Keeping Canada's shorelines safe

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Canada is nine percent water.

Canadians boast about how we have 20 percent of the world's total freshwater resources. There is virtually no location in the country that does not have quick access to rivers, lakes, or oceans.

Across Canada, the Disaster Mitigation and Adaption Fund (DMAF) has an important role in keeping the nation's shorelines safe.

The fund was set up by the federal government to help municipalities address and prepare for disasters happening in their communities.

This article looks at the work being done in the City of Hamilton, as well as other projects in British Columbia, Alberta, Ontario, Quebec, and the Atlantic provinces where the DMAF is making a difference.

City of Hamilton: A Shoreline City

Hamilton is blessed with more than 22 kilometres of shoreline fronting Lake Ontario, the Hamilton Harbour, and Cootes Paradise – an incredible inland marsh and lake environment. Feeding into these three bodies of water are many streams, rivers, and waterfalls. So, to say that Hamilton is a shoreline city is not an exaggeration.

One of the most beloved trails in the entire city runs along the shore of Hamilton Harbour. The trail boasts 310,000 visitors a year for recreation and commuting, and provides access to beaches, bluffs, wildlife habitat, and amenities along the way.

In recent years, when high water levels and extreme wave events sloughed off huge pieces of land, flooded the low-lying areas, and cut users off from their favourite trail, city staff raised alarm bells.

Supported by a forward-thinking council, city staff worked to repair damaged areas and initiated a large study of the municipally owned shoreline properties.

The study[1] was undertaken to determine what future work would be necessary to ensure that storms do not wash away the waterfront access (something that all shoreline cities strive to attain). Hamilton's shoreline project was one of the first to be approved as part of the DMAF program – $31.68 million with $12.7 million of that from the federal government for shoreline protection

1 *Shoreline Inventory and Assessment of City of Hamilton Owned Assets,* City of Hamilton, June 11, 2019, https://pub-hamilton.escribemeetings.com/filestream.ashx?DocumentId=209441.

projects to address damage from recent storms and protect against future damage.

A major 2017 storm brought record-breaking water levels in Lake Ontario. In the Hamilton area, those levels peaked at a daily average mean water elevation of 75.93 International Great Lakes Datum (IGLD is a reference system by which water levels in Great Lakes-St.Lawrece Basin are measured.)

The following were damages associated with the water levels:

- three sections of land were washed away along Confederation Beach Park;
- sections of the trail by Bayfront Park were under water;
- the shoreline trails were compromised; and
- a lake-viewing plaza, constructed in 2012, was undermined when storm culverts allowed water to wash out the soils and aggregate under the concrete platform.

The storm highlighted areas of shoreline that were particularly at risk of damage and loss of land into the lake. Hamilton is certainly not the only city in Canada that has sustained damage due to extreme storms.

Other cities and towns were equally compromised, including:

- Surrey, British Columbia;
- Calgary, Alberta;
- Toronto, Ontario;
- Markham, Ontario;
- Ottawa, Ontario;
- Montreal, Quebec;
- Perce Rock, Quebec; and
- Fredericton, New Brunswick.

Across central Canada, water levels in 2019 exceeded those of record-setting 2017, with Lake Ontario peaking at 76.03 IGLD.

A 2018 storm resulted in incredible wave heights and battered the unprotected shores along Lake Ontario, leading to further erosion and trail damage in Hamilton.

While these were the triggering events to raise red flags for city staff, the storms keep coming.

Minimizing Damage from Extreme Storms across Canada

While cities are doing the best they can to protect their property and citizens, municipalities can't do this work alone.

Across the country, the federal government and its DMAF is financially assisting communities with the completion of projects.

This will help minimize damage from future extreme storms and protect critical infrastructure. Funding sources such as this are incredibly important.

Faced with ever-increasing tax bills, the residents of cities and towns cannot shoulder this burden alone.

Funding partnership opportunities like the DMAF allow cities to redirect funds to priority projects that otherwise could not be funded.

1. Surrey is approved for $76 million

One project that has received approval for funding through the DMAF program is in Surrey, British Columbia.

Surrey's project will have a federal investment of more than $76 million.

The funding is in support of Surrey's Coastal Flood Adaptation Strategy, in which the city has developed 13 strategic actions aimed at increasing community resiliency, safety, and health. The strategic actions include securing funding for innovative, nature-based solutions and large-scale structural projects to strengthen and protect lowlands and flood plains.

One of those strategic actions, the Nicomekl Riverfront Park Project, will create a three-kilometre riparian park that implements flood attenuation features woven into habitat enhancement, recreation infrastructure, and traditional cultural features.

The project will also provide opportunities for climate awareness and environmental stewardship and protection of natural assets.

2. Calgary creates a flood response plan

Alberta is also not immune to extreme storms and flooding.

In 2013, the Bow River flooding through southern Alberta damaged many parts of the province, leading to evacuations and massive damage to the shorelines along the river.

Years earlier, the City of Calgary had the foresight to create a flood response plan. Since then, the challenge of adapting to flooding has continued.

Many of the other urban areas are struggling with massive amounts of run-off from increasingly common torrential rains.

3. Toronto makes investments in shoreline protection

The City of Toronto and the federal government announced a joint investment through DMAF of $30 million to rehabilitate the city's shoreline from Etobicoke to Scarborough with infrastructure and tree canopy to reduce shoreline erosion hazard. A second announcement identified an investment of $33.7 million from the DMAF and $50.6 million from the city to repair 80 erosion control structures across 13 parks, including Ashbridge's Bay, Bluffers, Colonel Samuel Smith, and Marie Curtis.

4. Markham demonstrates a new approach to stormwater management

The City of Markham in York Region, north of Toronto, provides another example of how landscape architecture is used within the planning process to help mitigate water damage.

The Residential Rainproofing – Community Program has, since 2011, demonstrated a practical approach to stormwater management on private property.

This strategy can be used in any neighbourhood across Canada and have a positive impact on water quality and quantity without a major infrastructure installation.

5. Flooding in Ottawa drained into great lakes

Ottawa was yet another city greatly affected by rising waters with massive flooding events through spring melt waters, causing the city to declare a state of emergency in April 2019.

The water that flooded Ottawa all drained into the Great Lakes system, further exacerbating the already high lake levels.

6. Sustainable Montreal project addresses climate change

The Bonaventure project in Montreal provides an exemplary environmental initiative, one that presents new sustainable approaches. It is helping to define tomorrow's standards in the context of climate change.

While projects funded through the DMAF are helping cities across Canada with adaptation, the climate continues to challenge municipalities to work faster to complete the projects before damage occurs.

Since 2000, the waterfront near the tourist destination of Perce Rock, Quebec has been battered by increasingly severe storms. In 2018, the municipality of Perce completed a massive year-long project of coastal remediation and protection, saving the municipality's tourism-based economy in the process.

7. Atlantic region doing its part

Fredericton, New Brunswick experienced flooding in 2018 and 2019 as well and is also a city that is benefitting from the DMAF program. As part of the program, the city has an approved initiative to address flood protection and flood adaptation projects.

Flood mapping along the Saint John River has shown that many areas are flood prone during storm events. To respond, the city has announced that infrastructure upgrades will be undertaken to try and reduce these impacts. Additionally, the city has prepared a flooding preparedness reference to help residents manage flooding events in Fredericton.

Withstanding the Compromise of Tomorrow

It has become clear that the traditional shoreline protection and stormwater management approach, and what has worked in the past, will no longer protect the parks and trails along the shorelines across Canada.

Considering the reality of climate change, communities working with landscape architects, engineers, planners, and others are managing water and manipulating landforms to overcome challenges of how we manage waterfront public spaces.

The overriding goal is to create accessible landscapes for all with beautiful, functional, and resilient designs. Partnerships that allow good quality projects to be completed will be essential in the years to come.

Governments must continue to work proactively to address climate change by considering future weather in order to prevent further damage as per targets set by international organizations.

Provincial governments have a leadership role. In Ontario, the recent report released by Ontario's Special Advisor on Flooding lists 66 recommendations to address flooding across the province. The implementation of the recommendations will be important in the continued work to build flood resilience in the province.

Cities and towns must make changes that create resilient landscapes that will withstand the storms of tomorrow.

Hopefully in two, five, and 10 years from now, *Municipal World* can highlight all of the amazing climate change adaptation projects that have been implemented across the country.

Despite extreme weather events that are inevitable in this changing climate, the hope is the shorelines in Hamilton and across the country will withstand these events and remain protected for the foreseeable future – not only for the enjoyment of residents and visitors, but also to ensure that our connection to water is sustained. **MW**

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