Canadian Water Network | IBC Insurance Bureau of Canada

Framing the Canadian Centre for Climate Information and Analytics to advance municipal flood management

INSIGHTS FROM A 2020 STUDY BY CANADIAN WATER NETWORK, SUPPORTED BY INSURANCE BUREAU OF CANADA

SUMMARY OF INSIGHTS

The impacts of climate change are being experienced by Canadians more and more frequently, and with more severe consequences. Flooding from severe storms and overflowing waterbodies has caused significant damage to Canadian communities over the past two decades. Insurance Bureau of Canada (IBC) says flooding is the "dominant climate peril facing Canada today."

To make effective decisions about adapting to climate change (including flood management), municipalities, provincial/federal levels of government and the private sector need relevant, timely and reliable climate data. A national solution is needed to support Canada's public and private sectors with their task of protecting people, the environment and local economies. In 2019, Canada's Expert Panel on Sustainable Finance recommended the establishment of a Canadian Centre for Climate Information and Analytics (C3IA), as an authoritative source of climate information and decision analysis.

Canadian Water Network, with support from IBC, undertook a study on how to best frame the new C3IA so that it will be useful for, and used by, municipal decision makers. The study commenced with a series of group meetings and one-on-one discussions with expert advisors on key areas of overlapping interest. The findings that emerged from this process were then used to shape the study's preliminary recommendations, which were then validated with municipal decision makers using a questionnaire. To read the full report, visit Canadian Water Network's **website**.

The C3IA needs to deliver three key functions to support effective decision-making on flooding:

- The curation of relevant data and information
- The curation of different kinds of data and information products from different sectors
- Expert analysis of the data to advance flood risk assessment and hazard mapping

These functions could be implemented as consecutive phases, whereby the first phase involves the curation of data and information and the final phase involves providing more complex functionality such as expertise in data analysis.

Establishing a data governance framework at the outset of the C3IA would be important to ensure data quality and support data analytics capabilities. An important near-term goal in the design of the C3IA is the development of a robust data governance framework to guide and establish minimum requirements

for the sending and receiving of data, information and knowledge between the spokes and the central hub of the C3IA. This data governance framework would help translate the overall framing to a practical implementation approach that informs and dictates the structure of how the C3IA would be delivered.

Ultimately, understanding the data and information needs of municipal decision makers to better assess risks and adapt to climate change — as well as the data and information they generate that would be useful to others — is critical to the successful implementation of the C3IA. Getting this right from the outset will greatly increase the ability of the C3IA to tangibly inform decision-making on climate change adaptation in the short-, medium- and long-term.

AN OPPORTUNITY TO SHAPE THE DEVELOPMENT OF THE C3IA

Climate change impacts are being experienced by Canadians more frequently and with more severe consequences. Extreme weather events now represent a significant challenge for Canada's people, environment and economy. Flooding from severe storms and overflowing waterbodies caused significant damage to communities in Canada over the past two decades and has now become the main source of property claims for the Canadian insurance sector. Reducing the risk of costly impacts from flooding requires strategic actions to adapt to climate change in communities across Canada.

Insurance Bureau of Canada has declared flooding **as the**

"dominant climate peril facing Canada today."

Responding to climate change is a challenge that is truly cross-sectoral and requires the development of effective approaches to better identify, understand and respond to the risks involved. In 2019, **Canada's Expert Panel on Sustainable Finance** recommended the establishment of a Canadian Centre for Climate Information and Analytics (C3IA) as an authoritative source of climate information and decision analysis to inform climate adaptation actions and investments. Municipalities, provincial and federal levels of government, and the finance and insurance sectors all conduct activities that involve identifying and/or mitigating risks posed by extreme weather events. The C3IA presents an important opportunity to leverage and curate the data, information and knowledge that public and private sectors are generating to better inform decision making.

The success of a C3IA relies on establishing the willingness and ability of multiple sectors to share data, information and knowledge. To achieve this collaborative approach and effective knowledge sharing, two things need to happen: the C3IA must provide clear value for participating sectors and achieve the trust needed by ensuring that the participating sectors are effectively engaged and heard in the early stages of the C3IA's development. Canadian Water Network and the Smart Prosperity Institute, with support from IBC, have developed recommendations on how to frame and structure the C3IA so that it can realize its intended purpose. **Canadian Water Network's study** focused on the needs of the municipal sector. **Smart Prosperity Institute's study** focused on the financial sector.

ASSESSING THE NEEDS OF CANADA'S MUNICIPAL SECTOR

Canadian municipalities are on the front lines of making key decisions that impact Canadians every day. As the owners of 60% of public infrastructure, they are constantly making short-, medium- and long-term decisions about risk management and setting priorities for climate change adaptation. Municipalities also generate data and information that could further inform the decisions made by other sectors. Thus, ensuring that municipalities can participate in and benefit from the C3IA will greatly increase its ability to deliver value to all Canadians.

Many municipalities across Canada have embraced open data over the past decade. There is growing interest in accessing and sharing data, information and knowledge with others outside the municipality, particularly to inform decisions on flood risk assessment and mitigation. The successful implementation of the C3IA requires first understanding what the data needs of these on-the-ground decisions actually are, and what data, information and knowledge will need to be shared or accessed as a result. Before the C3IA can curate data, information and knowledge that meets various sector needs, there needs to be a solid understanding of the decisions that municipalities need to make in their management and mitigation of flood risk.

Canadian Water Network consulted with the study's expert advisors and reached out to municipal decision makers from stormwater utilities to investigate:

1. The decisions that municipalities need to make — now and in the future — on flood risk assessment and mitigation
2. Data and information that is used or generated by municipalities to inform the above decisions
3. Additional data and information needed by municipalities to better inform decisions
4. Key elements of data, information and knowledge curation that will ensure the C3IA's usefulness and usability to municipalities

During this investigation, we learned that municipalities and utilities collect and use data/information on municipal assets (e.g., asset condition), historical flood locations and frequency, the location of low-lying areas or basins, and the location of critical infrastructure. There are key pieces of data and information that would further inform municipal decision-making, but are currently not available or accessible. Municipalities and utilities highlighted the need for better information on storm cell characteristics and patterns, as well as how to more accurately represent storm cells in flood risk models. There was general agreement among the municipalities participating in the study that the accurate representation of storm cells in flood risk modelling is a key need to advance the assessment and mitigation of flood risk. Respondents from east and west coast municipalities also indicated that storm surge and tidal information is critical to advancing flood risk assessment and mitigation, but is often not available to them. These municipalities also do not have access to information on sea level rise and its potential impacts at the local level.

SHAPING THE C3IA TO MEET MUNICIPAL SECTOR NEEDS

Canadian Water Network's final report recommended that the C3IA should fulfill the following functions to be useful for and used by Canadian municipalities:

- Curate relevant data and information
- Curate different kinds of data and information products from different sectors
- Provide advanced expertise on data analytics that could advance flood risk assessment and hazard mapping

The curation of data generated by other sectors would enable municipalities to compare similarities and differences with how flood risk is identified and assessed by other sectors, resulting in a more complete picture. The provision of data analytics and expertise would also have strong value for municipalities — for example, municipalities would benefit from expertise on how to downscale precipitation information from global and regional climate change models to inform local analysis. The C3IA could introduce each of the three key functions consecutively, using a phased approach. Initially, data curation would address some critical gaps, but the strongest potential to support municipal decision-making lies in curating data from other sectors (phase 2) and the provision of data analytics expertise (phase 3). This three-phase framing for the C3IA is illustrated in the figure on page 6.

PHASE 1

Curate relevant data and information

Getting a better handle on our collective knowledge base and opportunities that could be facilitated by data and information curation

Data and information curation from various sectors or 'spokes'.

PHASE 2

Curate different kinds of data and information products from different sectors

Determining how a more holistic picture of risk can be created to better inform decisions

Includes access to different data uses and products for municipalities to use to compare their assessment of flood risk with that of other sectors' assessments.

PHASE 3

Provide advanced expertise on data analytics that could advance flood risk assessment and hazard mapping

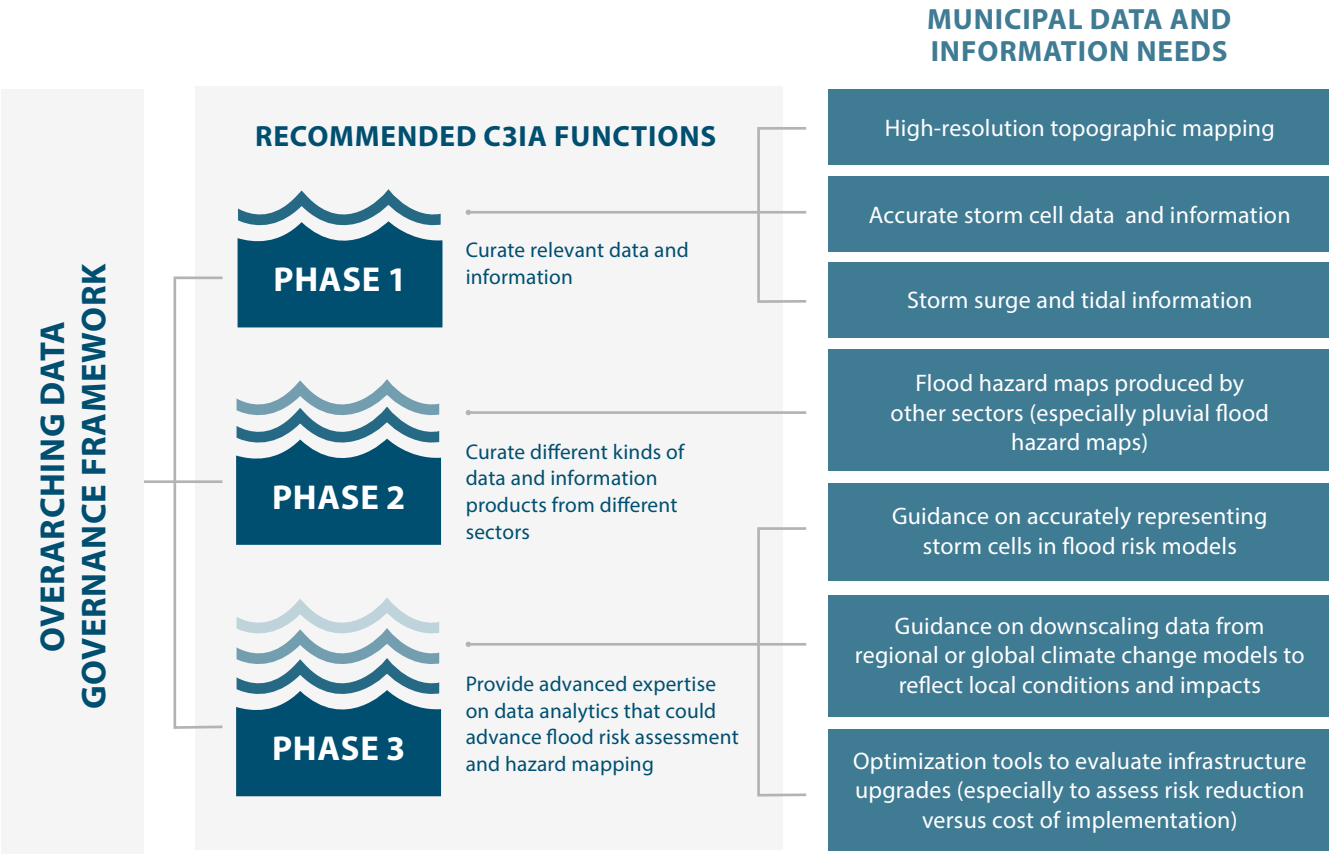
Generating the knowledge that tangibly supports climate-informed decisions

Includes supporting the creation of data/information products, providing tools for data analysis, and contributing to the generation of new methods of analyzing data and information.

Canadian Water Network's study investigated what aspects of data, information and knowledge curation would be useful to municipalities. Municipalities suggested that the C3IA establish protocols to ensure that the data, information and knowledge are up-to-date, securely transferred and protected. They also highlighted the importance of establishing protocols to ensure that a minimum standard of data and information quality is maintained. It was important to them that data ownership, stewardship, and custodianship be clearly listed and maintained. As a result, the study recommended the creation of a data governance framework to guide the sharing and curation of data, information and knowledge.

Establishing an overall data governance framework at the outset of the C3IA would be important to ensure data quality and support data analytics capabilities. The development of a robust data governance framework to guide and establish minimum requirements for the sending and receiving of data, information and knowledge between the spokes and the central hub of the C3IA is an important next step in the design process. The data governance framework would help translate the overall framing to a practical implementation approach that informs and dictates the structure of how the C3IA would be delivered. Efficient, effective and sustained functioning of the C3IA's proposed hub and spoke model would also be strengthened by establishing a data governance framework with both intra- and inter-organizational policies, procedures and processes.

The figure below presents the study's recommended overall framing for the C3IA, with municipal needs depicted as extensions of each of the three phases. The needs summarized in the figure reflect those that would tangibly support municipal decision-making related to the management of flooding — Canada's most prevalent and costly climate risk for communities.



The study found that the C3IA must be viable, stable and sustainable to warrant the municipality's investment, both in terms of time and effort, into the development and implementation of the C3IA. The framing and structure must clearly reward contributors by providing access to dependable, quality data, information and knowledge that can tangibly advance decision-making on flooding and other impacts from climate change.

There is a clear opportunity for a nationally relevant approach like the proposed C3IA to advance and elevate the success of Canadian municipalities with their task of protecting people, the environment and local economies from the impacts of climate change. This study highlights the critical importance of accurately framing well-informed objectives at the outset before developing the C3IA's structure. Ultimately, understanding the needs of municipal decision makers, as well as exactly what data, information and knowledge will need to be shared or accessed is a key factor in successful implementation. Seeking clarity from potential contributors and users from the outset will greatly increase the C3IA's ability to deliver genuine value and tangibly inform decision-making over the long term.

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