Engaging Canadians in Flood Risk Management
Lessons from the International Community

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Key Points
→ Flood risk management is most effective when responsibilities are defined and shared among stakeholders, and when citizens feel personal responsibility to reduce their flood risk.
→ International experience shows that effective public engagement starts at the community level, but must be supported by accurate and locally relevant flood risk information.
→ Canada needs a strategy to engage Canadians in flood risk management that involves educating them about personal and community flood risks and encouraging them to take responsibility to protect themselves and their property from floods.

Introduction
In recent years, unprecedented flooding has caused billions of dollars in damages across Canada. The 2017 spring floods in British Columbia, Ontario, Quebec and the Maritimes served as a reminder that flooding is a national issue that deserves attention from governments, private stakeholders and the public (Bradley 2017; CBC 2017a; Canadian Press 2017). These events revealed that Canadians are typically unaware of their flood risk and are caught off-guard by the economic burden that flooding imposes. In eastern Ontario, for example, it was only after their properties were flooded that cottage owners discovered that damages to secondary residences are ineligible for financial compensation through the province’s disaster assistance program (Fagan 2017). Similarly, after widespread basement flooding in Windsor, Ontario, 40 percent of affected homeowners were denied financial assistance, while another 40 percent of claims remain in limbo (CBC 2017b). Too often, property owners are left to pay out-of-pocket for repairs and restoration, which can amount to tens of thousands of dollars, depending on the severity of the damage and the value of the property and its contents (Beeby 2017).
About the Authors

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A recent survey conducted at the University of Waterloo illustrated this flood awareness gap: about 94 percent of Canadians living in designated flood risk areas do not know they are at risk (Thistlethwaite et al. 2017). This is problematic for two reasons. First, people who perceive little risk from floods are unlikely to adopt personal protection measures to reduce and manage flood impacts. Indeed, the survey indicated that a majority of Canadians are taking little action to protect their property and less than one-quarter intend to buy flood insurance. Second, eligibility for federal and provincial disaster assistance has been tightened, shifting greater responsibility to property owners to protect their property and finance recovery, but these new expectations have not been effectively communicated to Canadians.

Like Canada, other countries have faced rising flood costs and have sought ways to share responsibility for flood preparedness and recovery. In many states, this has resulted in a policy shift toward integrated flood risk management, a holistic approach to flooding that clearly distributes responsibilities among governments, private actors and citizens, and employs multiple strategies to reduce and manage flood risk. In Germany, for example, efforts to increase public risk awareness assisted in reducing flood losses by 40 percent (Thieken et al. 2016). The experiences of other countries offer valuable ideas about how to strengthen flood risk management in Canada.

This policy brief scans international initiatives designed to foster flood risk awareness, engage the public and encourage behavioural changes that support flood risk management. From this analysis, there are two overarching lessons that can inform Canadian flood risk management policy. First, public risk information, in particular in the form of flood risk maps, is fundamental to raising awareness among citizens, achieving transparency and increasing the legitimacy of flood risk policy decisions (for example, regulating flood plain development). Second, to induce the public to participate in flood risk management, citizens must perceive flooding as a serious problem — one that threatens their home and community — and acknowledge that they have a responsibility to protect themselves and their property. Locally appropriate public engagement campaigns that resonate personally with citizens are most effective in motivating protective behaviour. The policy brief concludes with three policy recommendations on how to better engage Canadians in flood risk management.

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**Informing Canadians through Flood Risk Maps**

International experience shows that flood risk maps are a crucial source of information for flood risk management (Hegger, Driessen and Bakker 2016). Beneficiaries of this information include emergency managers, planners, engineers, realtors, lenders, insurers and the public. Whereas flood maps have typically been used in Canada for planning purposes (for example, regulating development on flood plains), they can also be a valuable tool for public risk communication that increases awareness of flood risk and socializes citizens to share responsibility for risk reduction (Hagemeier-Klose and Wagner 2009). Publicly accessible flood risk maps are an important reminder for citizens, since floods may occur infrequently and may not be part of public memory.

Canada’s approach to flood maps differs from its international counterparts’ in two key ways. First, flood maps in other countries are typically created and maintained by national and regional governments and then distributed to local authorities to support planning decisions and public awareness. Second, other countries typically make flood maps publicly available online, coupled with additional, context-specific information, such as photographs of previous flood events and stories of personal hardship in dealing with floods (CAPFLO [Local Resilience Capacity Building for Flood Mitigation] 2017a).

In Canada, flood map production is decentralized and fragmented. Local organizations (for example, municipalities or conservation authorities) are tasked with developing their own maps and flood information. This approach to flood map production continues to be supported through the National Disaster Mitigation Program, which encourages individual communities to create their own maps (Public Safety Canada [PSC] 2017). Meanwhile, most maps are outdated — with a median age of 18 years — and development in flood-prone areas has continued (MMM Group 2014). This fragmented approach to flood risk
mapping is out of step with Canada’s international counterparts, who typically coordinate map production and employ dissemination strategies designed for public engagement. A review of contemporary practice suggests:

→ maps are created primarily by regional and national governments, who often work with communities to integrate local knowledge and feedback into flood modelling processes (de Moel, van Alphen and Aerts 2009; Alexander et al. 2016);

→ public access to maps is provided by an authoritative and trusted organization (for example, the Environment Agency in the United Kingdom; the Austrian government in partnership with insurers) (Alexander et al. 2016);

→ maps are updated regularly in recognition that flood lines are not static (for example, the European Union and the US Federal Emergency Management Agency [FEMA] require maps to be revised every five to six years) (European Commission 2017; FEMA 2006, 2017);

→ maps are typically made publicly accessible through an online flood information portal, as evidenced in Australia, Belgium, the Czech Republic, England, Finland, France, Germany, Ireland, Italy, Luxembourg, Poland, Sweden, Switzerland, the Netherlands and the United States (de Moel, van Alphen and Aerts 2009); and

→ other countries have established coordination strategies whereby national governments provide insurers with flood maps (for example, England) or governments and insurers partner to create and release flood maps publicly (for example, HORA project in Austria) (ibid.).

Flood maps that are made publicly accessible require context, so they must include different and additional information than those used by experts (such as hydrologists) (Hagemeier-Klose and Wagner 2009). A review of practices in other states suggests that public understanding of flood risk maps can be improved by:

→ pairing maps with local information that the public can relate to, such as images of past floods (for example, height of flood waters) and personal stories from households that have experienced flooding (see Grand River Conservation Authority 2017);

→ using searchable online map portals to support risk-awareness campaigns, particularly when floods are not part of recent public memory; and

→ complementing maps with current information about the consequences of flooding (for example, costs of damage) and what citizens can do to address their personal risks (for example, seeking insurance) (Merz, Thieken and Gocht 2007).

The Government of Canada’s Federal Floodplain Mapping Framework acknowledges some of these practices as critical for awareness and engagement (Natural Resources Canada and PSC 2017). It is also promising that Canada already has the technical infrastructure to make flood maps publicly available through the Federal Geospatial Platform initiative. However, at present, flood maps are often unavailable or not easily accessible to the public, making it difficult for property owners to know their risk unless they personally experience flooding. Furthermore, the maps that are available are outdated by international standards.

### Strategically Engaging Canadians in Flood Risk Management

Although it is an important ingredient, providing information about flood risk is not enough to generate behavioural change among citizen groups (Mileti and Fitzpatrick 1992; Parker, Priest and Tapsell 2009). International initiatives to increase public engagement in flood risk management vary considerably in scope and substance, but generally require community involvement in their creation and delivery. Despite their heterogeneous nature, several common factors increase the effectiveness of public engagement initiatives, including trust in authorities (that is, those leading public engagement initiatives), community feedback in flood risk campaigns, coordination across governance scales and methods that instill a sense of personal ownership in flood risk management.

Not all public flood awareness and engagement campaigns are effective (Bradford et al. 2012). One of the most cited reasons why citizens do not mitigate privately against flooding is a lack of trust in authorities (Lin, Shaw and Ho 2008; Armas...

Effective public engagement campaigns build trust over the long term and are community-specific. In Germany, for example, flood risk information materials created by the national government to raise public awareness were found to be ineffective because they did not reflect the existing knowledge and needs of the public (Thieken et al. 2016). A national flood awareness campaign implemented by the Dutch government had similarly poor results, as it did not adequately account for the public’s perception of their own flood risk (Bradford et al. 2012). Co-learning and co-building solutions between experts and non-experts are ways to effectively encourage public involvement in flood risk management (for example, public meetings that teach property owners about insurance). One of the key lessons following a two-year public engagement initiative in England was that the public was more receptive to community organizations (for example, grassroots groups) than the national government (Twigger-Ross et al. 2015; Thaler and Levin-Keitel 2015). Behavioural change is more likely when individuals are engaged in collaborative problem solving with professionals and peers, so that they are motivated by a belief in the efficacy of individual ideas or actions rather than being compelled to act by outside forces (Parker, Priest and Tapsell 2009).

Engaging the public in learning about personal and community flood risks and motivating behavioural change can be resource-intensive. Many communities lack the capacity to create and manage engagement campaigns independently, so there is a critical role for higher levels of government to support these initiatives by providing resources and guidance. In some countries, local initiatives are derivatives of national flood awareness and engagement campaigns (for example, England and Germany). This implies an intergovernmental partnership whereby upper-level governments play a role in launching engagement campaigns and supporting their continued functions, while local governments facilitate long-term implementation by integrating flood risk management into existing programs and projects (for example, volunteer-run educational programs and including flood insurance information in existing emergency preparedness documents).

Finally, it is important to instill a sense of personal ownership in flood risk management. This can be accomplished in various ways, such as through community feedback on existing flood risk campaigns, information sessions on insurance and incentives to install protection measures (CAPFLO 2017b). For example, the German national government has created a “flood pass” system that enables property owners to request a flood risk assessment of their property. This assessment is then reviewed by an expert and, if it is approved, the homeowner will have access to private insurance and learn about ways to reduce the property’s flood risk (Organisation for Economic Co-operation and Development [OECD] 2016). Without a sense of personal responsibility, citizens lack an incentive to take protective action. In the Netherlands, for example, heavy investment in structural flood defences and low public engagement in flood risk management have created a false sense of security among citizens, making it more difficult to convince them to prepare for floods (Kaufmann et al. 2016).

Policy Recommendations

The following recommendations are presented as an integrated approach to effectively inform and engage Canadians in flood risk management and are based on practices employed by the international community.

Create flood risk maps and make them available to the public. Flood risk maps are invaluable for spatial planning, emergency management and risk communication. Other countries have established systematic methods of creating and revising flood maps. A centralized mapping initiative in Canada would enable local authorities to focus on reducing their own flood risk rather than on investing scarce
time and resources in determining how to create accurate flood maps (Moghal and Peddle 2016). Maps should account for the changing nature of flood risk due to climate change by integrating adjustments based on future emissions scenarios. When sharing flood maps with the public, information must be packaged in a way that is both informative and compelling. Public flood maps should be paired with the following: historical flood data; actions that citizens can take to reduce risk before, during and after a flood (such as purchasing flood insurance); advice on mitigation measures that can protect personal property from flooding (for example, a clear explanation of costs and benefits might be helpful to spark action); and information about the real economic and personal costs of flooding. It is also important that flood risk maps be dynamic and updated regularly to reflect changes in land use, population growth, infrastructure changes and other relevant factors. There is social licence for this policy change in Canada: the survey referenced above indicates that 90 percent of Canadians are in favour of the public release of flood maps (Thistlethwaite et al. 2017).

**Design and implement public engagement initiatives.** Flood maps are only the start of the conversation. Effective public awareness and engagement campaigns emerge from individual community members, grassroots groups or the local authorities who are best positioned to engage members of the public. Effective awareness and engagement initiatives are sensitive to the audience and the social context, and national governments have a role in stimulating local initiatives. In England, for example, the Department for Environment, Food & Rural Affairs launched and coordinated an awareness and engagement initiative — the Pathfinder Scheme — but participating communities designed locally appropriate initiatives within the scheme (Twigger-Ross et al. 2015). These efforts were effective because trust and credibility were established as the foundation for co-learning with residents.

**Leverage community resources to implement long-term engagement and awareness.** Incorporating flood risk communication into existing public communication channels (for example, town hall meetings) is an effective and efficient way to implement public flood risk awareness campaigns. It is also efficient to partner with local non-governmental organizations (NGOs), social enterprises and private actors to pool resources for flood risk awareness and engagement. For example, the United Kingdom’s National Flood Forum, a national charitable organization funded by government and industry, has helped implement flood action groups across England and has supported local capacity building for flood mitigation. In Zaragoza, Spain, a local social enterprise, ebroNAUTAS, leads guided kayak tours on the Ebro River to share local knowledge on floods and Spanish flood risk management policies (CAPFLO 2017b). After these tours, 93 percent of participants reported a “significant” increase in risk perception and willingness to implement property-level protection. Local NGOs or social enterprises are often trusted community groups that are well-positioned to lead flood mitigation initiatives or to simply build interest in flood issues. Ultimately, governments and homeowners must share responsibility for flood risk management, and public investments in prevention and recovery must be supplemented by homeowners’ investment in self-protection (Box, Thomalla and van den Honert 2013). Effective long-term public engagement and awareness campaigns can help facilitate this risk sharing.

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1 See https://nationalfloodforum.org.uk/working-together/community-engagement-hub/.


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