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# **Benchmarking Climate Change Adaptation Action in Ontario**

## **Summary Report**

AUGUST 2022

# BENCHMARKING ADAPTATION ACROSS ONTARIO

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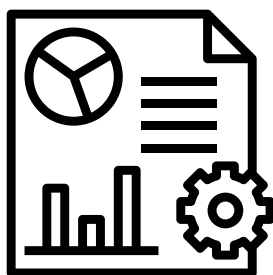
Municipalities across Ontario are on the front lines of responding to the impacts of a changing climate. Many communities have started to undertake formal planning to adapt to these impacts, however adaptation tracking and adequate reporting systems to measure the effectiveness of these actions do not exist. Improving the knowledge of adaptation implementation will help to improve efficiency and targeted action, and support an informed evolution of the next generation of capacity building programs and policies.



With support from Natural Resources Canada, the Climate Risk Institute (CRI) conducted an analysis of climate change adaptation implementation across Ontario municipalities. The results of this analysis will help establish baseline knowledge of adaptation action in Ontario municipalities and reveal the progression of climate change adaptation in thematic areas such as policy, infrastructure resilience, nature-based solutions, and community health and well-being.



An online survey was distributed to over 400 municipalities in Ontario and supplemented with one-on-one conversations with municipal staff to reveal more detail on the current state of implementation and associated driving factors and barriers related to progressing adaptation. The 85-question survey included a list of detailed adaptation actions under the following thematic areas: economic mechanisms, municipal planning and decision-making, infrastructure, policy laws and regulations, nature-based solutions, capacity building and education, and community health, safety and well-being. The virtual interviews aimed to advance understanding of the nuances that were not apparent in the survey results and to obtain additional information in categories not contained within the survey including coordination and governance, enabling factors, prioritizing action, and reporting and evaluation.



This project establishes a snapshot of climate change adaptation in Ontario municipalities that can be used to address barriers and advance climate change adaptation policy and programs at all levels of government. Identified areas for future work include increasing systematic support for municipalities, improving guidance and training, particularly on the economic analysis of adaptation, and supporting municipal coordination and knowledge transfer.



# KEY FINDINGS



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## Results

- 53 municipalities responded to survey and 16 one-on-one interviews were conducted.
- 7.1 million Ontarians reside in the communities that answered our survey.
- 50% of these communities have, or are working on, a Climate Change Adaptation Plan.
- Over 50% reported not having any capacity to work on adaptation or said responsibility was shared across municipal departments.
- Extreme weather events were the primary driver in advancing adaptation implementation efforts in most communities.
- Climate emergency declarations have spurred or accelerated implementation.
- Covid-19 stalled adaptation efforts when staff were temporarily reassigned to other departments but also led to resilience-building opportunities through emergency planning.
- Most implemented actions include: stormwater infrastructure improvements, emergency management plan updates, providing climate risk information on webpage, and providing back-up power in municipal facilities.
- Staff time, expertise, and turnover were the primary barriers to adaptation action implementation, in addition to the cost of actions and competing priorities such as efforts to mitigate greenhouse gases.
- Small municipalities (>25,000 residents) reported a total lack of capacity to support adaptation planning and action implementation.

## Overall Conclusions

- Progress on adaptation remains limited in Ontario.
- A lack of monitoring and cost-benefit analysis of adaptation actions impedes implementation.
- Small municipalities feel left behind and unable to compete for funding for adaptation actions.
- All municipalities are struggling to identify and provide support to vulnerable populations.

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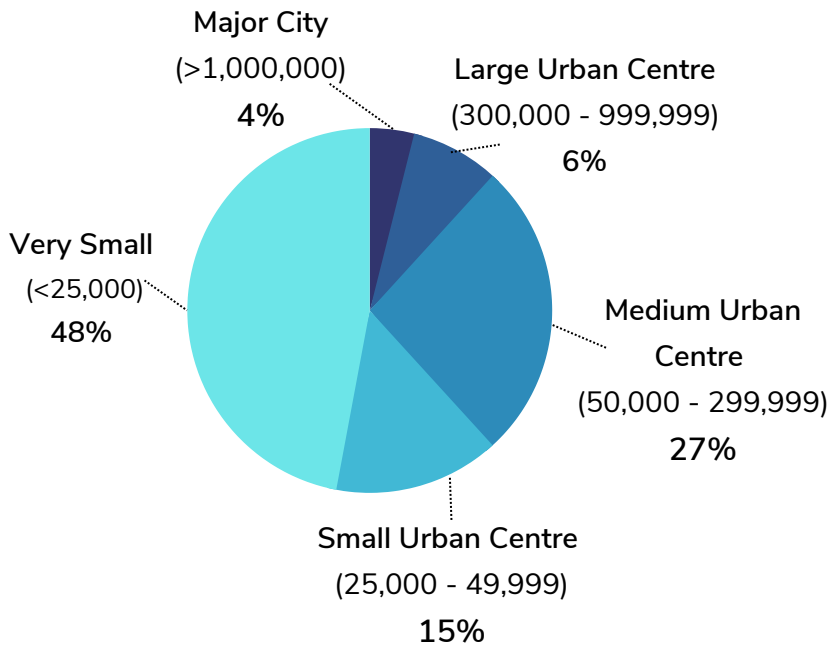
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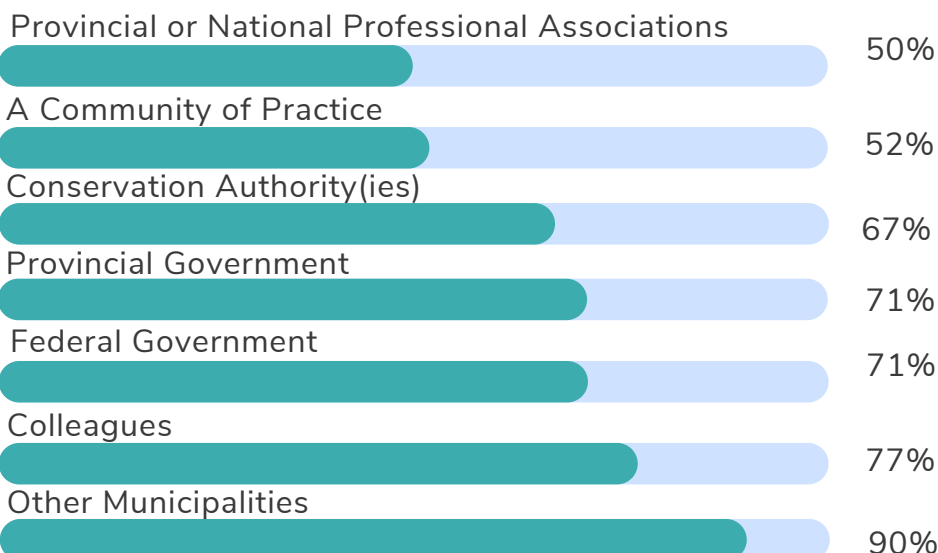
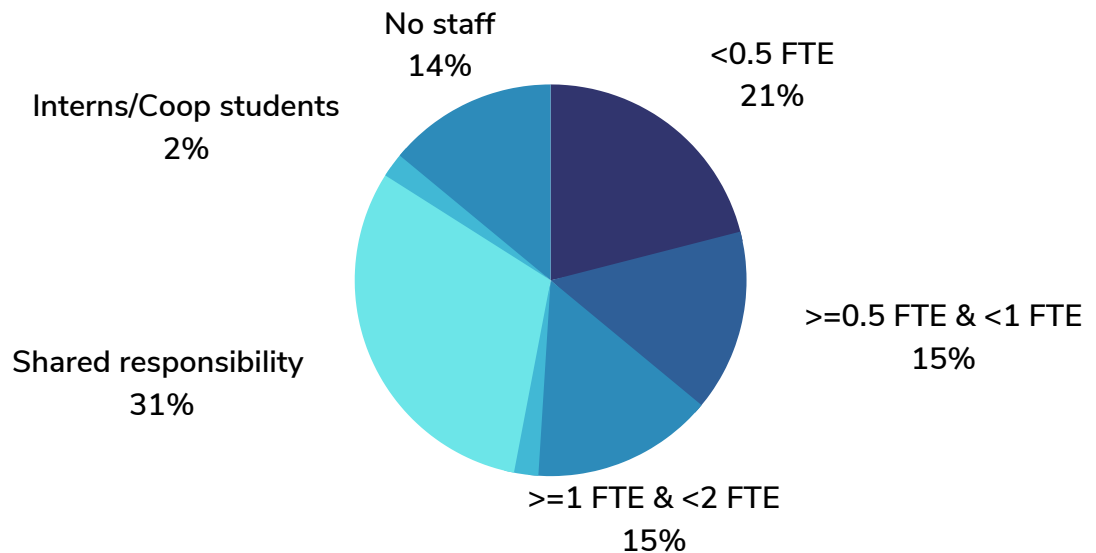
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# SNAPSHOT OF SURVEY RESULTS

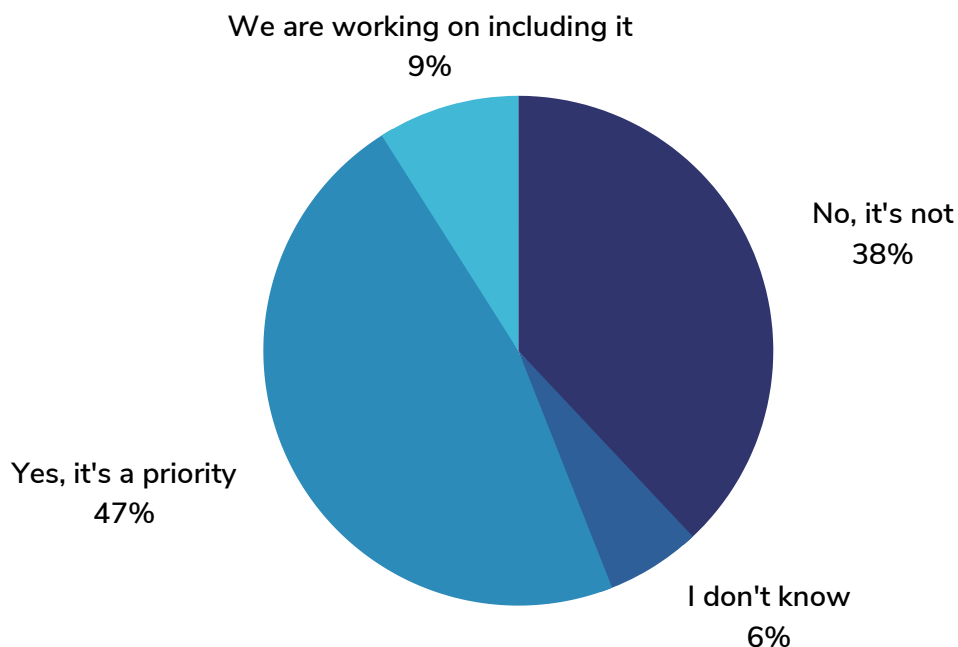
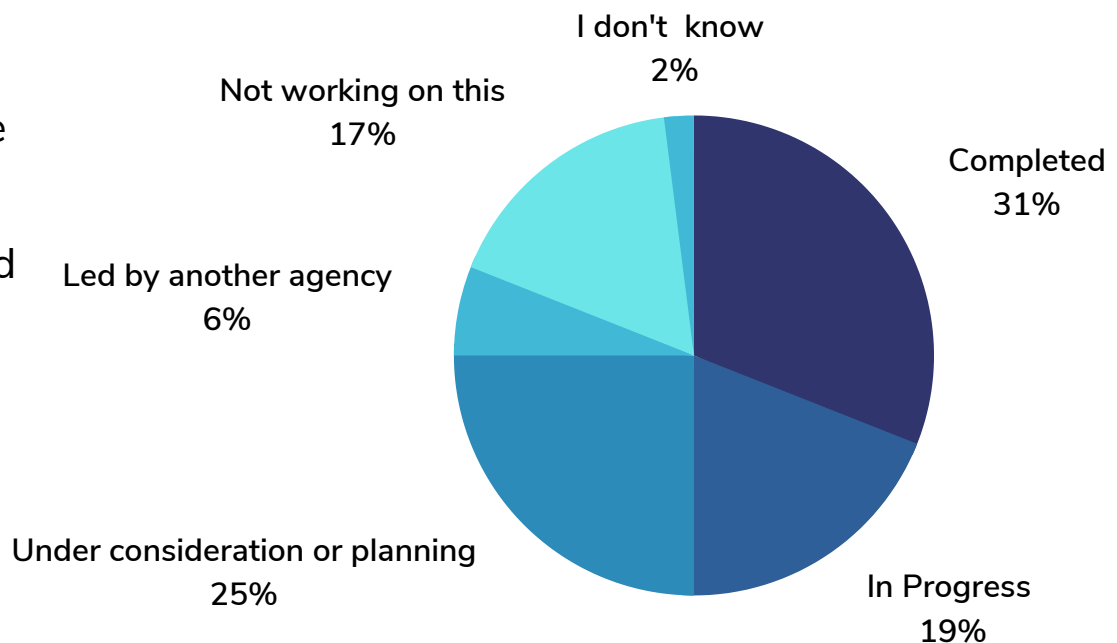
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"Do you have staff dedicated to furthering climate change adaptation in your community?"

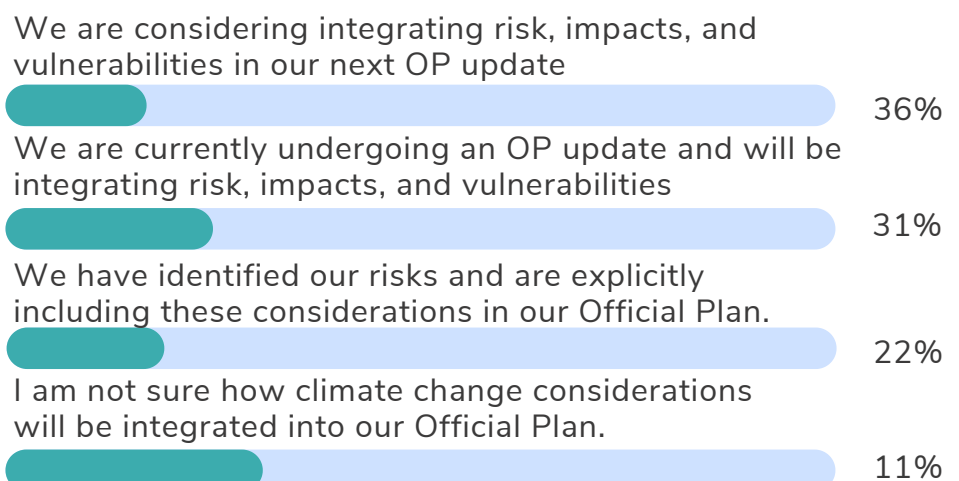


"A Climate Change Adaptation Plan has been completed and endorsed by council."



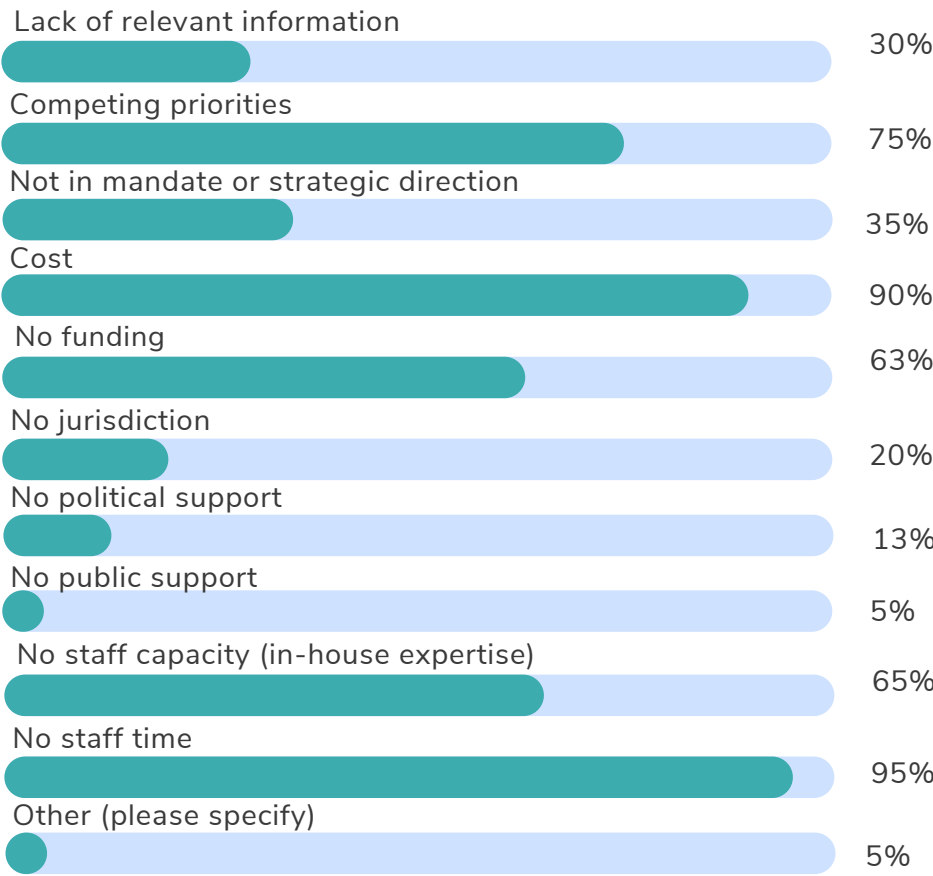
"Climate change adaptation or climate resiliency is identified as a priority in the strategic plan."

"Policies in the Official Plan (OP) require consideration of climate change risk, potential impacts, and vulnerabilities"

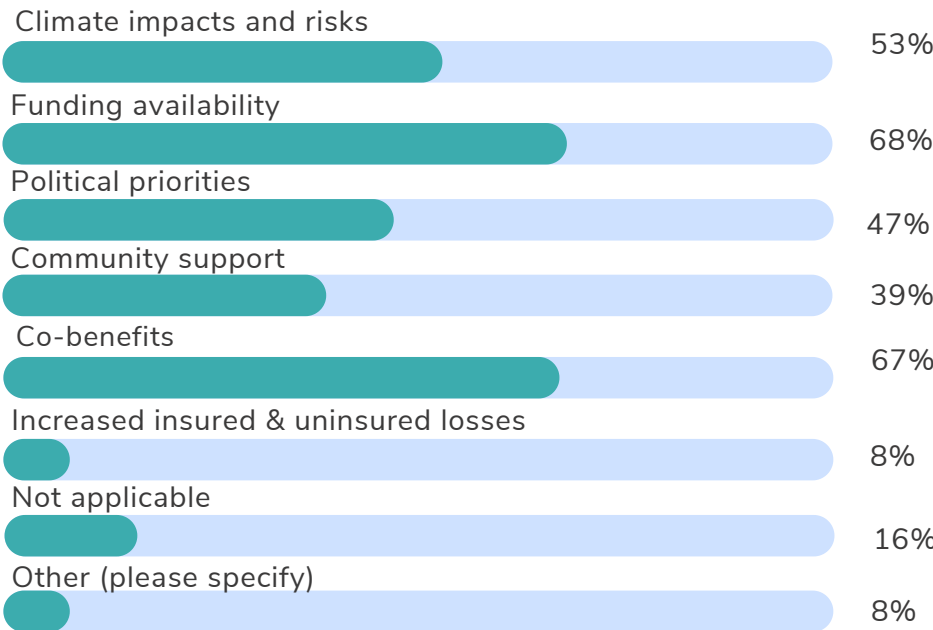


# BARRIERS AND DRIVERS OF IMPLEMENTATION

"Which barriers do you experience when implementing climate adaptation plans and projects?"



Percentage of municipalities that reported each barrier as impeding progress on adaptation implementation



"What is driving implementation of adaptation actions in your community? How are measures being prioritized for implementation?"

Percentage of municipalities that reported each driver as facilitating progress on adaptation implementation

# SURVEY RESULTS BY CATEGORY

- 53 municipalities responded to the online survey.
- 16 follow-up interviews were conducted.
- Over 7.1 million people reside in the communities that answered our survey, which is approximately 49% of the total population of Ontario.

| Thematic Area      | Action   | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|--------------------|--|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| Economic Mechanism | A Community Improvement Program incentive has been established or amended to encourage developers or residents to implement adaptation actions such as lot-level flood prevention  | 12%                             | 6%   | 26%  | 0%                                       | 50%                         | 6%                                  | 0%               |
|                    | A Microfinancing Program has been established to support residents or businesses in undertaking climate adaptation actions (e.g., shoreline assistance loan program)   | 2%                              | 4%   | 20%  | 4%                                       | 64%                         | 6%                                  | 0%               |
|                    | An Extreme Weather Emergency Fund has been established for your municipality to cover response and recovery costs after extreme weather events   | 10%                             | 4%   | 14%  | 0%                                       | 60%                         | 12%                                 | 0%               |
|                    | Your Municipality has Climate Consideration in Budget Forecasting, including long-term Capital Plans and operating budgets (e.g., increased infrastructure costs associated with required flood mitigation measures)   | 6%                              | 20%  | 42%  | 2%                                       | 26%                         | 4%                                  | 0%               |
|                    | Your municipality has submitted Climate Adaptation Funding Applications to address climate impacts (e.g., National Disaster Mitigation Fund, Disaster Mitigation Adaptation Fund, FCM Green Municipal Fund, FCM Municipalities for Climate Innovation, etc.) | 40%                             | 10%  | 22%  | 4%                                       | 20%                         | 4%                                  | 0%               |
|                    | Your municipality uses a Stormwater fee system to fund stormwater infrastructure improvements and capacity expansions to account for climate change  | 14%                             | 8%   | 18%  | 2%                                       | 48%                         | 8%                                  | 2%               |

|                    |   |     |     |     |    |     |    |    |
|--------------------|---|-----|-----|-----|----|-----|----|----|
| Economic Mechanism | Climate Adaptation Economic Analysis - A Cost-benefit analysis of climate change impacts in your community has been undertaken (e.g. insured vs. uninsured losses from a flood, clean-up costs, 'do nothing' economic assessment. | 6%  | 12% | 24% | 8% | 46% | 4% | 0% |
|                    | Accounting of Natural Assets was incorporated into asset management planning and have been valued based on services provided  | 2%  | 26% | 42% | 4% | 26% | 0% | x  |
|                    | Flood Proofing Incentive Programs have been implemented (e.g. downspout disconnection programs, backwater valve installation rebate programs, low impact development incentive programs)  | 20% | 10% | 26% | 4% | 38% | 2% | 3% |

### Key Stats

- 40% of municipalities have submitted funding applications to address climate impacts ( e.g., National Mitigation Disaster Fund, Disaster Mitigation Adaptation Fund, FCM Green Municipal Fund, FCM Municipalities for Climate Innovation, etc.)
- 6% of municipalities have undertaken an economic analysis of climate impacts in their community.
- 2% of municipalities have incorporated natural assets into their asset management plans and have been valued natural assets based on services provided.

| Thematic Area                          | Action   | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|--|--|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| Municipal Planning and Decision Making | Natural Heritage Plan - An assessment of the impacts climate change will have on local ecosystems has been completed to determine priority natural heritage systems sites.   | 2%                              | 13%  | 44%  | 7%                                       | 27%                         | 7%                                  | x                |
|  | Watershed and/or Sub Watershed Plans - Climate change has been incorporated into the scenario analysis for various technical components of the watershed planning process, where possible, including terrestrial impact assessment, aquatic system impact assessment, and hydrologic modeling. | 7%                              | 22%  | 16%  | 27%                                      | 18%                         | 11%                                 | x                |



|   |  |     |     |     |     |     |     |   |
|---|--|-----|-----|-----|-----|-----|-----|---|
| Municipal Planning and<br>Decision Making | An <b>Urban Forest Management Plan</b> has been completed or updated to include climate considerations (e.g., impacts to the urban forest, increased canopy targets to mitigate extreme heat, suitable species list for future climate conditions)             | 18% | 18% | 24% | x   | 33% | 7%  | x |
|   | Climate change impacts and adaptation has been identified as a priority in your municipality's <b>Sustainable Neighborhood Action Plan (SNAP)</b>  | 4%  | 11% | 20% | x   | 58% | 7%  | x |
|   | Climate risks are included in municipal and/or regional <b>Emergency Management Plan</b> (including staff training and response planning on climate-related emergencies)   | 36% | 18% | 23% | 5%  | 5%  | 14% | x |
|   | <b>Source Water Protection Plan</b> - A vulnerability assessment has been completed to assess local climate change impacts to determine the vulnerability of drinking water systems to climate change and highlight areas where further protection is required | 9%  | 9%  | 20% | 27% | 13% | 22% | x |
|   | <b>Stormwater and/or Sewer Master Plan</b> Standards and guidelines have been updated to meet performance expectations under future climatic conditions (e.g., increased capacity considerations, updated Intensity-Duration-Frequency (IDF) curves etc.)      | 18% | 20% | 36% | 7%  | 13% | 7%  | x |
|   | A <b>Flood Mitigation Plan</b> or shoreline management plan has been developed to address specific flood issues associated with the changing climate   | 7%  | 24% | 29% | 13% | 22% | 4%  | x |
|   | The <b>Parks and Trails Master Plan</b> has been updated to include climate risks and vulnerabilities. This may include plans for stormwater storage, naturalization plans for biodiversity resilience, or thermal comfort studies/structures                  | 0%  | 29% | 29% | 4%  | 22% | 16% | x |
|   | The <b>Business Continuity Plan</b> has been updated to reflect the potential impacts of severe weather and other climate variables in order to maintain critical operations   | 9%  | 13% | 38% | x   | 24% | 16% | x |
|   | A climate change risk assessment has been undertaken on municipal transportation infrastructure and was used to inform updates to the <b>Transportation Master Plan</b> or <b>Roads Needs Study</b>  | 11% | 9%  | 36% | 4%  | 31% | 9%  | x |

|  |   |     |     |     |     |     |    |   |
|--|---|-----|-----|-----|-----|-----|----|---|
| Municipal Planning and Decision Making | Climate Considerations in Council Reports - Climate change adaptation and/or climate resiliency considerations are included in all staff reports to Council                                   | 20% | 16% | 22% | x   | 38% | 4% | x |
|  | Climate Hazard Mapping - Climate hazards (e.g., flooding, extreme heat etc) have been mapped for the municipality based on the future climate and is used to inform decision-making processes | 11% | 22% | 20% | 16% | 27% | 4% | x |

### Key Stats

- 36% of municipalities have included climate risk into municipal and/ or regional emergency management plan
- 2% of municipalities have undertaken an assessment of the impacts climate change will have on local ecosystems in order to determine priority natural heritage system sites
- 0% of municipalities have an updated Parks and Trail Master Plan including climate risks and vulnerabilities such as stormwater management, naturalization plans for biodiversity resilience, or thermal comfort studies/structures.

| Thematic Area  | Action  | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|----------------|---|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| Infrastructure | Shoreline or Coastal Protection Structures have been constructed along shorelines to mitigate climate impacts (e.g. erosion, flooding, etc.) and/or have been reconstructed for future climate conditions | 10%                             | 14%  | 14%  | 3%                                       | 31%                         | 10%                                 | 17%              |
|                | Dykes, Berms, or Levees structures have been constructed to mitigate climate impacts or reconstructed for future climate conditions   | 7%                              | 14%  | 10%  | 5%                                       | 36%                         | 12%                                 | 17%              |
|                | Water Storage structures and chambers have been implemented in new or re-developments to mitigate flooding impacts  | 17%                             | 14%  | 5%   | 7%                                       | 33%                         | 17%                                 | 7%               |
|                | Transportation Design and Construction projects (e.g., road segments, bridges, etc.) have been replaced or reconstructed to reasonably withstand future climate and weather extremes                      | 7%                              | 33%  | 27%  | 3%                                       | 12%                         | 19%                                 | 0%               |

|                |   |     |     |     |     |     |     |     |
|----------------|---|-----|-----|-----|-----|-----|-----|-----|
| Infrastructure | <b>Reflective Surfaces</b> have been integrated into infrastructure projects and installed on municipal buildings to reduce cooling needs and reduce the urban heat island effect   | 5%  | 7%  | 14% | 0%  | 62% | 12% | 0%  |
|                | <b>Permeable Surfaces</b> have been integrated into infrastructure projects and implemented in response to changing recharge and flow rates   | 7%  | 14% | 43% | 0%  | 29% | 7%  | 0%  |
|                | <b>Stormwater Management Upgrades</b> - Some or all SWM infrastructure has been designed and retrofitted for increased flow events (e.g., increased capacity of SWM ponds, upsized culverts and storm sewers, etc.). Intensity-Duration-Frequency (IDF) curves may have been updated to reflect the geographic areas of the municipality and changing climate parameters. Inflow and Infiltration Studies could integrate climate change considerations | 5%  | 43% | 31% | 2%  | 7%  | 10% | 2%  |
|                | <b>Wastewater Infrastructure Upgrades</b> - Wastewater infrastructure has been designed and retrofitted to reflect projected climate conditions (e.g., flood-proofing, accelerated sewer separation programs, etc.)   | 5%  | 27% | 29% | 10% | 5%  | 12% | 12% |
|                | <b>Energy Resiliency</b> - Back-up power generation (e.g., generators) has been installed in all critical municipal facilities to avoid service disruptions during and after extreme weather events   | 34% | 29% | 29% | 0%  | 5%  | 2%  | 0%  |
|                | <b>Thermal Comfort Improvements</b> - Infrastructure projects have been implemented to mitigate extreme heat at municipal facilities (e.g., drinking water stations, shade structures)  | 5%  | 37% | 34% | 0%  | 17% | 7%  | 0%  |
|                | <b>Green Infrastructure and Low Impact Development</b> projects that feature living and engineered elements designed to manage stormwater and/ or mitigate extreme heat have been implemented (e.g., rain gardens, green roofs, bioswales, etc.) in private and public areas  | 15% | 24% | 37% | 0%  | 17% | 7%  | 0%  |
|                | <b>Building Design Guidelines</b> have been created or updated to incorporate considerations of climate impacts (e.g., encouraging climate-resilient building materials)  | 7%  | 17% | 49% | 3%  | 20% | 5%  | 0%  |
|                | <b>Innovative Building Designs</b> - Municipal infrastructure projects incorporate climate-resilient design and construction (e.g., passive or mechanical cooling)  | 7%  | 15% | 46% | 0%  | 22% | 10% | 0%  |

|                |  |     |     |     |     |     |     |    |
|----------------|--|-----|-----|-----|-----|-----|-----|----|
| Infrastructure | Monitoring Technology - Remote operating, weather monitoring systems or flood alarm systems have been installed within the municipality or at corporate facilities to mitigate impacts of extreme weather events   | 2%  | 12% | 24% | 17% | 24% | 20% | 0% |
|                | Climate Lens is applied to Infrastructure Projects, corporate development, and re-development projects. Measures might include: climate risk assessments to inform output specifications for new construction projects, a portfolio-level flood risk assessment, resilience audits to investigate flood-prone buildings, or a resilience-building checklist. | 3%  | 27% | 44% | 0%  | 22% | 5%  | 0% |
|                | Increased Maintenance and Inspection programs have been strengthened for stormwater management infrastructure and systems (e.g., regular clearing of catch basins) to mitigate flooding impacts  | 15% | 17% | 42% | 2%  | 17% | 7%  | 0% |

#### Key Stats

- 34% of municipalities have backup power generation (e.g., generators) installed in all critical municipal facilities to avoid service disruptions during and after extreme weather events
- 2% of municipalities have remote operating, weather monitoring systems, or flood alarm systems installed within the municipality or at corporate facilities to mitigate the impacts of extreme weather events
- 3% of municipalities have a climate lens applied to corporate development and re-development projects.

| Thematic Area                 | Action   | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|-------------------------------|--|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| Policy, Laws, and Regulations | Zoning by-laws have been reviewed and updated to minimize climate impacts and build climate resilience (e.g., limiting new development in hazardous areas like coastal erosion areas, floodplains, areas of wildfire risk typically identified on mapping, etc.) | 18%                             | 18%  | 38%  | 5%                                       | 10%                         | 10%                                 | 0%               |

|                               |   |     |     |     |     |     |    |    |
|-------------------------------|---|-----|-----|-----|-----|-----|----|----|
| Policy, Laws, and Regulations | Tree-Cutting by-laws have been strengthened to limit tree removals to help sustain tree cover (could also be an action item of a forest or tree management plan)  | 28% | 10% | 31% | 3%  | 26% | 0% | 3% |
|                               | Climate Resilient Building Standards have been developed to prescribe climate resilience features for all new developments. Local standards could be adopted through municipal by-laws and implemented through Official Plans, Plans of Subdivision, Site Plan approvals and Building Permits | 10% | 10% | 38% | 10% | 28% | 0% | 3% |
|                               | Green Infrastructure and LID Standards are required and mandated in new and re-development applications   | 5%  | 18% | 40% | 8%  | 20% | 8% | 3% |
|                               | Human Resource and Corporate Policies have been updated to address climate impacts on staff health and safety (e.g., work from home policies during extreme weather events, extreme heat policies for outdoor workers)  | 30% | 15% | 30% | 0%  | 15% | 8% | 3% |
|                               | Municipality's Procurement Policy has been updated to include climate change considerations and identifies the aspects of climate change that are likely to affect a particular procurement decision  | 5%  | 20% | 43% | 0%  | 30% | 3% | 0% |

#### Key Stats

- 30% of municipalities have updated corporate policies to address climate impacts on staff health and safety (e.g., work from home policies during extreme weather events, extreme heat policies for outdoor workers)
- 5% of municipalities have required and mandated green infrastructure and low-impact developments (LIDs) in new and re-development applications
- 5% of municipalities have an updated procurement policy to include climate change considerations and identify the aspects of climate change that are likely to affect a particular procurement decision

| Thematic Area              | Action   | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|----------------------------|--|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| NB and Ecosystem Solutions | Naturalization Projects - The municipality has undertaken projects to enhance biological diversity and/or re-naturalize areas (e.g., 'no mow' zones have been implemented) | 18%                             | 30%  | 28%  | 3%                                       | 18%                         | 5%                                  | 0%               |
|                            | Tree Planting Programs - The municipality has established tree planting and/or maintenance programs to enhance tree cover  | 33%                             | 33%  | 15%  | 5%                                       | 13%                         | 3%                                  | 0%               |
|                            | Naturalization of Flood Plains - The municipality has undertaken projects to renaturalize flood-prone areas to mitigate risk   | 5%                              | 25%  | 33%  | 13%                                      | 10%                         | 13%                                 | 3%               |
|                            | Controlled and Prescribed Burns or another activity to reduce wildfire risks has been undertaken   | 13%                             | 3%   | 5%   | 0%                                       | 45%                         | 20%                                 | 15%              |

#### Key Stats

- 18% of municipalities have undertaken projects to enhance biological diversity and/or re-naturalize areas (e.g., 'no mow' zones have been implemented)
- 5% of municipalities have undertaken projects to neutralize flood-prone areas to mitigate risk

| Thematic Area                   | Action   | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|---------------------------------|--|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| Capacity Building and Education | Community Climate Awareness and Education Programs have been developed for climate change impacts and risks (e.g., basement flooding, vector-borne diseases, invasive species) or specific adaptation measures (residential flood-proofing methods, tick reduction strategies) have been implemented | 13%                             | 40%  | 30%  | 3%                                       | 15%                         | 0%                                  | 0%               |
|                                 | Staff Training on Climate Risks and Adaptation (e.g., Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, Asset Management and Climate Resiliency, Climate Change Impacts and Adaptation Training for Professional Planners, etc.) has been implemented                      | 5%                              | 25%  | 48%  | 0%                                       | 18%                         | 5%                                  | 0%               |
|                                 | Community Consultation on Climate Change has been undertaken on climate change impacts and adaptation priorities   | 23%                             | 20%  | 30%  | 0%                                       | 23%                         | 5%                                  | 0%               |
|                                 | Staff has hosted or participated in Knowledge-Sharing and Learning and Platforms on Climate Change (e.g., workshops, council presentations, public forums etc.)  | 30%                             | 20%  | 20%  | 3%                                       | 28%                         | 0%                                  | 0%               |
|                                 | Climate information is hosted on your Municipality's Webpage and/or offers resources to climate data services  | 44%                             | 10%  | 15%  | 3%                                       | 26%                         | 3%                                  | 0%               |
|                                 | Community Climate Monitoring Programs or citizen science programs on local climate-related impacts (e.g., extreme weather, invasive species etc.) have been implemented  | 3%                              | 8%   | 23%  | 10%                                      | 50%                         | 5%                                  | 2%               |

#### Key Stats

- 44% of municipalities host climate information for the region on their municipality's webpage and/or offer resources for climate data services
- 5% of municipalities have staff who have completed training programs on climate risks and adaptation (Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, Asset Management and Climate Resiliency, Climate Change Impacts and Adaptation Training for Professional Planners, etc)

| Thematic Area                          |  | "We have completed this action" | "We are working on implementing this action" | "We are considering or planning this action" | "Another Partner agency is leading this" | "No, we are not doing this" | "I don't know if this is happening" | "Not Applicable" |
|--|--|---------------------------------|--|--|--|-----------------------------|-------------------------------------|------------------|
| Community Health, Safety and Wellbeing | Vector Borne Surveillance Programs have been implemented or enhanced (e.g., mosquito or tick surveillance)   | 5%                              | 12%  | 5%   | 30%                                      | 43%                         | 3%                                  | 3%               |
|  | Community Health and Safety Measures - A network of emergency weather shelters, community cooling centres, altered public transportation routes, drinking water stations, or other health and safety measures to mitigate extreme heat and weather have been established | 28%                             | 20%  | 23%  | 10%                                      | 15%                         | 5%                                  | 0%               |
|  | Thermal Comfort Measures such as increased shade structures and urban tree cover in areas vulnerable to extreme heat or heavily used areas during summer months (e.g., park spaces, sports fields) have been implemented   | 3%                              | 33%  | 40%  | 0%                                       | 23%                         | 3%                                  | 0%               |
|  | Food Security Measures - Food surplus distribution programs or other food programs, including community food gardens, have been implemented to address food security inequalities  | 8%                              | 23%  | 18%  | 21%                                      | 31%                         | 0%                                  | 0%               |
|  | Early Warning Communications systems are in place for extreme weather events (e.g., alert systems, GIS-based app)  | 20%                             | 13%  | 18%  | 20%                                      | 15%                         | 15%                                 | 0%               |
|  | Staff Health and Safety Training - Staff have completed training on risk management and emergency protocols during extreme weather events, extreme heat events, etc.   | 5%                              | 25%  | 33%  | 0%                                       | 23%                         | 15%                                 | 0%               |

#### Key Stats

- 28% of municipalities have a network of emergency weather shelters, community cooling centers, altered public transportation routes, drinking water stations, or other health and safety measures to mitigate extreme heat and weather
- 5% of municipalities have staff who have completed training on risk management and emergency protocols during extreme weather events, extreme heat events, etc



# PRIORITY AREAS FOR ADVANCING ADAPTATION IMPLEMENTATION

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## INCREASING SYSTEMATIC SUPPORT

Municipalities bear the burden for implementation of adaptation yet all noted the lack of capacity to adequately undertake the work needed. Federal funding has been critical to advancing adaptation efforts but municipal staff also noted that applications are onerous, and funding can be slow to arrive, making it challenging to advance projects. Smaller municipalities are overwhelmed by grant opportunities and lack resources and expertise to adequately develop robust applications.

## IMPROVING GUIDANCE AND TRAINING

Educational resources related to climate change are needed in multiple languages and with content that addresses action at the homeowner level. Continuous training and upskilling opportunities across all municipal departments continue to be important in building resilience, especially with the high staff turnover many municipalities are experiencing. Additionally, guidance or best practice on coordinating activity between stakeholders was explicitly requested. Providing guidance documents, technical resources and interpretation of climate data continue to be of importance.

## GUIDANCE ON ECONOMIC ANALYSIS OF ADAPTATION

The results of our survey and interviews suggest that few municipalities have the tools to understand the cost of climate impacts. Knowledge of costs of impacts helps define the requisite level of investment for adaptation and ensures adaptation plans are adequately funded for implementation. Economic analysis and guidance are needed on integrating climate-related risks and opportunities into operational budgeting and long-term capital planning. Priority should be given to further developing existing tools and framework that can help measure tangible and avoided costs of climate impacts and benefits or returns from investment in adaptation actions.

## MUNICIPAL COORDINATION AND KNOWLEDGE TRANSFER

Roles, responsibility, and funding for implementation of adaptation actions can be ambiguous between levels of government. Regional (upper tier) governments can play a critical coordinating and knowledge-sharing role, particularly in lower density and rural or isolated municipalities, which may face heightened capacity constraints. Efforts to enhance coordination across Ontario municipalities could increase knowledge transfer and encourage municipalities with more advanced adaptation implementation to share lessons learned with those starting out. This can also help to reduce duplicative efforts and coordinate widespread, transformative adaptation efforts.