Canadian Environmental Law Association
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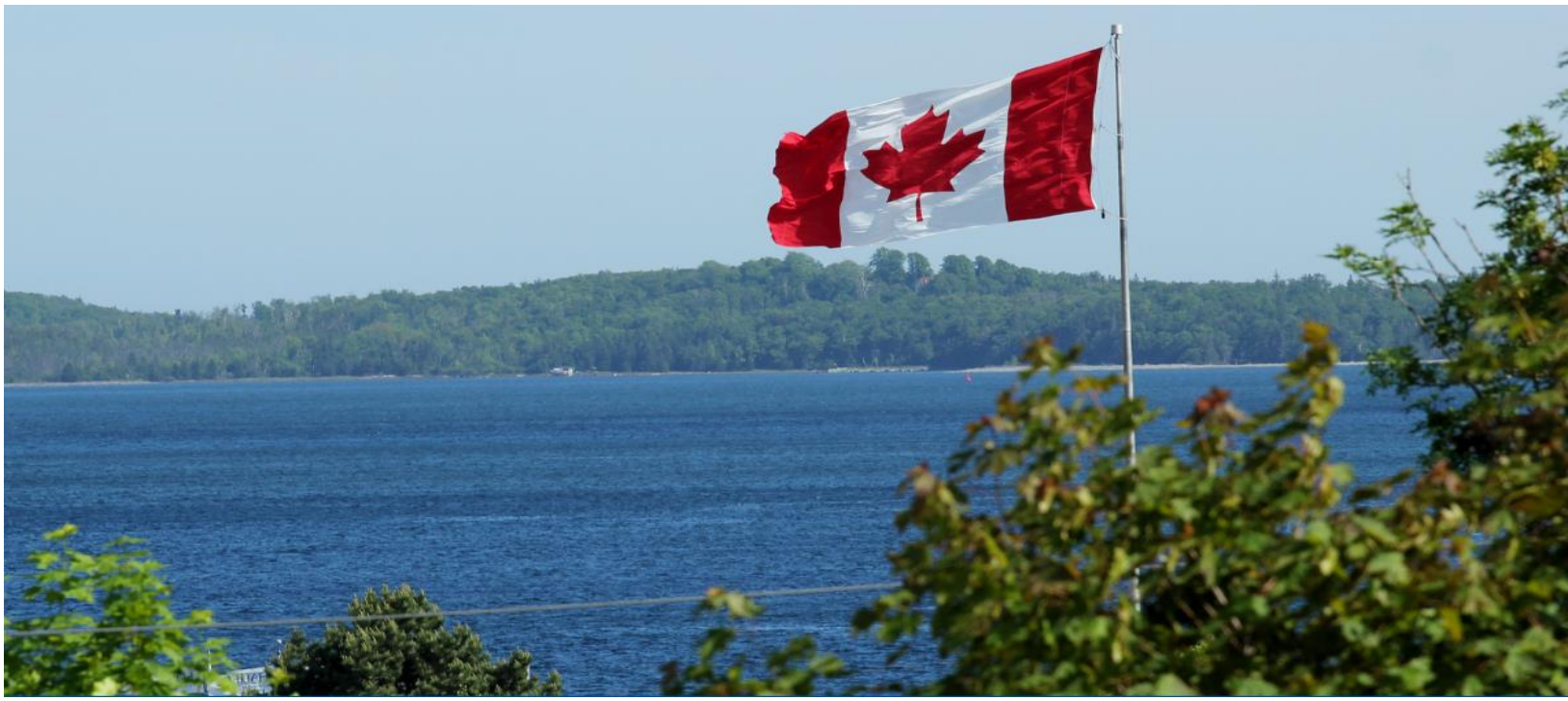
Recommendations for Municipalities
Focus: Flood Protection



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1. Floods in Canada

As a result of climate change, the frequency and magnitude of floods in Canada are increasing. Floods are the most common natural disaster in Canada[1] and are the costliest in terms of property damage.[2] Per year, floods cause an average of $1 billion in direct damage.[3] Currently, two in 10 Canadian homes face a flood risk.[4] As Canadians continue to occupy flood-prone areas, the economic losses from flood damage will only worsen.

2. Flood Protection and Co-Benefits to Human Health

Mould proliferates in damp conditions and presents a risk to human health, especially to children. Mould presents a human health problem by inducing asthma, hypersensitivity pneumonitis, disease, or other issues.[5] As their immune systems are less developed than adults, children are more susceptible to mould-related illnesses. 30 studies from different countries have demonstrated a close relationship between living in damp homes or homes with mould proliferation and the extent of detrimental respiratory symptoms in children.[6] Further, the Centers for Disease Control and Prevention (CDC) noted the potential link between early mould exposure and the development of asthma in children.[7] In fact, with excessive exposure, infants face an increased risk for hemorrhagic pneumonia and death.[8]

Flood protection retrofits present a co-benefit to human health by reducing mould growth. The CDC found that after a flood in New Orleans, 46% of flooded structures had some mould contamination and 17% had heavy mould contamination.[9] The CDC noted that the key to mould prevention is to "eliminate or limit the conditions that foster microbial growth by limiting water intrusion and the nutrients that allow mo[u]ld to grow."[10] By retrofitting buildings with flood protection to keep water out, mould proliferation will be decreased.

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[1] Government of Canada, "The risk of floods" (March, 2022), online: <https://www.canada.ca/en/campaign/flood-ready/know-the-risks/risk-floods.html>

[2] Burn, D. H., & Whitfield, P. H., "Changes in floods and flood regimes in Canada" (2016) Canadian Water Resources Journal, *41*(1-2), 139-150.

[3] Government of Canada, "Flood Mapping" (May, 2022), online: <https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-mapping/24223>

[4] Government of Canada, "The risk of floods" (March, 2022)

[5] Centres for Disease Control and Prevention, "Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods" (May, 2006), at 3, online: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5508a1.htm>

[6] Etzel, R., & Rylander, R., "Indoor mold and children's health" (1999) Environmental health perspectives, 107 (suppl. 3), 463-463.

[7] Centers for Disease Control and Prevention, "Basic Facts about Mold and Dampness" (September, 2022), online: <https://www.cdc.gov/mold/faqs.htm>

[8] Etzel, R., & Rylander, R., "Indoor mold and children's health" (1999) Environmental health perspectives, 107 (suppl 3), 463-463.

[9] Centres for Disease Control and Prevention, "Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods" (May, 2006) at 1.

[10] Centres for Disease Control and Prevention, "Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods" (May, 2006) at 8.

3. Vulnerable and Disadvantaged Communities Face a Higher Flood Risk

A connection exists between low-income and an increased prevalence of water damage and mould. Households with lower income may experience higher concentrations of indoor contaminants because lack of capital causes them to reside in deteriorating structures that have water damage.[11] Another study found that vulnerable groups including visible minorities, the elderly, lone-parent households, Indigenous peoples, and low-income residents are at a higher risk for flooding in Canada.[12] In Hamilton, Ontario, tenants with low-income in basement apartments are vulnerable to flooding.[13] The cost of flood prevention tools such as backwater valves and sump pumps may be a barrier for installation for people with low-income.

The U.S Grand Forks flood in 1997 emergency responses did not consider the unique issues that would impact people with low-income and provided lessons:

- 750 homes lost were rental and most were basement apartments. As a result, people in affordable housing were more likely to experience homelessness after the flood.
- After evacuating homes in an emergency, it may not be affordable for people with low-income to return to the community.
- In long-term recovery, there was a shortage of affordable childcare options which created a barrier for people with low-income to enter the job market.[14]

4. Municipalities Can Manage Flood Risk

Municipalities are primarily responsible for responding to flooding and flood emergencies in Ontario. The authority is outlined in the Emergency Management and Civil Protection Act (Ontario Regulation 380/04) and also designates municipalities with the responsibility to protect property and the welfare of residents.[15]

Floods maps are tools that pinpoint and manage potential flooding risks.[16] Many areas of Canada do not have updated and recent flood maps that identify hazard zones.[17] The Government of Canada dedicated $63.8 million in 2021 to complete flood maps in high-risk areas over three years.[18] The Government of Canada's Adaptation Action Plan has

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[11] T. Reponen, L. Levin & L., Zheng, "Family and home characteristics correlate with mold in homes" (2013) 124 Environmental research, 67-70.
[12] L. Chakraborty, H. Rus & D. Henstra, "Exploring spatial heterogeneity and environmental injustices in exposure to flood hazards using geographically weighted regression" (2022) 210 Environmental Research 112982.
[13] City of Hamilton, "Climate Change Impact Adaptation Plan" online: (2022) <https://pub-hamilton.escribemeetings.com/filestream.ashx?DocumentId=335322>
[14] Federal Reserve Bank of Minneapolis, *Disaster Recovery for low-income people: Lessons from the Grand Forks* online: (September 2006) <https://www.minneapolisfed.org/article/2006/disaster-recovery-for-lowincome-people-lessons-from-the-grand-forks-flood>
[15] Government of Ontario, *Ontario, O Reg. 380/04: STANDARDS* (August, 2021), online: <https://www.ontario.ca/laws/regulation/040380>
[16] Government of Canada, *Flood Mapping* (May, 2022), online: <https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-mapping/24223>
[17] Government of Canada, *Floods and river ice break-up* (March, 2021), online: <https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/floods-river-ice-break/10660>
[18] Government of Canada, *Climate change adaptation in Canada* (May, 2022), online: <https://www.nrcan.gc.ca/climate-change-adapting-impacts-and-reducing-emissions/what-adaptation/10025>

committed new funding of $164 million over five years to expand the Flood Hazard Identification Mapping Program.[19] Canada is working with provinces and territories to create flood maps in vulnerable areas. Many provinces and territories have responsibility related to addressing flood risk but delegate authority for flood mapping to other parties, including municipalities.[20]

5. CELA RECOMMENDATIONS

1. Map flood prone areas to show vulnerability of low-income communities.
   Under federal mapping guidelines as demonstrated in the diagram below, the first of seven steps is to understand priorities, including locations facing a high risk of flooding.[21] The first Canada-wide map that demonstrates how climate change may impact floodplains was created in 2021 by Slobodan P. Simonovic, an expert at Western University.[22] CELA recommends that municipalities assist with identifying flood prone areas where low-income communities reside. Municipalities can refer to Climate Central's new online mapping tool that identifies the risk of coastal flooding and its connection to affordable housing vulnerability in the U.S.[23]

[19] Government of Canada, *Government of Canada Adaptation Action Plan* (24 November 2022), online: <GCAAP-Report-EN.pdf (canada.ca)>
[20] Government of Canada, *Flood Mapping Community* (May, 2022), online: <https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-mapping-community/24229>
[21] Government of Canada, *Flood mapping types and process* (May, 2022), online: <https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-mapping-types-and-process/24264>
[22] Deborah Van Brenk, "Flood-impact map a Canadian first" (03 November 2021), online: Western News <https://news.westernu.ca/2021/11/flood-impact-map-a-canadian-first/>
[23] Climate Central, "Affordable Housing at Risk of Coastal Flooding" (1 December 2020), online: <https://www.climatecentral.org/climate-matters/affordable-housing-at-risk-of-coastal-flooding>

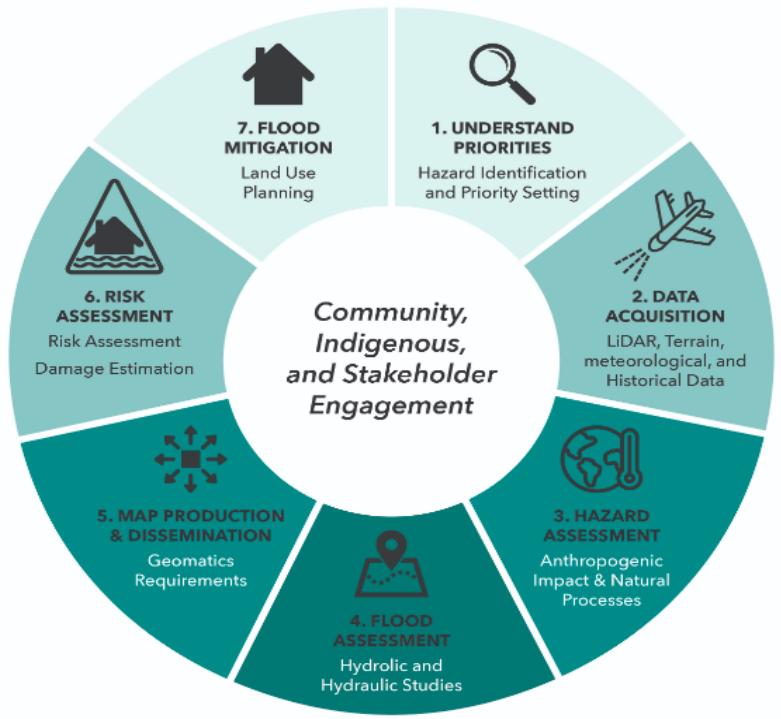

Figure 1 - Flood Mapping Process
Source:https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-mapping-types-and-process/24264

2. Develop and implement flood specific emergency plans at the municipal level that are equity-focused. Consult with vulnerable community members to create a targeted plan and identify any barriers to flood recovery.
    a. Conduct a **vulnerability assessment** and a **risk assessment.** Hamilton, Ontario conducted both assessments and the findings have been implemented in a climate change action plan.[24]
        i. A vulnerability assessment determined the sensitivity of a community to climate change, and its adaptive capacity, at least every 5 years.
        ii. A risk assessment examined the likelihood of climate change impact and its consequences.
        iii. Key findings of Hamilton's assessments include that there is reduced flood protection due to an increase in rainfall causing flooding, and extreme rain will increase flooding.[25]
    b. Collect data on types of low-income dwellings most impacted by floods in your municipality, such as basement apartments.

[24] City of Hamilton, "Climate Change Impact Adaptation Plan" (2022).
[25] City of Hamilton, "Climate Change Impact Adaptation Plan" (2022).

c. Consider costs disproportionately impacting those with low income that may impact long-term recovery plans, including cost of childcare, finding employment and the loss of low-cost housing.
d. Follow up and provide information on resources available to people with low-income who have left the area to assist in their decision to return to the impacted community.[26]
e. The emergency plan should be publicly accessible on the city's website without any barriers, such as having to request access to the plan.

3. Aid low-income and vulnerable communities in covering costs for the repair or replacement of damage to property. As part of its Restore Louisiana Homeowner Rehabilitation, Reconstruction and Reimbursement Program, the state first directed funding to individuals that are of low-income, elderly or have a disability, and who did not have flood insurance.

4. Work with landlords and community organizations to establish a vulnerable persons registry to communicate with them and their caregivers proactively during floods.

5. Implement a grant program. Municipalities can create grant programs to install backwater valves, green roofs, sump pumps and more to help prevent flooding in low-income housing. Flood prone areas should receive more funding than non-flood affected areas to mitigate impacts of water damage. Full cost grant programs should be implemented for low-income homeowners and for landlords with tenants in flood-prone and low-income neighbourhoods, as identified by the flood maps.
    a. The City of Toronto's Basement Flooding Protection Subsidy Program offers homeowners a subsidy of a maximum of $3,400 per property to implement flood protection.[27]
    b. In the Region of Peel, there is a subsidy program that provides a $700 backwater valve rebate.[28]
    c. The City of Buffalo in Alberta has a program where backwater valves installed since May 1, 2020 can be reimbursed. Homeowners in flood affected areas are eligible for $3,000 and those in non-flood affected areas are eligible for $1,500.[29]

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[26] Federal Reserve Bank of Minneapolis, *Disaster Recovery for low-income people: Lessons from the Grand Forks* (September 2006).
[27] City of Toronto, *Basement Flooding Protection Subsidy Program*, online: <https://www.toronto.ca/services-payments/water-environment/managing-rain-melted-snow/basement-flooding/basement-flooding-protection-subsidy-program/>
[28] Region of Peel, *Sanitary Backwater Valve Rebate Program,* online: <https://www.peelregion.ca/wastewater/backwater-valve-rebate.asp>
[29] Regional Municipality of Wood Buffalo, *Backwater valve grants are available to homeowners across the region* (15 February, 2022), online: <https://www.rmwb.ca/en/news/backwater-valve-grants-are-available-to-homeowners-across-the-region.aspx>

d. The City of Windsor has a Basement Flooding Protection Subsidy Program that offers a subsidy for the installation of sump pumps, backwater valves and disconnecting foundation drains with a maximum of $2,800 for each property. The program does not include the replacement of an existing sump pump.[30]
e. In Detroit, Michigan, there is a Basement Backup Protection Program with $15 million in funding to support homeowners in 11 select areas prone to basement backups. It supports installing backwater valves and sump pumps, but does not cover replacement costs.[31]

6. Enact a bylaw that governs basement flooding grants, subsidies and incentive programs because they are key for supporting low-income communities. A reserve fund should be created and distributed. London, Ontario enacted a Basement Flooding Grant Program By-law to provide guidelines for grants to certain owners of residential dwellings. A Reserve Fund was established for the Program.[32]

7. Construct infrastructure to manage stormwater. Rainwater retention tanks can reduce runoff and the water collected can be utilized to flush toilets, water gardens, wash cars and more. City-wide implementation of green roofs can also contribute to stormwater retention. The City of Toronto's Green Roof By-Law requires that green roofs are constructed on new buildings. Please see CELA's Green Roof Recommendation for more information.

[30] City of Windsor, *Basement Flooding Protection Subsidy Program (BFPSP),* online: <https://citywindsor.ca/residents/maintenanceandfieldservices/Sewers-/Pages/Basement-Flooding-Protection-Subsidy-Program-(BFP).aspx>
[31] City of Detroit, "Mayor, DWSD announce up to $15M program to reduce basement backups in 11 flood prone neighbourhoods" (7 February 2022) online: <https://detroitmi.gov/news/mayor-dwsd-announce-15m-program-reduce-basement-backups-11-flood-prone-neighborhoods>
[32] City of London, "Basement Flooding Grant Program By-Law - A. - 7562 - 160" online: <https://london.ca/by-laws/basement-flooding-grant-program-law-7562-160>