afternoon [Aug. 19]. The strongest severe thunderstorm was long-lived and tracked from Milverton to just north of Fergus and across Brampton and the northern part of Toronto then east to Oshawa. It left a trail of damage in its wake with many areas receiving excessive rainfalls as well as two distinct tornadoes and some locally large hail…Both tornadoes were associated with the single long-lived storm and estimated to rank as F2 on the Fujita Scale with winds of 180 to 250 km-h."

The City of Toronto says the storm resulted in more than 1,274 complaints of basement flooding as of Aug. 26. Public infrastructure was damaged to the tune of millions of dollars. A large section of Finch Avenue West at Black Creek was washed away as a result of the heavy rain and flooding. It was expected that repairs to the collapsed section of road would take approximately three to four months to complete and would cost an estimated Cdn$5 million. In the meantime, the city had to erect a temporary pedestrian bridge, at a cost of Cdn$250,000. Several other roadways sustained lesser damage.

THE NEW NORMAL?

Worldwide, 2005 can be characterized as a year of extremes. The year in review has seen:

- The hottest year on record, with the global average temperature already slightly warmer than 1998 (the current record year).
- The most Arctic melting, with satellite photos showing the smallest area ever remaining covered by perennial sea ice at the end of summer.
- The worst Atlantic hurricane season, with the most: named tropical storms (26); hurricanes (14); top-category hurricanes (5); and, costly damage due to hurricanes.
- Epsilon became one of only five North Atlantic hurricanes to form in December.
- Hurricane Vince, the first hurricane to hit Europe, made landfall in Spain in October – the most eastern and northern such storm on record.
- Hurricane Katrina, the sixth-strongest hurricane since records began. It was the costliest weather disaster on record, with losses totalling more than US$125 billion. Hurricane Wilma, the strongest hurricane ever measured.
- The worst storm in Ontario history, second worst in Canadian history.
- The third-latest tornado in Canadian history.

This car was carried into a flooded ditch on Bayview Aveneue, south of Steeles Ave. in Toronto on Friday, Aug. 19, 2005 following a brief but intense storm. (CP PHOTO/Toronto Star-Richard Lautens)

Many watermain breaks were reported. The Highland Creek Wastewater Treatment Plant was flooded, triggering damage to approximately 30% of its equipment and operation. Damage to the plant is expected to exceed Cdn$1 million. Additionally, the Highland Creek trunk sanitary sewer collapsed, triggering a large spill of raw sewage into the creek. The 48-inch diameter pipe broke during the heavy rains, releasing sewage into the creek at a rate of 0.7 cubic metres per second, or 60,480 cubic metres a day. The spill wasn't stopped until the evening of Aug. 22.

MEMORIES OF HAZEL

The Aug. 19 event is being compared to Hurricane Hazel, which dropped more than 280 mm of rain on parts of southern Ontario during a 48-hour period in October 1954. While the August 2005 storm dumped less rain than Hazel, its total rainfall of up to 175 mm happened during a short, three-hour window.

The Institute for Catastrophic Loss Reduction (ICLR) commissioned – and the engineering consulting firm Cumming Cockburn Ltd. produced – a November 2000 study entitled *Hurricane Hazel and extreme rainfall in southern Ontario*. According to the study: "Significant flood events similar to Hurricane Hazel will recur. For example, Hurricane Floyd in September 1999 might be regarded as a 'near miss.' Other large events will continue to occur, exceeding existing system design capacities on a random basis." An analysis included in the study indicated that potential widespread basement flooding in another Hurricane Hazel-type event could exceed Cdn$400 million.

LESSONS LEARNED

Infrastructure failure is one reason for the extensive damage caused by the recent storm. Such failure can largely be attributed to decreased government spending on infrastructure.

In 1961, 5% of GDP was spent on infrastructure. This spending has spiralled downward over the last 40 years and now sits at between 2-3%. Given that one percentage point of GDP represents about Cdn$13 billion (2001 dollars), we have seen a drop of roughly Cdn$30 billion in infrastructure spending in the last 40 years.

According to *Municipal Infrastructure Investment Planning: Asset Management*, by D.J. Vanier and N.H. Danylo (1998), "…even if Canadian cities…spent between $12 [billion] and $15 billion every year on maintaining and rehabilitating their infrastructure, there is currently an accumulated shortfall estimated at $44 billion to return these assets to an acceptable condition."

Similarly, a report submitted to the Ontario government in May 2005, entitled *Watertight: The case for change in Ontario's water and wastewater sector*, warns that: "…Ontario's municipalities all face a number of pressures that, together and over a period of years, could increase costs and risks substantially. The most serious of these is that water-related assets are wearing out, and most communities are not replacing them quickly enough…The Ministry projects that, unless the rate of capital investment increases sharply from the levels of the recent past, Ontario will face a gap of roughly $18 billion between what systems need and what they receive in funding over the next 15 years."

The infrastructure debate speaks to wider issues centering around population

growth, increased development and, consequently, building codes.

As part of its mandate to prevent natural hazards from becoming disasters, ICLR sent research teams to Florida and the Gulf Coast to examine hurricane damage first-hand and to study means of improving home construction and design. A key finding is that homes built under the new Florida building code experienced little damage while those built under older codes sustained most of the damage.

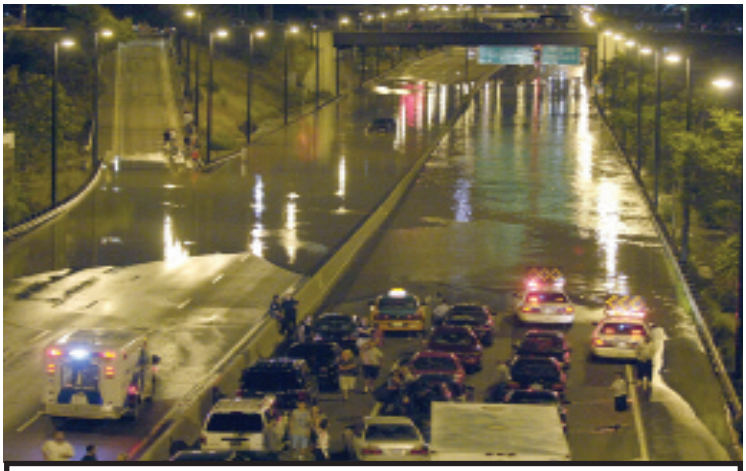
As noted in Hurricane Hazel and extreme rainfall in southern Ontario, "the legacy of Hurricane Hazel has significantly reduced the potential for riverine-related flood damages in the study area and across Ontario. Since 1954, there has been less development in floodplains along rivers and streams than would have otherwise occurred due to the implementation of flood plain management policies restricting development in flood hazard areas. These policies should continue to be enforced, and serious attention should be given to adopting similar zoning policies in other municipalities across Canada in order to reduce the potential for an increase in future flood damages."

Had these measures not been taken, it is clear that damage from the Aug. 19 storm would have been far worse. The main message is that building codes matter.

CONCLUSION

For a number of years, climatologists and others have been warning of a rainfall event in the GTA equal to or greater than that of Hurricane Hazel. Though not triggered by a hurricane, the Aug. 19 storm event certainly mimicked one, making many of these predictions come true.

We learned a great deal after the October 1954 deluge. We were able to implement preventative measures to mitigate impacts of an event like Hazel. One key lesson from the Aug. 19 event is that maintaining and replacing aging infrastructure is integral to mitigating the impact of weather perils, particularly extreme rainfall events. CU



A van sits stranded in the northbound lanes on the Don Valley Parkway, south of Gerrard St., Friday Aug. 19, 2005, in Toronto. Toronto's afternoon commute was snarled as cars were forced to plow through highways that, in places, resembled rivers. (CP PHOTO/ Toronto Star/ Tony Bock)

Mary Thompson of Drayton, Ont., looks for some of her personel valuables with the help of her son Ken Thompson, left, and OPP Const. Louis Berthelot, bottom centre of photo, and Matt Chorny, right, of the Wellington detachment at Conestogo Lake Friday, August 19. 2005 following a storm. (CP PHOTO/Waterloo Regional Record-Philip Walker)

TIMELINE: AUGUST 19, 2005

12:50 p.m. – 1:20 p.m.
Milverton to Conestogo Lake (west of Elmira):
Intermittent F2 tornadic damage path 25 km long and up to 1 km wide. Twenty-eight-foot motor home carried 50 ft. Numerous trees down. Cottages damaged. Barns destroyed.

1:30 p.m. – 1:45 p.m.
Salem to Bellwood Lake (north of Fergus):
F2 tornadic damage path 10 km long and up to 1 km wide. Department of Public Works building severely damaged in Salem; roof carried 750 m. Barns/silos destroyed and tractors lifted.

2:30 p.m. – 3 p.m.
Brampton:
Torrential rain and flooding – about 100 mm of rain.

3:15 p.m. to 4 p.m.
Toronto:
Severe flooding, with quarter- to possibly golf-ball-sized hail. Local trees down due to brief, strong, straight-line winds.

3:30 p.m.
Environment Canada, Downsview:
136 mm of rain and flooding at the Ontario Storm Prediction Centre.

3:15 p.m. to 4 p.m.
Toronto (Yonge and Steeles):
175 mm of rain and flooding.

4 p.m. to 4:30 p.m.
Ajax to Oshawa:
Torrential rain and flash flooding.

5:30 p.m.
Hamilton:
Quarter-sized hail. Funnel clouds sighted; a few trees down.