MAKING STRIDES ON COMMUNITY ADAPTATION IN CANADA

Final Report

ICLEI
Local Governments for Sustainability

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1 INTRODUCTION

Impacts of a changing climate are already being felt in towns and cities across Canada. Municipalities are becoming increasingly vulnerable to a variety of impacts, including increased incidences of extreme weather events, sea level rise, increasing temperatures, and changes in precipitation.[1] Indeed, there is a growing acknowledgement that it is now adaptation and resiliency strategies at the local level that are essential to support infrastructure, land use planning, and the broad range of services provided by local governments. While climate change adaptation has received increasing attention over the past several years, the focus has largely been on the planning process (e.g. conducting vulnerability and risk assessments, developing different types of asset management plans, storm water management plans, community adaptation plans, etc.) and less on tangible on-the-ground actions. Adaptation planning is a process that is often capable of delivering positive outcomes, however it can also overestimate the capacity of planning to deliver the intended outcomes of adaptation.[2]

The purpose of the *Making Strides on Community Adaptation Project* was to bridge the gap between planning and implementation by increasing the uptake of existing implementation-related resources such as decision-making tools or geographically specific guidance. This report shares recommendations on how to better leverage implementation, exposes readers to targeted resources and tools that can be used to help support the implementation of adaptation actions, and presents the broad findings from the Project. The report aims to answer the following questions:

- What is the status of adaptation-related implementation in Canada?
- What are possible critical success factors for implementing adaptation actions?
- What are some of the common barriers to implementing adaptation actions?
- How can practitioners use adaptation resources to better leverage implementation?

By engaging practitioners who are advanced in their adaptation efforts in this project, we were able to 'look back' to learn specifically which resources they have used to reach the point they are at today, how they have used them, and what recommendations they would make to other municipalities working towards getting to the implementation stage. However, in this project, we were also able to 'look forward' to learn and assess which resources advanced users and other municipal practitioners in the early stages of the adaptation action spectrum *could* use to leverage their work on implementation.

Strengthening our understanding of the drivers and constraints to implementation, as well as the tools that are available to better leverage implementation, can help municipalities develop climate change adaptation actions and strategies that can be implemented locally and effectively improve resiliency to climate change related impacts.

[1] Warren, F.J. and Lemmen, D.S., editors (2014): Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation; Government of Canada, Ottawa, ON, 286p

[2] Mimura et al. (2014). Adaptation Planning and Implementation. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 869-898

2 METHODOLOGY

The methodology for this project sought to accomplish two broad yet complimentary goals – collecting information on the status of adaptation implementation in Canada and the resources used by municipal practitioners who are advanced in their adaptation efforts, and sharing the results to support a wider audience in moving from planning to actions.

2.1 COLLECTING INFORMATION

Collecting information was carried-out through a series of two workshops delivered in Nova Scotia, Ontario, and British Columbia, in partnership with local subject matter organizations who acted as outreach and communication hubs with the municipal practitioners in each region. A survey distributed to, and interviews carried out with, municipal practitioners and climate change experts complemented this across Canada. Through this survey, we were able to assess the status of implementation on several levels. Some of the information gathered from the survey included:

- Type(s) of plans and policies in which municipalities house adaptation actions;
- Municipal departments that they engage (or foresee engaging) for the successful implementation of adaptation actions;
- External stakeholders whom they believe are important in the delivery of actions; and
- Critical success factors for implementation. [3]

This methodology allowed us to identify the challenges municipal practitioners are facing in implementing climate change adaptation actions in their communities, explore new ways to use implementation-related resources and begin to identify additional resource needs. ICLEI Canada then scanned 400 adaptation resources in the Adaptation Library to select the ten implementation-related resources best suited to support the needs identified. Abridged versions of these resources were created to assist with accessibility. A short self-assessment checklist was included in the design of each abridged version in order to enhance uptake, as they are designed to allow end-users to "experience" the resource and whether it is appropriate for them to research further.

2.2 SHARING THE RESULTS

The results from the first workshops, the survey, and the interviews, along with the abridged resources and the project recommendations, were shared at the second workshops with a wider group of municipal practitioners (many in the early stages of the adaptation action spectrum). This engagement was designed to help them gain insights and be better informed as to the resources that are available to help them move forward on adaptation implementation and increase on the ground results.

3 The Making Strides on Community Adaptation survey results are presented in Appendix One.

3 CONSTRAINTS TO IMPLEMENTATION

Through a survey conducted with local governments and interviews with local practitioners, ICLEI Canada was able to identify some of the common barriers and constraints facing municipalities during the implementation phase. Some of the critical barriers identified were lack of human and financial resources, lack of political buy-in, and difficulty accessing relevant resources and best practice documentation. Understanding and considering these barriers early on can help to alleviate their presence later on in the implementation process. The Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR) developed a comprehensive list of common constraints to implementation that were presented at the 2015 Latornell Conservation Symposium in Ontario. The questions we have modified to accompany these constraints can help practitioners recognize and plan for measures to ensure that adaptation can still move forward. Addressing these challenges so as to transform them into drivers and long-lasting opportunities may require modification of policies, procedures, and processes.

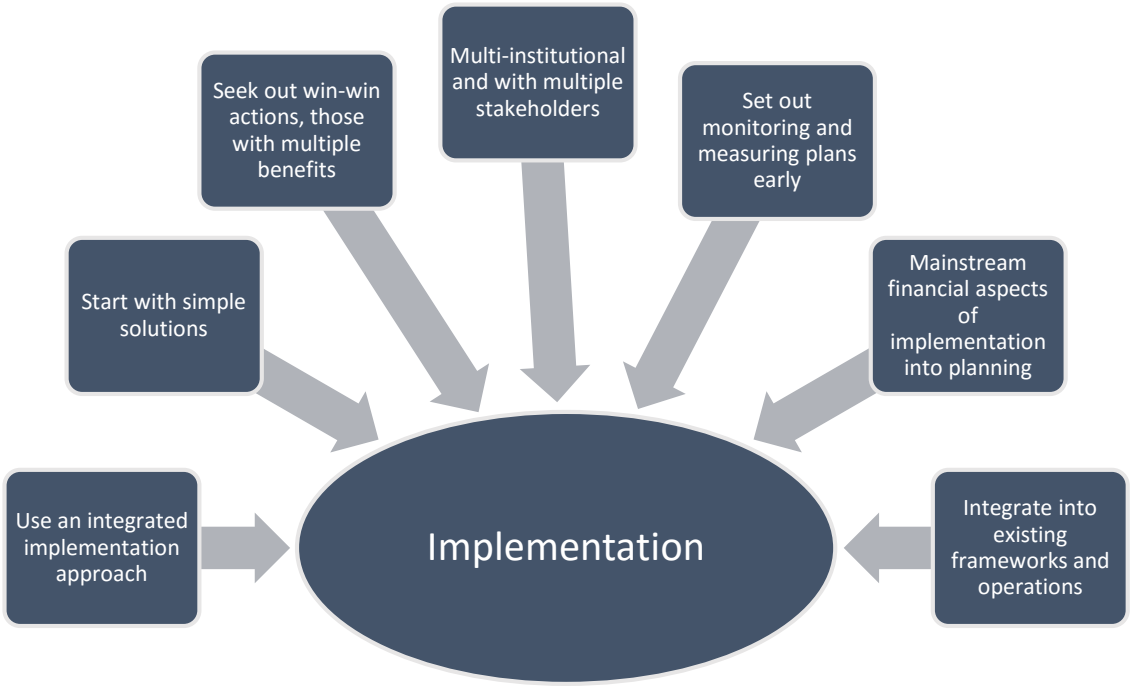
- Threshold of intent: How much implementation can an individual, department, or Council actually take on given other competing constraints?
- Authorization: Does the individual undertaking the adaptation effort have the authority to sign off on implementation activities?
- Sufficient resources: Are there sufficient resources in place – both human and financial – to support both short- and long-term implementation?
- Accountability (for process and implementation): Are the departments or groups that have been included in the adaptation plan being held accountable for the implementation of identified actions?
- Clarity/specificity of option: Has enough specificity been built into the actions identified in the adaptation plan to allow for timely implementation and for the measurement of progress and effect?
- Legality and procedural feasibility: Are the actions identified in the plan legally and procedurally "doable" within the confines of the municipal administration?
- Momentum: Is there sufficient momentum built within the administration to overcome institutional "stickiness", path dependency and behavioral obstacles?

Considering these questions early on in the planning stages, and creating indicators to track changes to constraints over time, can prevent these challenges from becoming detrimental to the adaptation process. There are several recommendations that municipal practitioners can observe to prevent and address constraints to implementation. ICLEI Canada has collated seven key recommendations (with case study examples) that not only address some critical constraints but can increase the likelihood of effective implementation of adaptation actions. They are presented in the following section of this report.

4 Recommendations for Effective Implementation of Adaptation Actions

Through consultation with workshop participants, interviews with practitioners, and surveys with local governments, ICLEI Canada has developed a set of recommendations to support effective implementation of adaptation actions in municipalities. These recommendations are not designed to act as guidelines for implementation, rather, they provide tips and strategies derived from best-practice adaptation cases that have proven to be beneficial for municipalities implementing actions. Ideally, municipalities should integrate implementation into the adaptation planning phase, drawing from these recommendations to foster political buy-in, community and Council support, and to address any constraints they have anticipated. These recommendations are attainable, low-cost, and straightforward strategies that can bolster the planning process and increase the likelihood of long-term success moving from planning to implementation.

Figure One – Recommendations for the Effective Implementation of Adaptation Actions



4.1 Use an integrated implementation approach

Incorporating a variety of implementation strategies to achieve an action improves the likelihood of effective implementation, provides new opportunities for outreach and engagement, and fosters long-term sustainability of the action by integrating multiple streams of support. For the purpose of the *Making Strides on Community Adaptation Project*, these activities were divided into four categories:

- *Communications and marketing:* This category includes many different mediums of communication and outreach, ranging from visual (e.g. infographics, advertisements) to written (e.g. government publications, brochures), to oral communication (e.g. group dialogue and presentations). Both internal and external communication will help, among other things, with public awareness, community buy-in and political support.
- *Pilots and demonstrations:* These activities refer to the implementation of an adaptation action through a small scale initiative before implementing it across the municipality or multiple neighborhoods. It can help to determine the cost of implementation and degree of success in terms of its desired results. The results of a pilot project's monitoring program can help to build confidence and strengthen the business case for a larger scale implementation.
- *Municipal policy tools:* This category includes policy-based implementation, such as land use planning tools (e.g. zoning, covenants and easements, design guidelines), municipal bylaws and subsidy programs. These tools can provide policy frameworks and generate new compliance requirements supportive of your adaptation actions.
- *Education and training:* This category includes both internal training of municipal staff, as well as external public education sessions on specific adaptation actions. These activities can help support implementation by increasing the knowledge and capacity of internal staff and the public to contribute to community adaptation and implementation.

For example, if a municipality wants to implement an outdoor water conservation program to adapt to the impact of drought or water scarcity, creating a by-law would not necessarily ensure resident and business compliance. Greater adherence could be leveraged through a targeted communications plan, which simplifies and explains the benefits of reducing outdoor water use during dry summer months. Furthermore, a public education campaign with live demonstrations at a variety of sites and events, can show homeowners how to transition to more water-efficient irrigation and landscaping. An integrated implementation approach is required not only to integrate an action into policy or law, but also to encourage buy-in or compliance from both internal and external stakeholders.

Keep Calm and Adapt - Town of Oakville, Ontario

The Town of Oakville's Keep Calm and Adapt event, run annually, is designed to help residents build their personal resilience to climate change by encouraging them to take actions to protect their lives and properties. This educational event is one of the many activities the Town of Oakville has undertaken to increase the emergency preparedness level of its community. The Town has also used climate change gamification as an education tool at public events, created new emergency and weather preparedness website pages, and has been active on social media channels during emergency situations.

Click here to read more on the Oakville's emergency preparedness initiatives.

4.2 START WITH SIMPLE SOLUTIONS

For municipalities newer to the adaptation planning process, beginning with actions that are low regret and low cost (i.e. 'low-hanging fruit') can help build momentum for more complex adaptation actions later on. While larger infrastructure projects will take time to come to fruition, taking advantage of 'low-hanging fruit' projects can produce visible and tangible result in the short term to help gain support for larger, more costly, or more controversial initiatives.

Attempting to use simple, non-technical, and non-complicated solutions wherever possible can make implementing adaptation actions easier for local governments. Although this approach will not always be possible, especially when a project involves "hard" actions (such as a large infrastructure upgrade), utilizing simple solutions can still be an effective way to increase a municipality's adaptive capacity. A basic example is having residents move their valuables from their basements to higher floors to prevent damage from flooding. While this action may not be a solution in preventing basement flooding from occurring, it does improve the resilience of private residents by reducing their personal loss. Other simple adaptation actions could include incentivizing the use of rain barrels, disconnecting weeping tiles, developing community raingardens, and others.

Mandatory Downspout disconnection – City of Toronto, Ontario

In 2010, Toronto City Council approved a bylaw making it mandatory for property owners to disconnect their downspouts. The bylaw is applicable to all buildings, including industrial, institutional, and commercial locations as well. There are three phases to the program designated by area: Phase One required property owners living in the central area of the City served by combined sewers (stormwater and sanitary sewage carried in a single pipe) to disconnect their home's downspout from the City's sewer system; Phase Two required property owners living in the basement flooding study areas to disconnect; and Phase Three (ongoing) requires property owners living in the remaining areas of the city to disconnect.–Having residents disconnect downspouts from the sewer system was a simple way for the City of Toronto to reduce residents' risk of basement flooding without having to undergo an extensive stormwater management upgrade.

Click here to read more about Toronto's Mandatory Downspout Disconnection Program.

4.3 SEEK OUT WIN-WIN ACTIONS, THOSE WITH MULTIPLE BENEFITS

Practitioners are encouraged to bolster the implementation process by seeking out win-win adaptation actions that not only improve resiliency but present other social, economic and environmental benefits. Actions that increase adaptive capacity of a community while benefiting multiple groups or stakeholders are met with greater approval and buy-in from local governments because they present an opportunity to achieve the goals of not one, but several local actors. Actions that are win-win also encourage collaborative planning and implementation, therefore fostering long-term commitment from multiple groups.

Green Roof Bylaw – City of Port Coquitlam, British Columbia

In 2006, Port Coquitlam became the first municipality in Canada to require the use of green-roof technology in buildings. According to the Zoning Bylaw NO. 3630, every person constructing a building for a commercial or industrial use with a building area of 5000m^2 or more is required to install a green roof on at least 75% of the roof area of the building, not including any roof area occupied by mechanical equipment. Furthermore, the owner of every building having a green roof must maintain the planting media and plant material in accordance with generally accepted landscape maintenance practices, replacing each as necessary.

Green roofs provide numerous measurable environmental, economic, and social benefits, making them a "win-win" solution for municipalities looking to increase their resilience. The City of Port Coquitlam recognized that the many benefits of green roofs may not be sufficient to entice developers, and therefore created a policy to fast track proposed buildings with green roofs through the approval process. The City further provides a level of flexibility by being prepared to consider variance to the green roof requirement through assessment of environmental and social benefits in light of economic viability. This expedited approval process can ensure a greater uptake of and adherence to the green roof bylaw by developers.

As indicated above, green roofs have numerous benefits that make them a "win-win" solution, including:

- Cooling of the surrounding air by up to 2 degrees on a hot day;
- Absorption of airborne toxins improving air quality;
- Increased roof lifetime by 2-3 times more than non-green roofs;
- Creation of new habitat for birds, butterflies, plants and other species; and
- Educational and relaxing space for employees to spend time while at work.

Click here to read more about the City of Port Coquitlam Green Roof Bylaw.

4.4 MULTI-INSTITUTIONAL AND WITH MULTIPLE STAKEHOLDERS

Partnering with multiple institutions and engaging with different stakeholders, such as community groups, non-governmental organizations (NGO), private businesses, as well as provincial and federal governments, can help municipalities implement their adaptation actions more quickly and effectively. Implementation barriers such as lack of funding, staff expertise, or time commitment, can hold a municipality back from moving forward. Engaging with multiple institutions and stakeholders can help them find and capitalize on outside resources to better leverage implementation. While numerous types of partnerships are available, a few examples include:

1. *Public-private partnerships* are a formal contractual agreement between the public and the private sector, where the private sector provides a project or services while assuming some of the operational or financial risk. For example, municipalities may partner with private businesses on capital-intensive infrastructure projects. Private-public partnerships are best suited for infrastructure projects that create a revenue source for the private partner (e.g. public transit, residential development projects).

2. *Partnerships with residents and community groups* can help municipalities ensure that adaptation actions are directly answering local needs, while also encouraging community uptake. Municipalities may partner with community groups when implementing adaptation actions that require resident compliance or a volunteer workforce.

3. *Partnerships with NGOs*, such as conservation authorities, can help municipalities gain access to new resources, including funding and in-kind support as well as information, expertise, and skills.[4] It allows them to reach new target audiences and broaden support, while facilitating a coordinated approach to climate change if the organizational boundaries of the NGO are greater than those of the municipality undertaking the adaptation action (e.g. conservation authorities intervening at the regional scale).

IMAX parking lot retrofit – IMAX and Credit Valley Conservation, Ontario

In 2012, IMAX retrofitted one of its parking lots in Mississauga Ontario with a variety of innovative low impact development stormwater management technologies. In order to ensure the project's success, IMAX partnered with Credit Valley Conservation (CVC), the City of Mississauga and product suppliers. Thanks to this multi-stakeholder partnership, CVC was able to provide a cash and in-kind contributions towards the upgrade and construction of the parking lots, and covered the monitoring infrastructure costs which is a crucial step of implementation. Partnering with multiple product suppliers also enabled a variety of innovative stormwater management technologies to be integrated into the project. Furthermore, open communication between the monitoring and design teams, products suppliers, and clients ensure that all stakeholder interests were being fulfilled and the project was moving forward as needed.

Click here to read more about the IMAX parking lot retrofit project.

[4] "Conservation Authorities, created in 1946 by an Act of the Ontario Provincial Legislature, are mandated to ensure the conservation, restoration and responsible management of Ontario's water, land and natural habitats through programs that balance human, environmental and economic needs" (Conservation Ontario).

4.5 SET OUT MONITORING AND MEASURING PLANS EARLY

The purpose of monitoring and evaluation (M&E) in the context of adaptation actions is to observe the results of a given project, measure its successes and shortcomings, and develop an understanding of how a project/action can be improved to better meet its goals. Tracking progress is an important part of the adaptation process, as it assesses how an action is influencing the adaptive capacity of the community and municipal departments.

Establishing an effective M&E strategy early on as part of planning or action setting stage can help to ensure that appropriate financial and human resources are budgeted for this important step. While developing the adaptation plan, a set of indicators that will be used as a baseline against which progress and effectiveness can be gauged, should be created for each action identified. This process of selecting indicators will primarily be influenced by what is being measured and what information is available.

Monitoring and evaluating progress during the implementation phase has several benefits. Aside from contributing to the development of adaptation actions and best practices, M&E results can be used for communicating success to stakeholders (e.g. elected officials, municipal practitioners, community groups) in order to build a business case or maintain momentum. Also, considering that adaptation actions often involve multiple municipal departments, embedding M&E into management practices and working collaboratively to gather and share information can help create a more effective and streamlined approach to managing climate change.

Embedding M&E into management functions – City of Surrey, British Columbia

The City of Surrey is in the process of integrating climate-related risks, impacts and adaptation actions into its Enterprise Risk Management (ERM) Framework. The City ERM's online platform will allows "risk owners" to track the implementation of actions, monitor any changes, and report out information in a timely and consistent manner to other concerned internal stakeholders.

Click here to read more about the City of Surrey's Climate Adaptation Strategy.

4.6 MAINSTREAM FINANCIAL ASPECTS OF IMPLEMENTATION

To support the move from planning to action, it is important that adaptation practitioners realistically look at the costs and financing possibilities associated with actions that are identified as part of an adaptation plan or strategy. Considering a variety of possible funding sources where funding is not available within existing budgets is crucial for securing funding for the implementation of adaptation activities.

Possible funding sources could include:

FCM Green Municipal Fund: Available for municipalities with innovative environmental projects; GMF grants and below-market loans directly support municipal initiatives and are a well-used form of financing for a variety of projects.

Partnerships: Opportunities for funding through partnerships with local universities and/or non-profit groups particularly for research and public outreach.

Revolving Funds: Using the savings rom existing energy efficiency efforts to help fund the expansion of adaptation actions. This can be particularly useful where the action is being implemented as part of a climate change strategy or plan but will have an economic return on investment (or payback) via budgetary savings.

Carbon trading: Once the municipality has met Council commitments to emissions reductions, any surplus emissions reductions that are made could be traded and the income from these.

Energy Management Revolved Fund in Edmonton (Alberta)

In 1995 the City of Edmonton created a revolving fund aimed at energy retrofits of City facilities. This fund started at $1 million dollars and was increased in 1999 to $5 million. In 2002, Edmonton City Council approved an increase in the fund limit of up to $30 million, to be financed from the Alberta Municipal Finance Corporation. The $30 million fund is set aside for energy efficiency projects such as upgrades to lighting, heating, cooling and ventilation systems and envelope upgrades. The amount borrowed against the fund for these projects is repaid over a period of up to eight years (where an exception can be made to 10 years for certain projects) out of the utility savings making this money available for other energy projects.

A revolving fund can be a an effective funding mechanism as it offers the use of short term borrowing and has little impact on the tax levy portion of municipal budgets; at the same time energy related projects are not competing for limited capital funds. In this context, the City of Edmonton has proven that the Revolving Fund approach works and because the fund is internal, it offers flexibility to address changing conditions.

For more information on Edmonton's Revolving Fund visit the City's website.

4.7 INTEGRATE INTO EXISTING FRAMEWORKS AND OPERATIONS

Mainstreaming climate change adaptation into existing frameworks and operations is an efficient strategy to overcome implementation constraints such as insufficient human and financial resources, lack of momentum and competing priorities. One way to mainstream adaptation is by influencing policy processes and integrating adaptation-relevant objectives within long-term development goals of sectoral plans such as:

- Official plans and land-use planning
- Sustainability plans
- Community development plans
- Stormwater management plans
- Transportation planning
- Water conservation plans

It is also recommended to begin to weave adaptation into everyday strategic thinking by incorporating climate change considerations into broad risk management practices. Internalizing climate risk management into planning and decision-making processes will allow for the measurement and prioritization of these risks and consequently influence business operations.

For example, infrastructure replacements that are already planned and budgeted for can be used as an opportunity to develop more climate resilient capital. Integrating climate change adaptation considerations into an existing infrastructure master plan or management practices will result in informed and strategically sound decisions that optimize investments and better manage risk.

Mainstreaming Climate Change Adaptation – Powell River Regional District, British Columbia

The Powell River Regional District's Strategic Plan (2015-2018) sets out key priorities and goals for the regional district. Alongside asset management, public communication and engagement, human resource planning, and economic development priorities, the plan also features climate change mitigation and adaptation. This plan communicates with the municipality, among other things, some actions that are needed to promote public safety and environmental protection, including re-evaluating drainage designs and incorporating them into asset management plans.

Click here to read more about the Powell River Regional District's Strategic Plan

For municipalities at the planning or implementation phase of adaptation, building an inter-departmental adaptation plan, using in-house capacity, and engaging and working with representatives from across departments will facilitate the integration of adaptation measures into existing sectoral plans and other departments' activities. This can help identify intersections between departments, avoid contradictions between different initiatives, leverage trade-offs, and maximize opportunities by exploiting synergies wherever possible. As the nature of climate change actions calls for cross-sectoral collaboration, institutional and social measures that favor changes to the organizational silo culture must be viewed as an integral part of the adaptation strategy.

5 TAKING ADVANTAGE OF IMPLEMENTATION-RELATED RESOURCES

While many resources exist that support the planning stages of adaptation, there are far fewer available to leverage the implementation of planned actions. Having better access to concise, innovative, and informative implementation-related resources can help to bridge this gap by placing key guides, best practices, and new ideas into the hands of municipal practitioners and decision-makers. In fact, according to ICLEI's survey, 75% of respondents believe that better access to implementation-related resources would enhance their ability to implement adaptation actions. However, it can often be difficult for practitioners to find these needed resources, and even more difficult to target resources that are appropriate for implementing actions in their specific context. As part of the *Making Strides on Community Adaptation Project*, ICLEI wanted to help municipalities maintain their momentum from planning to action by facilitating the guided use of implementation resources through the development of 'abridged versions' of larger resources, while also directing users to the updated Adaptation Library, a web-based tool that hosts numerous implementation-related materials.

5.1 ABRIDGED RESOURCES


Paying for Urban Infrastructure in Canada:
An Analysis of Existing and Potential Economic Instruments for Local Governments
Author: the Adaptation to Climate Change Team (2015)
Climate change related outcome addressed
Change in precipitation
Change in temperature
Changes to lake and river levels
Climate change in general
Extreme weather event
Sea level rise
Volatile weather
Type of implementation activity this resource supports
Communications and marketing
Education, training, outreach
Municipal policy tools
Pilots and demonstrations
Other: Financing
Stage of implementation
Starting implementation
On the path of implementation
Advanced implementation
Resource needs for application
Staff—Moderate
Staff expertise and skills—Moderate
Funding—Considerable
Material requirements—Considerable
Keywords
Infrastructure deficit, reserve funds, green bonds, climate bonds, tax increment financing, property tax, tax levy, local improvement charges, development cost charges, carbon fund
Resource Overview
This resource addresses the challenge of financing adaptation infrastructure in municipalities by providing information on financial tools and instruments that are available for local governments. It is geared toward local governments who typically have authority over land use decisions and the selection of infrastructure projects at the municipal level. Several economic instruments are analyzed for their design, application, benefits, and limitations, demonstrated with case studies, in order to better inform local level decision-makers about the financial tools that are available and most helpful for them to fund and finance the development of climate resilient infrastructure. The report also identifies and critically evaluates financial tools that can incentivize behavioural changes at the local level and reduce the need for public investments in adaptation infrastructure.
Key Sections
The study examines 10 financial tools that have the potential to address the challenge of paying for adaptation infrastructure. In Chapter 4, each tool is evaluated based upon seven objectives and 12 criteria. According to the report, the tools that are found to be the most effective are financing tools, traditional property tax, and outside revenue streams. In Chapter 5, internal financing mechanisms (e.g., tax levy, local improvement charges, climate bonds, user fees) are evaluated based on a structured framework that addresses: Application for Climate Change Adaptation, Benefits, Limitations, examples from Canadian case studies, and Feasibility for each mechanism listed. In Chapter 6, the study provides examples of external revenue streams that local governments can access outside of municipal jurisdiction, for instance the federal gas tax. It also explores innovative external revenue sources to fund infrastructure adaptation, such as public-private partnerships and carbon funds, however these require strong political will to implement.

Produced by ICLEI Canada and the Adaptation to Climate Change Team (ACT), the abridged resources serve as an "at-a-glance" synopses of existing implementation related documents and are designed to help end-users judge to what degree the resource is appropriate for them. The process of developing the abridged versions began with identifying key resources that are, or have been previously, used to assist advanced users in the implementation phase of their work. This information was collected primarily through one-on-one interviews with adaptation practitioners, who were asked about resources and materials they consulted when implementing actions in their municipality or organization, and what the biggest gaps are in terms of resources that are available to assist with implementation. Using these responses and internal knowledge of available resources, ICLEI was able to select ten resources that best support various implementation activities, including communication guides, land-use planning guides, detailed case studies, infrastructure financing, and many more. Ultimately, the abridged resources will help key implementation resources to get into the hands of more users who can then turn to the full and comprehensive document and leverage implementation in their community.

The abridged versions of resources are available through the Adaptation Library, www.adaptationlibrary.com, an online catalogue of adaptation-related resources. Users are able to download the abridged versions of ten implementation resources and "get to know" the resource and

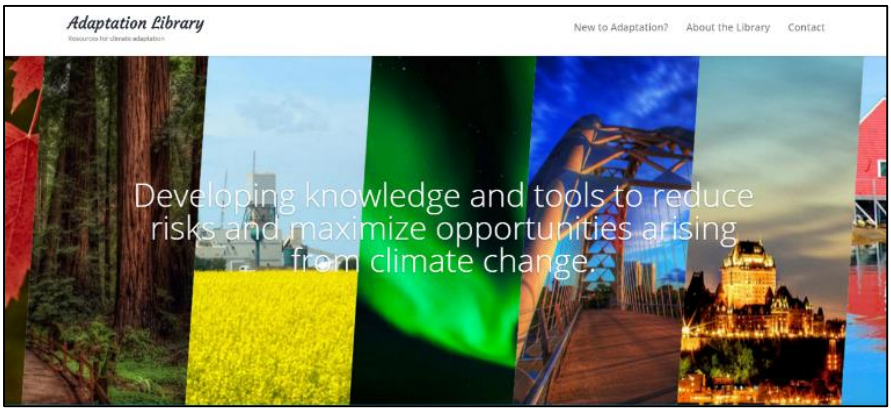
whether it is right for them. The abridged versions act as a decision-support tool by providing users with basic information on the product, so they can then choose whether to move forward with the full product if it meets their needs. They include a table at the top of the page, which identifies the type of climate change-related outcomes the resource could address; the type of implementation-related activity that this resource could support; the required resources for the application of the recommended actions; as well as the stage of implementation at which the resource can be useful. Other sections give an overview of the resource as a whole, highlight key sections and provide users with details on the types of implementation constraints the document can help overcome. The final section of the abridged resources describes how the resource could be used and/or replicated in a variety of contexts.

The ten abridged resources can be found in Appendix Two.

5.2 The Adaptation Library

One of the greatest challenges identified by Canadian municipalities is not only accessing implementation-related resources, but also finding relevant resources in an efficient and timely manner. The Adaptation Library (www.adptationlibrary.com) provides a centralized online platform where practitioners can turn to search for, read about, download (and as of early 2016, upload) Canadian and international adaptation-related information. Since creation in 2013 (and update in 2015), it has been a staple resource for providing relevant, validated, and usable information by simplifying the often complex process of searching and synthesizing disparate information.

The Adaptation Library contains over 400 adaptation-related resources that range from case studies, to decision-support tools, to technical and academic documents relating to community, energy or forestry adaptation. All products can be found through a variety of navigation filters, including but not limited to the climatic change, target audience, sector and mediums. Users interested specifically in implementation-related resources can click on the secondary focus filter and select the implementation option to narrow down their search. From there, users will have access not only to the resource documents and accompanying bibliographic information, but also to a validation framework which examines each product based on sustainability, clarity, participatory processes, locality and replicability. These frameworks are meant to guide users of the Adaptation Library on when, where, and how products might fit their municipality or sector-specific climate change adaptation efforts.



The Adaptation Library is both timely and necessary as it has the potential to address three parallel observations:

- Most municipalities lack the mechanisms or time to search existing data and research;
- Development and uptake of adaptation products can be accelerated by using web-based tools to facilitate collation, analysis, and sharing of information; and
- Careful analysis is required to move beyond a simple collection of products to the provision of insights on emerging adaptation innovations, geographic patterns in implementation, and gaps in adaptation practice.

Complimented by the Abridged Resources, the Adaptation Library helps adaptation practitioners narrow down their search for relevant, reliable resources, and provides with them guidance to find the tools that are best-suited to their adaptation needs. The Library and the new Abridged Resources assist in bridging the implementation gap faced by municipalities who struggle to find strong resources that cater to their goals.

6 CONCLUSION

The impacts of climate change are now widely acknowledged by municipalities across the country. Now more than ever, municipalities are beginning to realize the need to assess their vulnerability to climate changes that are already underway and to develop responses that will protect their communities. While climate change adaptation has received greater attention over the past several years, the focus has largely been on the planning process. This has allowed for a widening gap in which municipalities' lack the understanding and capacity required to implement the actions they are planning. This gap continues to widen as there persists to be a lack of support for them in the implementation stage, while more and more Canadian municipalities are becoming ready to implement.

This project and subsequent report were created to address the current reality that many municipalities fail to implement their planned initiatives due to lack of resources and support at the implementation stage. The *Making Strides on Community Adaptation Project* attempted to bridge the gap between planning and implementation by providing recommendations that are straightforward, accessible, and achievable for municipalities at various stages of adaptation. The Adaptation Library and abridged resources were provided in support of our recommendations and to address common implementation constraints, by directing municipal practitioners to existing resources and best practice documentation of local implementation initiatives.

Mainstreaming implementation into the planning process is critical to reduce risk and ensure success of the adaptation process in communities. While this project highlights where more support is needed, it also sheds light on existing opportunities available to municipalities to pursue implementation in a collaborative, effective manner, turning planning into action, and improving resiliency across the country. Continued support for the unique challenges related to the implementation of adaptive actions is needed to ensure that community resilience is developed over the short-, medium-, and long-term.

7 APPENDIX ONE

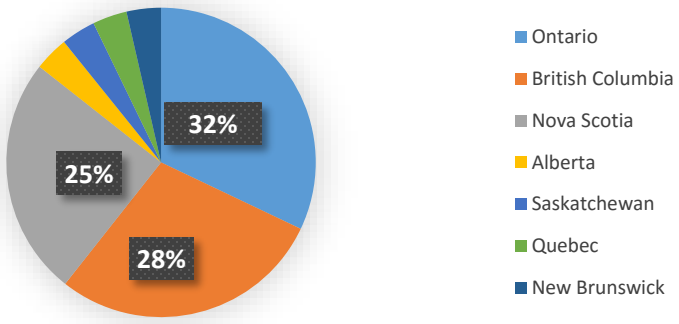
MAKING STRIDES ON COMMUNITY ADAPTATION SURVEY RESULTS

The information presented below are the results of a survey distributed to by ICLEI Canada to local governments and climate change adaptation experts across Canada. The interpretation of these results are based on the results of interviews and discussions held with municipal practitioners during the project workshops.

Q1. Please select the province or territories where your organization is based.

The vast majority of respondents were representatives from local governments in Ontario, Nova Scotia, and British Columbia, the three provinces in which the workshops were help. ICLEI shared the survey through its national network and also secured the participation of local governments from Alberta, Saskatchewan, Quebec, and New Brunswick. ICLEI primarily targeted municipal practitioners working in the realm of climate change and adaptation.

Figure 1: Location of respondents

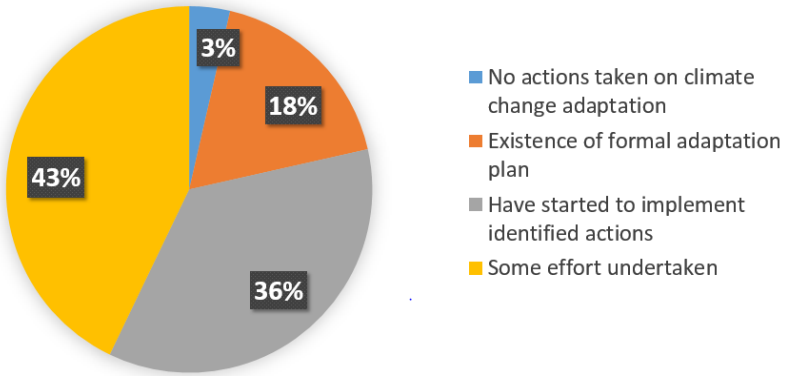


Q2. What is the status of adaptation actions in your community?

Figure 2 shows that 18% of respondents' municipalities have a formal adaption plan, but have not yet begun to implement the actions identified, while 36% reported to have started to implement their actions. 43% have undertaken some effort – meaning that they are working on identifying their climate change impacts, conducting vulnerability or risk assessments, and/or have undertaken individual or ad hoc actions that are not part of a formal adaptation planning process.

While 46% of respondents reported to not have a formal adaptation plan in place, this could be due to the fact that adaptation actions are occurring within individual departments, or are present within other sustainability and/or climate change-related plans. This theory is supported by the fact that 97% of respondents reported to be engaged in at least some sort of activity related to climate change adaptation.

Figure 2: Status of adaptation actions

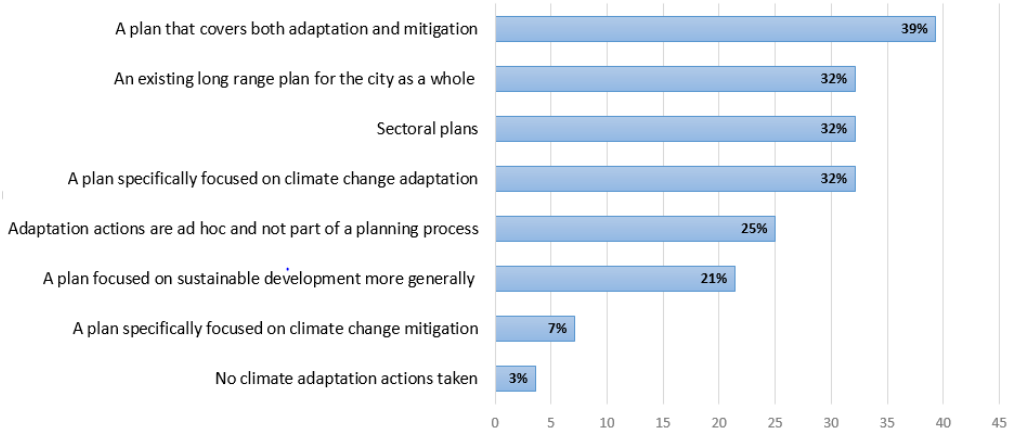


Q3. In what type(s) of plan are your adaptation actions housed?

As shown in Figure 3, the majority of adaptation actions are housed in municipal plan that cover both adaptation and mitigation (39%). These results could be inflated as a result of the number of respondents from Nova Scotia, as they were required by the 2010-2014 Gas Tax Agreement and the Municipal Funding Agreements to prepare and submit a Municipal Climate Change Action Plan (MCCAP) that covers both adaptation and mitigation. 32% of respondents house adaptation actions in a formal adaptation plan, while 32% house actions in existing long range plans for the municipality as a whole. 32% also have their actions housed in sector-specific plans, and only 7% are found in plan specifically focused on climate change mitigation.

These results show that approximately 50% of respondents have their actions housed in more than one plan. The high percentage of respondents that indicated their actions were housed in plans that cover both adaptation and mitigation could be due to the fact that responding to climate change often requires this type of cross-sectoral collaboration. It could also be due to the fact that mitigation has a longer history at the local level, and plans that contain both mitigation and adaptation-related actions are more likely to garner staff and political support than stand-alone adaptation plans.

Figure 3: Types of plans that house adaptation actions



Q4. What departments do you engage (or foresee engaging) for the successful implementation of adaptation actions?

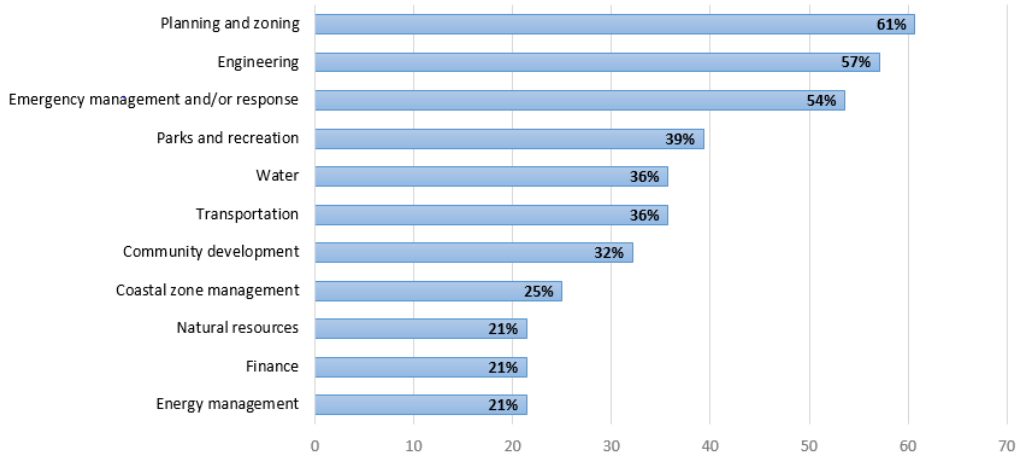
Figure 4 shows that planning and zoning are perceived by the majority of respondents (69%) to be among the top 5 most important departments to engage (or foresee engaging) for successful implementation.[5] This department is followed by the engineering department (57%). These high percentages could suggest that a) there is a predominance of built infrastructure projects currently being pursued by municipal governments (supported by the notion that the majority of Canadian municipalities are currently in an infrastructure deficit), or b) there is a favoritism towards hard infrastructure solutions to climate change related problems.

The emergency management/response department was another popular selection for 54% of respondents, most likely due to their immense role in responding to extreme weather events (such as hurricanes, tornadoes, severe floods, wildfires, etc.) Emergency response departments are also important when engaging and educating the community on how to prepare for and react to an extreme event. Their expertise can help increase adaptive capacity at the local level, by teaching residents how to build emergency survival kits, secure their belongings during a storm, or how to prepare for blackouts.

Finance departments ranked lower (21%), which workshop attendees found to be surprising as this department tends to be the first step in green-lighting any municipal project. However, it was discussed that perhaps Finance ranked lower because it is more heavily involved in the planning stages of adaptation rather than implementation, as finances would theoretically already be secured before "shovel in the ground" actions were to occur.

Finally, public health ranked the lowest among respondents (7%). This number contrasted with the relatively high climate change-related public health concerns expressed by interviewees and workshop participants. This could be due to the fact that public health regulation is under the authority of the province, even though local governments would have an important role to play in public health issues, such as water and air quality.

Figure 4: Department to engage for implementing adaptation actions



[5] Respondents could choose among a list of 22 departments. Only those selected by a minimum of 20% of all respondents are represented in Figure 4.

Q5. What types of external stakeholders are the most important to assist in delivering adaptation actions in your community?

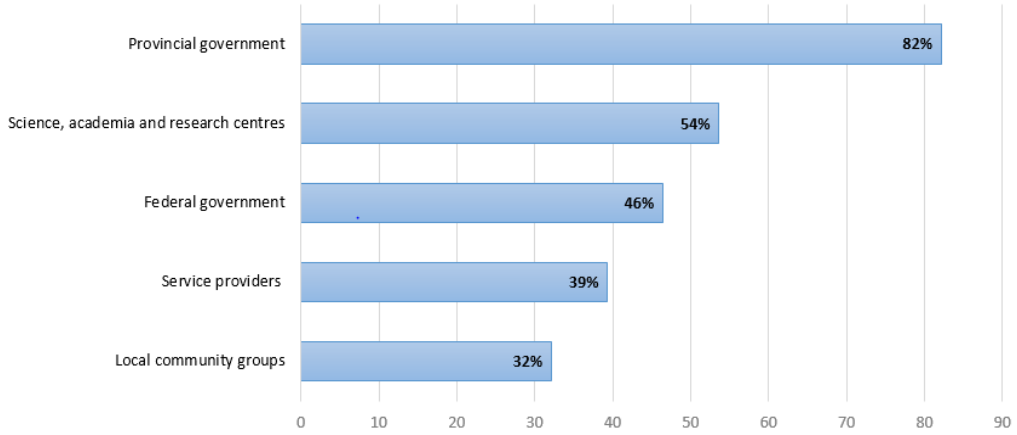
Figure 5 shows that the provincial government is considered to be amongst the top 3 most important external stakeholder to assist in delivering adaptation actions (82%).[6] Most likely this high percentage is due to the fact that the province provides significant funding assistance to municipalities when it comes to any sort of climate change related actions or programming.

The Federal government scored significant lower (46%). This could be due to the complex jurisdictional and operation structures of national, subnational and local agencies within Canada. Workshop attendees also remarked that the importance of engaging the Federal government will most likely increase in the coming years following the 2015 Federal Election, as the new Federal Budget allocates record-breaking funding for climate change and green-related initiatives. For example, one new mandate of the Ministry of Infrastructure and Communities, as well as the newly-named Ministry of Environment and Climate Change is to protect communities from the adverse effects of climate change by promoting the development of green and climate resilient infrastructure – an issue that is very prevalent among Canadian municipalities as indicated by survey respondents.

Research and academia is perceived by 54% of respondents to be part of the top 3 most important external stakeholder to assist in delivering adaptation actions. This could be explained by the fact that this group tends to be a financially accessible source of support and expertise outside of the municipality, especially in the planning stages (e.g. flood mapping, localized climate data, etc.).

Service providers ranked fourth, with 39%. Collaboration with these stakeholders is important as they are essential components of (or may be impacted by) climate change adaptation (e.g. updating hydro poles). Finally, local community groups (32%) and local businesses (18%) ranked fairly low amongst survey respondents.

Figure 5: External stakeholders to engage in delivering adaptation actions



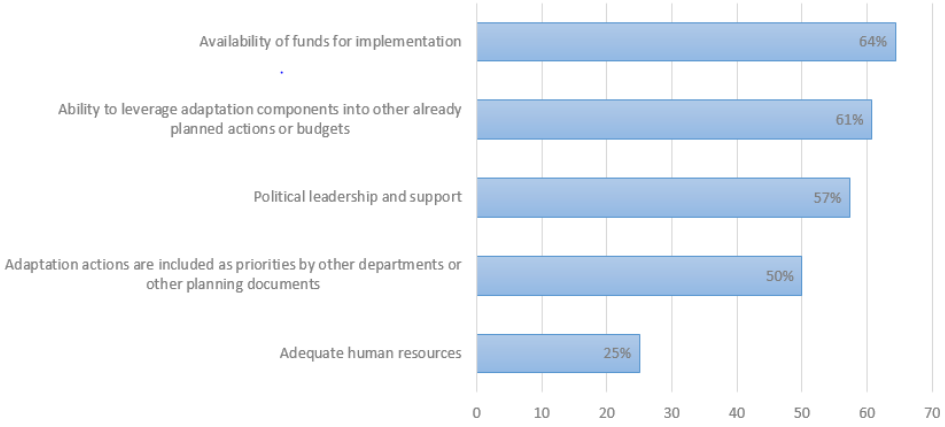
6 Other external stakeholders were listed in the survey but are not presented here because of their low scores (i.e. media [3%], Insurance industry [3%] and Financial institutions [3%], non-profit organizations [18%])

Q6. What are the most critical success factors for the implementation of adaptation actions in your community?

Respondents were asked to select their top 3 critical success factors for implementing adaptation actions in their community. As shown in Figure 6, respondents believed that the availability of funds (64%), the ability to leverage adaptation components into other already planned actions or budgets (61%), and political leadership and support (57%) to be the top 3 most important factors. [7]

The ability to have adaptation actions included as priorities by other departments or other planning documents is perceived to be one of the top 3 most critical success factor by 50% of respondents. This critical success factor has been selected by approximately 50% respondents whose local governments have their actions housed in more than one type of plan, thus suggesting that this strategy has been beneficial and that other local governments are coveting this approach.

Figure 6: Critical success factors for implementing adaptation



Q7. Which of the following activities have you used (or are you using) to support the implementation of adaptation actions in your community?

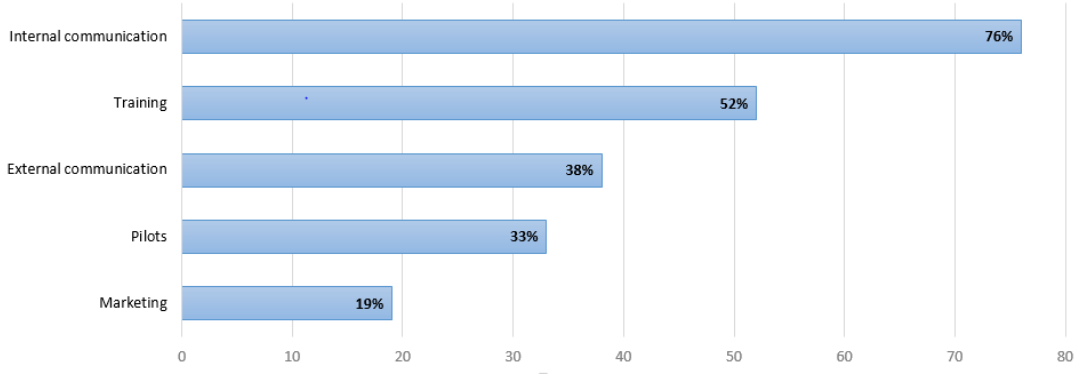
When asked which of the following activities respondents have used to support adaptation in their community, internal communications ranked the highest with 76%. Only 47% of those who have used internal communications reported to have also used external communications or marketing (e.g. social media campaign). The difference in the use of internal and external communications suggest that developing awareness internally among municipal staff and decision-makers is still a primary concern and/or that internal dynamics is an issue that still needs to be alleviated before making advancements on implementing adaptation actions. In both cases, choosing the appropriate medium of communication is crucial. A lot of workshop participants reported that infographics and videos have been among the most effective means of communicating externally with the public, and other stakeholders that are less

[7] Other critical success factors were listed in the survey but are not presented here because of their low scores (i.e. Residents share concerns and awareness [4%], Actions are aligned with objectives of internal stakeholders [7%] Staff leadership and support [11%], Actions are aligned with objectives of external stakeholders [14%], Adequate human resources - number of staff, skills, expertise [25%]).

knowledgeable about climate change. This is due to the fact that pictures and visual animations can be appreciated across multiple languages and age groups. While written communication can often be too saturated or complex, infographics and animations compresses information in a more accessible and visually appealing way.

Pilots and marketing ranked the lowest amongst respondents, with respectively 33% and 19%. These numbers are interesting when compared to the results of a workshop activity where participants were asked to brainstorm a set of activities to support the implementation of an action they currently wish to pursue in their community. The level of interest in pilots and marketing activities was very high compared to other activities such as internal communications and training, which ranked the highest in the survey. The percentage of respondents that have used pilots is relatively low, most likely due to the fact that despite the ability of pilots to leverage project funding on a wider scale, they do require upfront investments and a high degree of expertise. As for marketing, it is often seen as a strategy to promote a finalized project instead of a tool to be adopted early on in the adaptation process to secure community, staff, and political buy-in. This, combined with the fact that the majority of survey respondents have not yet moved from the planning to the implementation stage, can in part explain why marketing has been used by only 19% of respondents.

Figure 7: Activities to support implementation

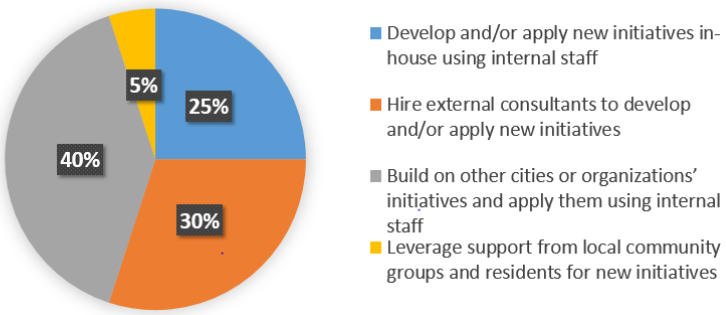


Q8. In implementing a given adaptation action, which of the following best describes your communities' approach to the development and use of implementation activities?

Respondents were then asked about the approach that best describes the development and use of implementation activities in their municipalities. As shown in Figure 8, 40% of respondents built on other cities or organizations' initiatives and applied them using internal staff. Conversely, 30% of respondents indicated that they hire external consultants to develop and/or apply new initiatives. This makes sense as 83% of respondents who indicated they hire external consultants also indicated that the availability of human resources (skill, expertise, number) is somewhat or very challenging to the application of implementation activities within their community.

Interestingly, only 5% of respondents indicated that they leverage support from local community groups and residents for new initiatives. This number is a bit surprising considering that the availability of funds is perceived as being very challenging to the application of the implementation activities by 61% of respondents and somewhat challenging to 32%. Local governments could tap into existing volunteer groups in order to overcome constraints related to funding and human resources.

Figure 8: Approach to the development of implementation activities



Q9: Based on your experience, how challenging are the following factors to the application of implementation activities such as those listed in question #8?

The availability of funds, (61%) adequate human resources (50%) and the availability of human resources (36%) are perceived to be the most challenging when attempting to implement adaptation actions. Figure 9 shows that the only factor not perceived as being very challenging is "existing institutional parameters." [8] This result is not surprising considering that the use of internal communications and training (highest ranking tools) does not deviate from traditional practices of local governments.

Figure 9: Challenges for applying implementation activities

Challenge	Level of challenge	Percent
Availability of funds	**Very Challenging**	**61%**
	Somewhat challenging	32%
Availability of human resources (skill and expertize)	**Somewhat challenging**	**50%**
	Very Challenging	**36%**
Adequate human resources (number of staff)	**Very challenging**	**50%**
	Somewhat challenging	39%
Existing institutional parameters (e.g. support from Council)	**Somewhat challenging**	**46%**
	Not very challenging	32%

[8] Only the two levels of challenge that ranked the highest for each factor are represented in this figure.

8 APPENDIX TWO

ABRIDGED IMPLEMENTATION-RELATED RESOURCES

TITLE	AUTHOR
Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Use: Guidelines for Management of Coastal Flood Hazard Land Use	British Columbia Ministry of Environment (2011)
Accelerating Adaptation in Canada Communities	Clean Air Partnership (2012)
Having the Climate Conversation: Strategies for Local Governments	ICLEI Canada (2012)
Preparing for Climate Change: An Implementation Guide for Local Governments in British Columbia	West Coast Environmental Law (2012)
Are we There Yet? : Applying Sustainability Indicators to Measure Progress on Adaptation	ICLEI Canada & Clean Air Partnership (2015)
Prairies Regional Adaptation Collaborative: Advancing Climate Change Adaptation in the Prairies	Saskatchewan Watershed Authority (2012)
Communicating the Health Risks of Extreme Heat Events: Toolkit for Public Health and Emergency Management Officials	Healthy Environments & Consumer Safety Branch, Health Canada (2012)
Land Use Planning Tools for Local Adaptation to Climate Change	Government of Canada (2012)
Adapting to Urban Heat: A Tool Kit for Local Governments	Georgetown Climate Centre (2012)
Paying for Urban Infrastructure in Canada: An Analysis of Existing and Potential Economic Instruments for Local Governments	The Adaptation to Climate Change Team (2015)

Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Use:
Guidelines for Management of Coastal Flood Hazard Land Use

Author: British Columbia Ministry of Environment (2011)

Climate change-related outcome addressed	Type of implementation activity this resource supports	Stage of implementation	Resource needs for application
△ Change in precipitation	△ Communications and marketing	▲ Starting implementation	Staff—Minimal
△ Change in temperature	△ Education, training, outreach	△ On the path of implementation	Staff expertise and skills—Moderate
△ Changes to lake and river levels	▲ Municipal policy tools	△ Advanced implementation	Funding—Considerable
△ Climate change in general	△ Pilots and demonstrations		Material requirements—Considerable
△ Extreme weather event	△ Other:		
▲ Sea level rise			
△ Volatile weather			

Keywords

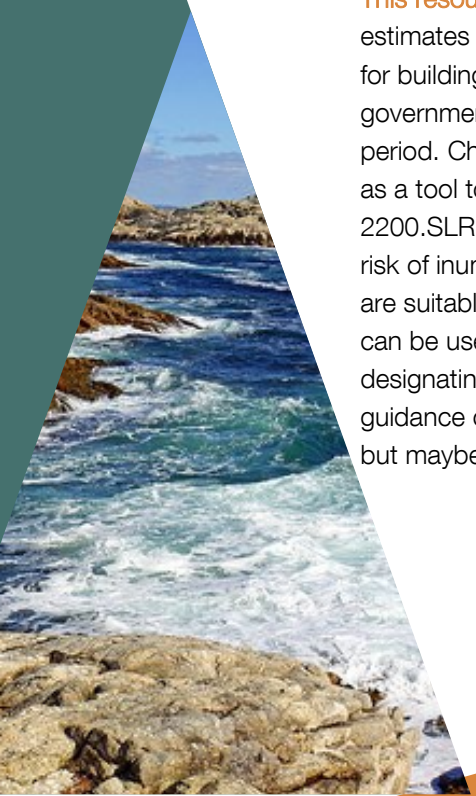
Sea level rise (SLR), adaptive risk management, shoreline retreat, coastal erosion, flood construction level, land management

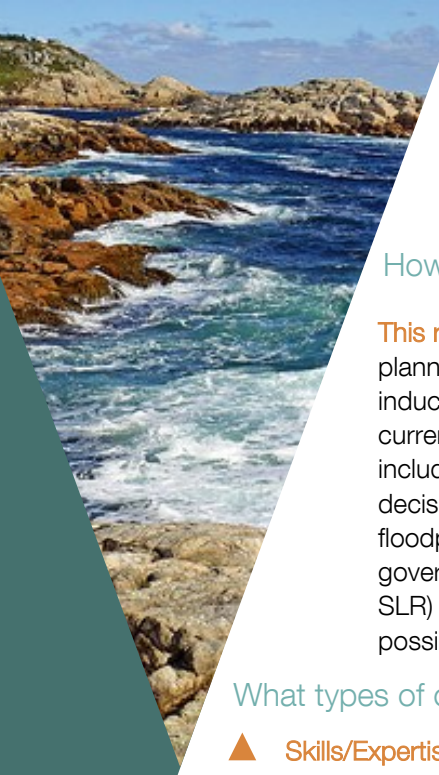
Resource Overview

This guideline document described the principles for determining the exposure of low lying coastal lands to flooding hazards and provides guidelines and direction for their management in British Columbia. The intent of this document is to guide local governments in updating their legislation, and implementing land-use management plans, and making subdivision approval decisions based on risk posed by sea level rise. This resource is an update of the previous provincial guidelines, "Flood Hazard Area Land Use Management Guidelines" (2004).

Key Sections

This resource synthesizes the findings of previous studies undertaken by the province into final estimates for SLR. Chapter 3 provides an overview of projected global SLR. It also includes guidance for buildings in the expected flood areas. Since most buildings have a service life of 50-100 years, governments need to ensure flood construction levels (FCLs) plan for projected SLR over this time period. Chapter 4 provides guidance on how local governments can implement SLR Planning Areas as a tool to plan for a changing climate, taking into account estimated changes for both 2100 and 2200.SLR Planning Areas should be defined for both settled and new development areas that are at risk of inundation or related erosion. Table 4.1 (page 19) outlines which type of planning responded are suitable for low, medium, and high risk areas. Chapter 5 includes examples of policy tools that can be used for land management, such as Official Community Plans (for identifying hazard land and designating SLR Planning Areas), zoning bylaws, and restrictive covenants, while Chapter 6 provides guidance on applying the directives of this resource to areas which are not currently in a flood zone, but maybe in the future.





How does this resource support implementation?

This resource provides helpful guidance for local governments to undergo land use planning in flood-affected areas. Having local estimates for SLR and other climate change induced effects is important in order to plan for local future conditions. Policy tools to protect current development in floodplains is vital and this resource includes some ideas to this effect, including implementing SLR Planning Areas. This resource also includes guidance on policy decisions that local governments may have to make to protected planned future development in floodplains, or retreat in order to ensure safer development. Overall, this resource shows how local governments can apply the municipal policy context to the physical reality (i.e. expected future SLR) in order to ensure that policy mechanisms will meet the physical challenges, be legally possible, and have tangible impacts.

What types of constraints can this resource help overcome?

- Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.
- Clarity/specificity of options: This resource could help build specificity into the actions identified in the adaptation plan to allow for timely implementation and for the measurement of progress and effect,
- Legality and/or procedural feasibility (municipality): This resource identifies ways to ensure that the actions proposed in the adaptation plan are legally and/or procedurally "doable" within the confines of the municipal administration.

How can this resource be replicated and used in a variety of contexts?

While not outlining one step-by-step method to plan for SLR (since municipalities will have unique needs and differing policy contexts), this document provides ideas on various ways to implement land use planning. Other coastal communities can use this resource as an example of how to ensure local bylaws and other legislation take into account a rising sea level. As this document is based on projected SLR as well as previous discussion papers for British Columbia, other jurisdictions will need to have their own localized climate change projections and explore how land use planning can be integrated into existing legislation in each context.

To access this resource visit: http://adaptationlibrary.com/#/option/219#top

PLEASE REVIEW THIS RESOURCE ON THE ADAPTATION LIBRARY!

This resource is included in a collection of documents that have been abridged by ICLEI Canada and the Adaptation to Climate Change Team (ACT) as part of the Making Strides on Community Adaptation project. The purpose of the abridged resources is to increase accessibility and uptake of the resources, specifically to further the implementation process in communities pursing adaptation. Please note the information included in these resources do not represent the resource as a whole and are largely focused on the contents of the documents pertaining to implementation.

Accelerating Adaptation in Canada Communities

Author: Clean Air Partnership (2012)

Climate change-related outcome addressed

- ▲ Change in precipitation
- △ Change in temperature
- △ Changes to lake and river levels
- ▲ Climate change in general
- ▲ Extreme weather event
- △ Sea level rise
- ▲ Volatile weather

Type of implementation activity this resource supports

- ▲ Communications and marketing
- △ Education, training, outreach
- ▲ Municipal policy tools
- ▲ Pilots and demonstrations
- △ Other:

Stage of implementation

- ▲ Starting implementation
- △ On the path of implementation
- △ Advanced implementation

Resource needs for application

Staff—Moderate

Staff expertise and skills—Moderate

Funding—Moderate

Material requirements—Moderate

Keywords

Forest floor mat transplanting, de-icing, water conservation, syndromic surveillance, stormwater management, land use, sustainability plan, flood reduction programming, cogeneration

Resource Overview

This resource aims to share best practices and lessons learned in adaptation through nine case studies from Ontario communities of various sizes, range from populations of 114,000 (Guelph) to over 1 million (York Region). Each case study provides details on the climatic change/issues; the adaptation actions determined to address it; the process for implementing the action (including funding and partnerships); as well as challenges and lessons learned. The information is drawn from interviews with municipal practitioners involved in the delivery of the actions on the ground. The actions presented in the case studies range from ecosystem based initiatives such as floor mat transplants, to public health undertaking such as heat wave monitoring systems, to broader policy changes affected land use planning, and municipal programming to improve resilience to flooding. Likewise, the implementation strategies presented vary from pilot projects of rock-salt de-icing methods, to community engagement exercises, to internal policy change

Key Sections

Each Case study includes sections titled “Challenges” and “Lessons learned”, which discuss common adaptation barriers faced by Ontario municipalities. Most cases identify funding adaptation actions, materials, and staff as some of the key challenges faced throughout the implementation process. The case studies also discuss ways these barriers have bee addressed, emphasizing the necessity of partnerships with the public, other municipalities, regional stakeholders, and relevant provincial and federal departments. As well, most case studies identify external partnerships as a key source of potential funding when municipal and regional funding is not sufficient. The full list of case studies include: forest floor mat transplanting in Sudbury, York Region de-icing strategies, Guelph water conservation programming, syndromic surveillance systems for heat-related illnesses, Pioneer Park stormwater management rehabilitation, alternative land use services, Markham Greenprint sustainability, Thunder Bay cogeneration, and Peterborough flood reduction programming.

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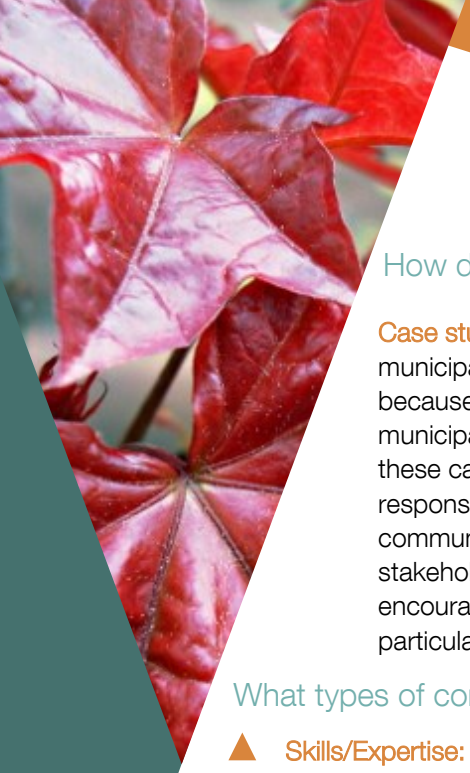

How does this resource support implementation?

Case studies on adaptation best practices are in high demand among Canadian municipalities. They are proven to be an effective method of supporting implementation because they identify critical factors of success that can be replicated across different municipalities. By including information on process, partnerships, funding, and lessons, learned, these case studies serve as a resource that can help other municipalities identify what responsibilities, procedures and relationships are necessary to implement actions in their community. This resource provides an accessible package of examples that can be shared with stakeholders to demonstrate the process and desired outcomes of particular projects. It can also encourage political will, public buy-in, and council support by demonstrating the success of particular initiatives in other communities.

What types of constraints can this resource help overcome?

- Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.
- Stakeholder buy-in: This resource could help spark the commitment of interested or affected parties to support an action.
- Political will: This resource could help inspire the political support required to implement an action.

How can this resource be replicated and used in a variety of contexts?

Communities facing similar challenges posed by a changing climate or pursuing similar adaptation actions can use these case studies as a basis for research and development of their implementation process. Thanks to the description of the processes, funding sources, partnerships, challenges, and lessons learned, users of this resource can design their own approach to these actions by referring to examples where they have been/are being effectively implemented. As well, since many of the key barriers to implementation (e.g. lack of funding, staffing, etc.) are consistent throughout Canada, these case studies provide tangible options on overcoming shared barriers and working towards implementation of a diverse set of adaptation initiatives.

To access this resource visit: http://adaptationlibrary.com/#/option/399#top

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Having the Climate Conversation:
Strategies for Local Governments

Author: ICLEI Canada (2012)

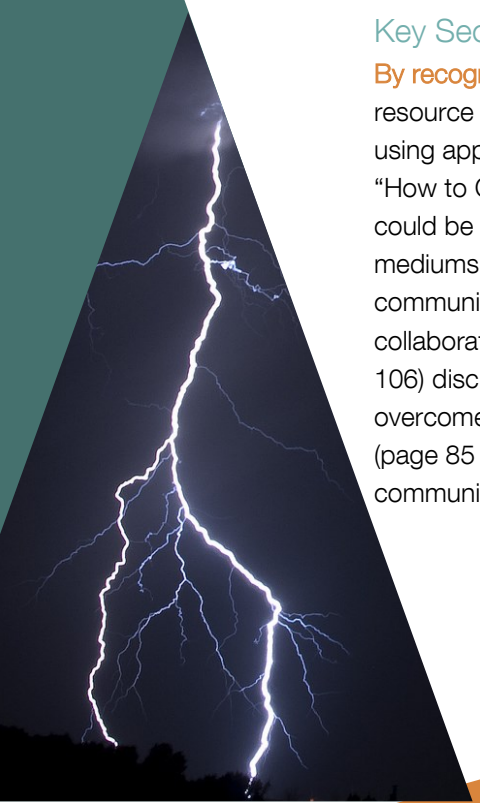
Climate change-related outcome addressed	Type of implementation activity this resource supports	Stage of implementation	Resource needs for application
△ Change in precipitation	▲ Communications and marketing	▲ Starting implementation	Staff—Minimal
△ Change in temperature	△ Education, training, outreach	▲ On the path of implementation	Staff expertise and skills—Moderate
△ Changes to lake and river levels	△ Municipal policy tools	▲ Advanced implementation	Funding—Moderate
▲ Climate change in general	△ Pilots and demonstrations		Material requirements—Minimal
▲ Extreme weather event	△ Other:		
△ Sea level rise			
△ Volatile weather			

Keywords

Communications, community planning, engagement, visioning, framing, media, skeptics

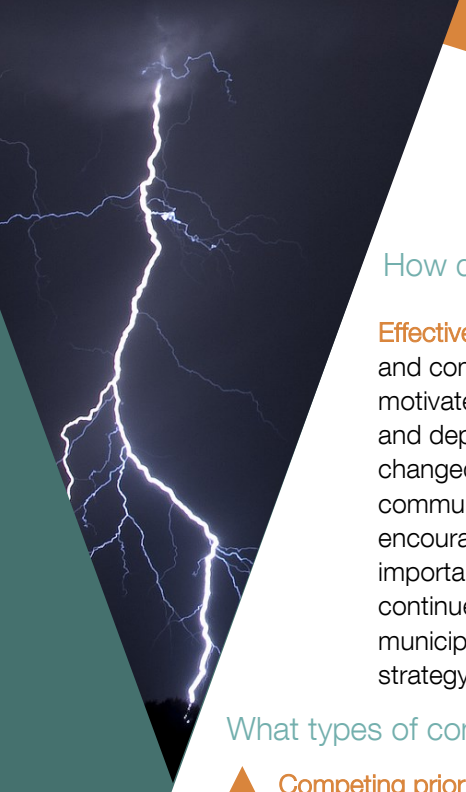
Resource Overview

This resource helps municipal practitioners communicate the issue of climate change to local governments, elected officials, and community stakeholders. Divided into concise sections, the WHY section briefly discusses the importance of communicating climate change; the WHO section helps users identify an audience and understand their perceptions; the WHAT section teaches users how to frame issues through various lenses (e.g. risk, health, financial liability, etc.) and discusses the importance of language and clarity; the WHEN section focuses on the important of timing, and teaches users how to capitalize on teachable moments; and finally, the HOW section examines several communication techniques and how they can be used most effectively. This resource also includes a section on challenges to communication and how these can be overcome, as well as case studies that highlight best practices in other communities.



Key Sections

By recognizing that there is no one size fits all approach to climate change communication, this resource helps municipal staff identify their audience, carefully develop their message, and deliver it using appropriate and effective communication tools and methods. Of particular importance is the "How to Communicate" section (page 60-89) which helps determine how the intended message could be disseminated and delivered to the audience. It highlight a variety of communication mediums while advising which techniques are best suited for the type of information being communicated. Case studied highlight best practices such as open data, website design, collaborative mapping and press releases. "Overcoming Challenges" to communication (page 94-106) discusses common constraints to communicating climate change, and suggests ways to overcome them. Key case studies on placemaking (page 42), visioning (page 83) and social media (page 85 and 87), will provide examples of best practices to communities just beginning their communication's strategies.



How does this resource support implementation?

Effective community-based adaptation requires not only that local governments and community stakeholders understand the threat of climate change, but they are motivated to take action to alleviate the risk. Internal communication with different municipal teams and departments will be required to keep everyone up to date on upcoming adaptation actions, changed to policies or codes, or new Council objectives. Moreover, effective internal communication can raised awareness and increase buy-in from staff or elected officials, and encourage support for implementation later on. External communication with the public is also important to increase community awareness and engagement, which is crucial when ensuring the continued success/uptake of adaptation actions. This resource can be used to help those municipalities implementing adaptation actions by determining the most effective communication strategy based on the type of information presented, audience perception, and timing of the event.

What types of constraints can this resource help overcome?

- Competing priorities: This resource could help align individuals, departments, or Council that a given action should be implemented regardless of other competing priorities.
- Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.
- Momentum: This resource could help create and maintain sufficient momentum within the administration to overcome institutional "stickiness", path dependency and behavioural obstacles.
- Stakeholder buy-in: This resource could help spark the commitment of interested or affected parties to support an action.

How can this resource be replicated and used in a variety of contexts?

Although the type of scale of communication strategy can vary, the wide range of tools presented in this resource offers a diverse set of options for different levels of local capacity (e.g. staff expertise, staff number, financial resources, etc.). Communities implementation adaptation actions can use this resource to communicate both internally and externally the reasons for action, its relevance to the audience, and its intended benefits. The guide can also be used when selecting the best medium for communication information to municipal staff and/or community stakeholders. Some specific examples of areas in which this resource could be applied include the dissemination of education and policy resources for local communities, community outreach programs, early warning systems, youth engagements, and many more. While not every municipality will have a dedicated communications staff or formal communications policies, this resource can be applied to numerous communities regardless of its size or population.

To access this resource visit: http://adaptationlibrary.com/#/option/8#top

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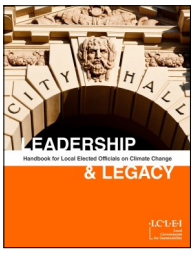


Check out this complimentary resource!

Leadership and Legacy: Handbook for Local Elected Officials on Climate Change

Tailored for Mayors and elected officials, the goal of this Handbook is to provide justifications for why cities should proactively undertake an adaptation process while offering clear-cut strategies on how to communicate climate change to the public. The Handbook also serves as a tool for municipal staff to build and maintain momentum at the political level for ongoing climate change adaptation action.

This resource is included in a collection of documents that have been abridged by ICLEI Canada and the Adaptation to Climate Change Team (ACT) as part of the Making Strides on Community Adaptation project. The purpose of the abridged resources is to increase accessibility and uptake of the resources, specifically to further the implementation process in communities pursing adaptation. Please note the information included in these resources do not represent the resource as a whole and are largely focused on the contents of the documents pertaining to implementation.

Preparing for Climate Change:
An Implementation Guide for Local Governments in British Columbia

Author: West Coast Environmental Law (2012)

Climate change-related outcome addressed	Type of implementation activity this resource supports	Stage of implementation	Resource needs for application
△ Change in precipitation	△ Communications and marketing	▲ Starting implementation	Staff—Moderate
△ Change in temperature	△ Education, training, outreach	△ On the path of implementation	Staff expertise and skills—Moderate
△ Changes to lake and river levels	▲ Municipal policy tools	△ Advanced implementation	Funding—Moderate
▲ Climate change in general	△ Pilots and demonstrations		Material requirements—Minimal
△ Extreme weather event	△ Other:		
△ Sea level rise			
△ Volatile weather			

Keywords

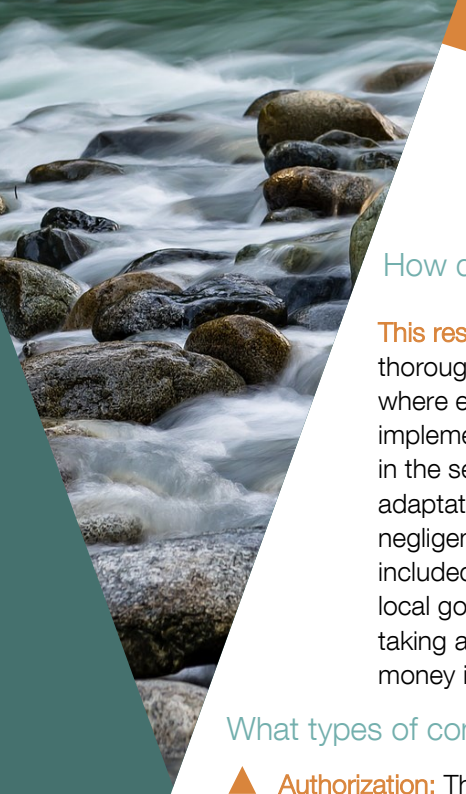
Land-use planning, regulations, emergency management planning, financial planning, asset management, infrastructure, building regulation, watershed management, liquid waste management, insurance

Resource Overview

This resource is designed to assist local governments, elected officials. and staff in planning and implementing climate change adaptation actions. Part One gives an overview of what adaptation is and the importance of undertaking this work at the local level. Part Two presents various policy tools, such as Official Community Plans (OCPs), zoning bylaws, Development Permit Areas (DPAs) and development cost charges. Other tools mentioned include regulatory powers of local governments, emergency management planning, financial and asset planning, and infrastructure considerations. Wherever possible, this guide provides concrete examples, drawing on the growing experiences of local governments in BC, and also some examples from outside the province.

Key Sections

Part 1(page 8-25) outlines considerations as to how local government planning will have to change to address adaptation. It includes an overview of the adaptation process, guiding local governments from the assessment of local risk to using the various policy tools. Part 2 (page 26-79) provides an in-depth analysis of several municipal policy tools, as well as examples of how each tool has already been applied in various municipalities through British Columbia and Canada. Appendix C (page 90) provides a checklist to assist local governments in exploring the entry points for integrating climate change adaptation into policy and operations, as well as the scope of responsibilities. Appendix D (page 103) provides guidance for local governments with limited financial resources (such as how to assess risk and prioritize actions).



How does this resource support implementation?

This resource builds skills and knowledge by providing local governments with a thorough overview of various policy tools supporting implementation. By knowing how and where each tool could be best utilized, governments can quickly select the appropriate implementation tools without needing to conduct extensive background research. The discussion in the second section of the resource concerning legal liability can also spark the implementation of adaptation actions (e.g. infrastructure replacements) if local governments don't want to be found negligent in exercising reasonable care toward their citizens. Furthermore, many of the strategies included are best practices that have fa-reaching community benefits. These strategies can assist local governments in developing a "business case" for climate change adaptation by showing that taking action on implementation will positively impact the community while saving the municipality money in the long term.

What types of constraints can this resource help overcome?

- Authorization: This resource could support the individual(s) leading the adaptation effort in receiving the authority to sign off on the implementation of adaptation actions
- Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.
- Clarity/specificity of option: This resource could help build specificity into the actions identified in the adaptation plan to allow for timely implementation and for the measurement of progress and effect.
- Jurisdictional authority: This resource identifies way to implement actions given jurisdictional barriers.
- Political will: This resource could help inspire the political support required to implement an action.
- Insufficient resources (financial): This resource proposes innovative approaches to access sufficient financial resources to support short– and/or long-term implementation.

How can this resource be replicated and used in a variety of contexts?

This resource is focused on municipalities in British Columbia, and as such its guidance on jurisdictional authority is mainly relevant to this province. Much of its information is informed by the Province of British Columbia's Local Government Act. However, similar legislation likely exists across Canada whereby local governments are given authority over certain aspects of land use planning and regulation. As such, other local governments across the country can us this resource as a guide to understanding the concepts and various policy tools while also considering their own local policy and legal contexts for their application.

To access this resource visit: http://adaptationlibrary.com/#/option/251#top

PLEASE REVIEW THIS RESOURCE ON THE ADAPTATION LIBRARY!

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Are we There Yet? : Applying Sustainability Indicators to Measure Progress on Adaptation

Author: ICLEI Canada & Clean Air Partnership (2015)

Climate change-related outcome addressed

- △ Change in precipitation
- △ Change in temperature
- △ Changes to lake and river levels
- ▲ Climate change in general
- △ Extreme weather event
- △ Sea level rise
- △ Volatile weather

Type of implementation activity this resource supports

- ▲ Communications and marketing
- △ Education, training, outreach
- △ Municipal policy tools
- △ Pilots and demonstrations
- ▲ Other: Monitoring and Evaluation

Stage of implementation

- ▲ Starting implementation
- ▲ On the path of implementation
- ▲ Advanced implementation

Resource needs for application

Staff—Moderate to Considerable

Staff expertise and skills—Moderate to Considerable

Funding—Moderate to Considerable

Material requirements—Moderate to Considerable

Keywords

Performance metrics, coastal management, flood management, infrastructure, health, monitoring and evaluation, progress

Resource Overview

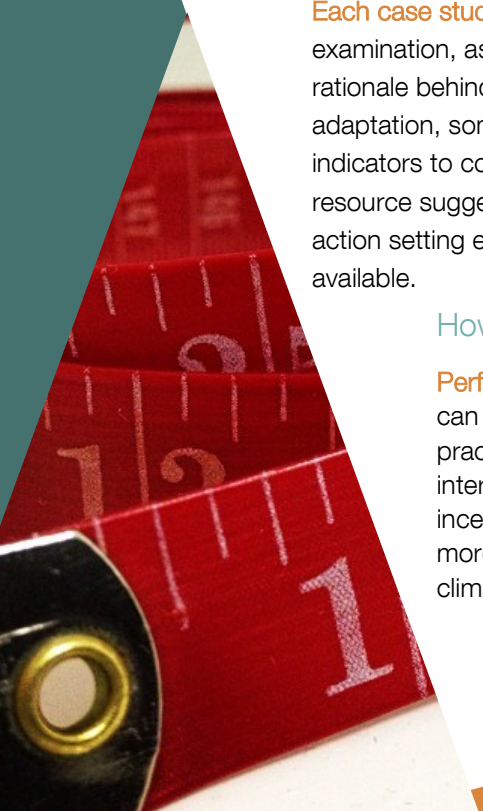
The purpose of this series of case studies it to present a series of sustainability indicators and assess their ability to contribute to the measurement of adaptation actions both in terms of effectiveness and progress on implementation. It presents forty indicators used in four sectors (coastal management, flood management, infrastructure, and health) to help determine whether an action is increasing the adaptive capacity of a system to a given climate change impact.

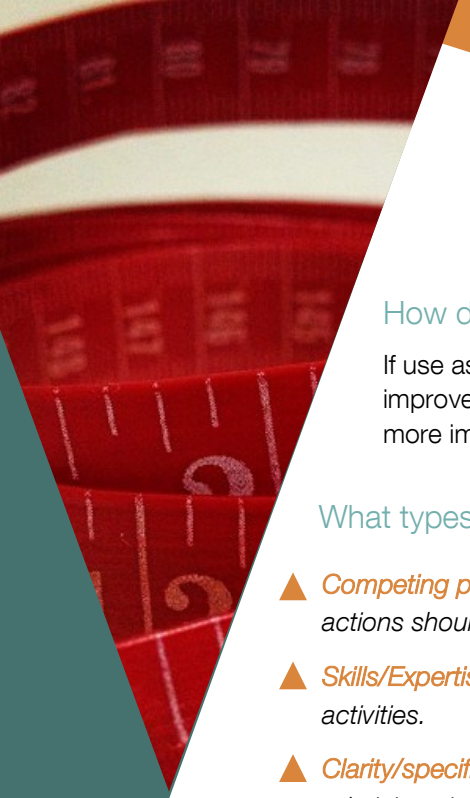
Key Sections

Each case study contains a header which helps user quickly discern the indicator's sector of examination, as well as the human and financial resource intensity. Each case study presents the rationale behind the use of indicator, the metric, the geographic scale, the baseline, its applicability to adaptation, some contextual information, the suggested frequency of data collection, complementary indicators to consider, the limitations, potential data sources, and web links to more information. This resource suggests that the process of selecting indicators should be undertaken as part of planning and action setting efforts, and will primarily be influenced by what is being measured and what information is available.

How does this resource support implementation?

Performance indicators are used to measure progress towards a set of goals. This information can be used for communicating successes to stakeholders (e.g. elected officials, municipal practitioners, community groups, etc.) in order to maintain momentum for continued action and interest. Working collaboratively to gather and share information may also provide incentives for intra– and interagency collaboration which can help create more effective and streamlined approach for managing climate change.





How does this resource support implementation? (continued)

If use as an adaptive management measure, information can lead to changes and improvements of an initiative, or can justify redirecting the allocation of the resources towards more impactful actions.

What types of constraints can this resource help overcome?

- *Competing priorities: This resource could help align individuals, departments, or Council that a given actions should be implemented regardless of other competing priorities.*
- *Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.*
- *Clarity/specificity of option: This resource could help create and maintain sufficient momentum within the administration to overcome institutional "stickiness", path dependency and behavioural obstacles.*
- *Momentum: This resource could help create and maintain a sufficient momentum within the administration to overcome institutional "stickiness", path dependency, and behavioural obstacles.*
- *Stakeholder buy-in: This resource could help spark the commitment of interested or affected parties to support an action.*
- *Political will: This resource could help inspire the political support required to implement an action.*

How can this resource be replicated and used in a variety of contexts?

All of the indicators presented as part of this resource can be applied at the municipal level and possibly at other levels of jurisdiction (e.g. provincial and federal government, conservation authorities, etc.). However, it is important to note that there is no universal set of indicators, and user should select the ones that are most relevant to them according to their local reality, the actions to be measured, and the available data. Users can learn from and find examples of localized application in the "More Information" section of the case studies. Complementary indicators are also provided in each case study so as to offer alternatives in the event that a specific indicator does not meet a user's needs. In order to increase the replicability of the case studies, the potential data sources identified for each indicator are not context-specific, but instead provide suggestions as to the type of organizations that can be approached in order to obtain the desired information.

To access this resource visit: http://adaptationlibrary.com/#/option/432#top

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Prairies Regional Adaptation Collaborative:
Advancing Climate Change Adaptation in the Prairies

Author: Saskatchewan Watershed Authority (2012)

Climate change-related outcome addressed

- ▲ Change in precipitation
- △ Change in temperature
- ▲ Changes to lake and river levels
- ▲ Climate change in general
- △ Extreme weather event
- △ Sea level rise
- △ Volatile weather

Type of implementation activity this resource supports

- △ Communications and marketing
- ▲ Education, training, outreach
- ▲ Municipal policy tools
- △ Pilots and demonstrations
- △ Other:

Stage of implementation

- ▲ Starting implementation
- △ On the path of implementation
- △ Advanced implementation

Resource needs for application

Staff—Moderate

Staff expertise and skills—Minimal

Funding—Moderate

Material requirements—Minimal

Keywords

Drought, excessive moisture, water, grasslands, agriculture, land management, wetlands, inter-governmental collaboration

Resource Overview

This resource is a concluding report on the work of the Prairies Regional Adaptation Collaborative (PRAC), which was a 3-year initiative aimed at the advancement of decision-making for climate change adaptation in Alberta, Saskatchewan, and Manitoba. The PRAC focused especially on three themes: water, terrestrial ecosystems, and drought and excessive moisture. One of the PRAC's main goals was to bring together decision-makers in each jurisdiction and move them through a continuum of adaptation, from awareness to the decision point. This resource includes a synthesis of the lessons learned from the PRAC process and ideas on how to move forward with adaptation.

Key Sections

Chapter 5considers the importance of inter-provincial collaboration for adaptation planning and implementation. Collaboration can advance adaptation initiatives by enabling the sharing of knowledge, best practices, approaches to vulnerability and risk, approaches to monitoring and evaluation, and costs of implementing adaptation. Chapter 7outlines barriers to adaptation work; these include adaptation often being a lower priority than other work (which leads to less staff and funding available for it), a lack of coordination within provincial governments, and a misunderstanding or lack of awareness around adaptation within high-level decision-making arenas. Chapter 8 suggests ways to advance adaptation. These include: mainstreaming adaptation into other planning work; broadening engagement to more levels of society (including industry and the public); framing adaptation in a positive manner; using effective targeting, goal-setting, and monitoring; and using financial resources efficiently through collaboration.

How does this resource support implementation?

This resource exemplifies how various jurisdictions and levels of government can collaborate to support better implementation of adaptation-related action. Through some of the particular barriers and local priorities differ across the three provinces, many adaptation implementation challenges are shared. Therefore, working collaboratively to share information and resources can help to create a more effective and streamlined approach for managing a changing climate. In particular, the use of inter-provincial forums or conferences to educate and involve all levels of governmental staff can be instrumental in creating and maintaining momentum for adaptation, developing the skills of staff, and raising the profile of adaptation as a key issue.

What types of constraints can this resource help overcome?

- Competing priorities: This resource could help align individuals, departments, or Council that a given actions should be implemented regardless of other competing priorities.
- Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.
- Jurisdictional authority: This resource identifies ways to implement actions given jurisdictional barriers.
- Momentum: This resource could help create and maintain a sufficient momentum within the administration to overcome institutional “stickiness”, path dependency, and behavioural obstacles.
- Political will: This resource could help inspire the political support required to implement an action.
- Insufficient resources (financial): This resource proposes innovative approaches to access sufficient financial resources to support short-and/or long-term implementation.

How can this resource be replicated and used in a variety of contexts?

This resource provides a strong case of the benefits of inter-governmental collaboration. Since climatic regions and ecosystems extend across governance boundaries, working with other local governments in adaptation planning and implementation will be crucial to ensure policies are streamlined and information is shared. Other governments looking to begin action on adaptation implementation can learn from this multi-governmental approach. These lessons extend beyond governance as well; the same principals of collaboration and sharing can also be applied on the municipal level to local governments looking to work together on implementation.

To access this resource visit: http://adaptationlibrary.com/#/option/414#top

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Communicating the Health Risks of Extreme Heat Events: Toolkit for Public Health and Emergency Management Officials

Author: Healthy Environments & Consumer Safety Branch, Health Canada (2012)

Climate change-related outcome addressed	Type of implementation activity this resource supports	Stage of implementation	Resource needs for application
△ Change in precipitation	▲ Communications and marketing	△ Starting implementation	Staff—Minimal
▲ Change in temperature	△ Education, training, outreach	▲ On the path of implementation	Staff expertise and skills—Minimal
△ Changes to lake and river levels	△ Municipal policy tools	▲ Advanced implementation	Funding—Minimal
△ Climate change in general	△ Pilots and demonstrations		Material requirements—Minimal
▲ Extreme weather event	△ Other:		
△ Sea level rise			
△ Volatile weather			

Keywords

Extreme heat, public health, emergency response, communication, public awareness

Resource Overview

This Toolkit is intended for use by public health and emergency management officials who are developing or updating heat-health communication strategies. It is designed to guide the development of targeted heat-health communication campaigns and necessary outreach products for specific audiences. This resource provides an overview of extreme heat events and the potential health risks to all Canadians, especially those most vulnerable to heat-health impacts. It includes guidance on communicating heat-health risks and strategies, including scientifically sound health messages to support the development of effective communication campaigns. It also provides template materials for public health and emergency management officials, such as fact sheets, media releases and checklists. Further guidance also includes information on how public officials can evaluate their communications plans both during and after implementation.

Key Sections

Chapter 1 (page 2) provides information on heat-vulnerable groups and challenges they each face as a result of extreme heat, as well as key short-term and long-term strategies to increase adaptive capacity of the community to extreme heat events. Chapter 2 (page 8) provides detailed information on how governments should craft their communications plans. Governments need to know their target audience(s) and tailor campaigns to their needs; set realistic objectives; choose the appropriate means of communication; remove barriers to adaptive actions; communicate the risks from extreme heat before and during the heat season, as well as during an extreme heat event; take special consideration for rural communities; develop “heat-health” messages that promote positive behavior; and focus on scientifically-sound messages. Various examples and templates of messages are provided. The appendices (page 32-47) also provide easy checklists and examples of materials for governments to ensure their communications plans meet all the above criteria.

How does this resource support implementation?

Communications about the dangers of extreme heat and types of community level adaptation actions will help support the widespread adoption of protective actions at the community level. This resource provides a step-by-step guide for governments to follow in order to create an effective communication plan for extreme heat events. Local governments can use this guide to create communications materials without needing in-house or external communication experts. The resource helps users identify vulnerable groups, the medium of communication, when to communicate, and the types of scientifically sound messages that can be conveyed. Performance metrics are also taken into account as the resource provides guidance on how to evaluate the effectiveness of communication campaigns through simple and cost effective means.

What types of constraints can this resource help overcome?

- Insufficient resources (human): This resource proposes innovative approaches to access sufficient human resources to support short- and/or long-term implementation.
- Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.
- Clarity/specificity of option: This resource could help build specificity into the actions identified in the adaptation plan to allow for timely implementation and for the measurement of progress and effect.
- Stakeholder buy-in: This resource could help spark the commitment of interested or affected parties to support an action.

How can this resource be replicated and used in a variety of contexts?

Though the local specifics of extreme weather events will vary across the country, all areas will likely face some sort of extreme weather. For those facing extreme heat events, this resource is easy to follow in replicating communications materials in any municipality. Building on existing social and community networks is also encouraged by this resource, making it easily applicable to a variety of local contexts. To use this resource, municipalities will likely need to first have local projections of temperature change and extreme heat events. Once they have this information, communicating health risks to the public can be guided with the use of this resource.

To access this resource visit: http://adaptationlibrary.com/#/option/382#top

PLEASE REVIEW THIS RESOURCE ON THE ADAPTATION LIBRARY!

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Land Use Planning Tools for Local Adaptation to Climate Change

Author: Government of Canada (2012)

Climate change-related outcome addressed

- ▲ Change in precipitation
- ▲ Change in temperature
- △ Changes to lake and river levels
- ▲ Climate change in general
- ▲ Extreme weather event
- ▲ Sea level rise
- △ Volatile weather

Type of implementation activity this resource supports

- △ Communications and marketing
- △ Education, training, outreach
- ▲ Municipal policy tools
- △ Pilots and demonstrations
- △ Other:

Stage of implementation

- ▲ Starting implementation
- △ On the path of implementation
- △ Advanced implementation

Resource needs for application

Staff—Moderate

Staff expertise and skills—Moderate

Funding—Minimal

Material requirements—Minimal

Keywords

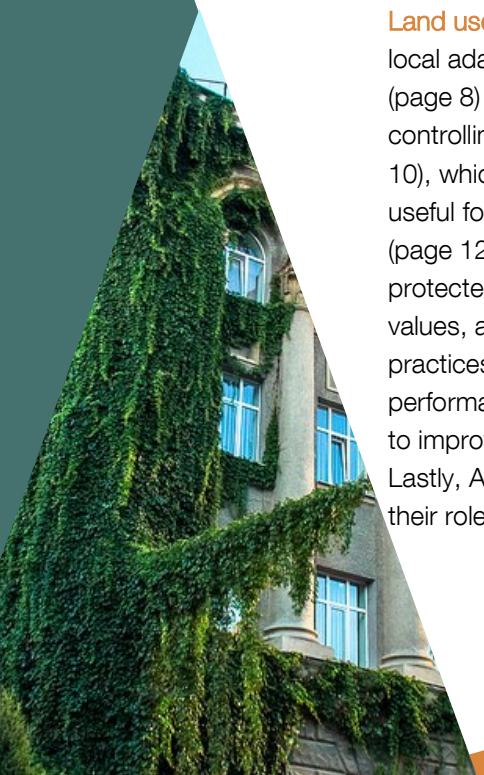
Land-use planning, zoning, design guidelines, development controls, official plans, covenants, easements

Resource Overview

This resource described land use planning tools that communities can use in preparing to adapt to climate change. It summarizes seven of the most prominent land use tools in use across Canada, including official plans, local plans on special matters, zoning, land subdivision or development controls, covenants and easements, design guidelines, and environmental review of development projects. A brief description of each tool and its use by a Canadian community is given. The resource also provides information on decision-support tools, including the assessment of community vulnerability and risk, climate projections, scenario planning, visualizing climate change impacts, and adaptation planning guidebooks. Furthermore, accompanying appendices describe the provincial and territorial role in land use planning for local adaptation.

Key Sections

Land use planning can be one of the most effective types of municipal policy tools for supporting local adaptation to climate change. Several of the tools mentioned in the resource include: (i) **zoning** (page 8) a key tool for implementing the goals/objectives set out in a municipality's official plan by controlling land use within the city's boarders; (ii) **land subdivision and development controls** (page 10), which allow local officials to evaluate development projects case by case, and can be very useful for adapting to climate change at the neighbourhood scale; (iii) **covenants and easements** (page 12), which can be used as a development control to ensure that community interests are protected, or as a conservation tool that places restrictions on the use of land to protects its natural values, and (iv) **design guidelines** (page 14), which can help municipalities describe preferred practices in the design of certain aspects of a development project to improve environmental performance, increase adaptive capacity in the design of certain aspects of a development project to improve environmental performance, increase adaptive capacity, increase public safety, etc. Lastly, Appendix A (page 30) discusses the provincial and territorial role in planning and their role of influence in municipal land use planning.



How does this resource support implementation?

In general, the planning tools discussed within this resource can be used to reduce climate risks by limiting development in hazard-prone areas and ensuring that the built environment can withstand a range of environmental stress. The resource can also be used to help preserve natural environments that protect communities against hazards, and also to educate stakeholders and decision makers about risks/opportunities, and fostering a dialogue about adaptation. The mentioned tools can provide a policy framework for implementing various adaptation actions, including infrastructure upgrades, floodplain development, parking lot designs, etc. The case studies provide examples of best practices for implementation by identifying the climate change related impacts, the relevant planning tools to use for addressing specific climate change related impacts, suggesting needed amendments, and demonstrating how these can increase the specific community's adaptive capacity.

What types of constraints can this resource help overcome?

- *Authorization: This resource could support the individual(s) leading the adaptation effort in receiving the authority to sign off on the implementation of adaptation actions.*
- *Skills/Expertise: This resource helps to build in-house capacity by guiding and informing implementation activities.*
- *Legality and/or procedural feasibility (municipality): This resource identifies ways to ensure that the actions proposed in the adaptation plan are legally and/or procedurally "doable" within the confines of the municipal administration,*
- *Jurisdictional authority: This resource identifies ways to implement actions given jurisdictional barriers.*

How can this resource be replicated and used in a variety of contexts?

The planning tools mentioned in this resource are of broad utility, and the design and application of a particular planning tool can vary greatly from one jurisdiction to another depending on the climate change impacts, size of the municipality, provincial or territorial laws, and other factors. As such, this resource can be applied in a variety of municipal contexts, which is reflected in its diverse set of case examples that range from Northern municipalities of less than 10,000 people, to large, densely populated cities in the South. Local governments looking to update their development and conservation practices can use this resource as a guide to the type of policy tools available under the jurisdiction of the municipality. Some examples of this resource's potential application include zoning bylaws to reduce urban heat island effect, sea level rise protection zones, green building standards, municipal development agreements, and more. Identified

To access this resource visit: http://adaptationlibrary.com/#/option/408#top

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Adapting to Urban Heat: A Tool Kit for Local Governments

Author: Georgetown Climate Centre (2012)

Climate change-related outcome addressed	Type of implementation activity this resource supports	Stage of implementation	Resource needs for application
△ Change in precipitation	△ Communications and marketing	▲ Starting implementation	Staff—Minimal
▲ Change in temperature	▲ Education, training, outreach	▲ On the path of implementation	Staff expertise and skills—Minimal
△ Changes to lake and river levels	▲ Municipal policy tools	△ Advanced implementation	Funding—Moderate
△ Climate change in general	△ Pilots and demonstrations		Material requirements—Moderate
▲ Extreme weather event	△ Other: Financing		
△ Sea level rise			
△ Volatile weather			

Keywords

Heat stress, heat islands, public health, cool roofs green roofs, cool pavements, urban forestry

Resource Overview

This resource is designed to help local governments reduce the effects of increased heat in their communities. It focuses on built-environment heat-reduction strategies, rather than on emergency response, and provides an overview of four possible options: cool roofs, green roofs, cool pavements, and urban forestry. This resource also includes an analytical framework for policy makers to consider each of these four options based on their local needs and resources. Possible government roles in taking action are explored, including shaping government's own operations, mandating or providing incentives for private choices, and engaging in public education.

Key Sections

The Introduction explains this resource's methodology in analyzing each of the four heat-reduction tools. The Following four chapters focus on cool roofs, green roofs, cool pavements, and urban forestry, respectively, Each of these chapters explores the benefits ad challenges of the option, and analyzes it based on an outcome and governance criteria. The outcome criteria refers to how well the option performs on reducing heat, improving public health, saving money, and providing environmental co-benefits; the governance criteria refers to administrative and legal considerations. Each chapter then describes how various policy tools could be used to enact each option, including mandates, incentives, and public education programs. Multiple examples of cities where each policy tool has been successfully implemented are provided throughout the resource.

How does this resource support implementation?

The chapter on each of the four heat-reduction strategies clearly outline various ways to implement each option, given the context of local government jurisdiction. Each chapter also includes information on co-benefits of some strategies, such as reducing storm water runoff while also cooling the community. These co-benefits are likely to increase the feasibility of the options as politicians, policy makers, and the public alike will tend to see the value of them for their multiple benefits. The introduction also discusses how to overcome challenges for governments including complex choices, limited resources and authority, agency coordination, and climate skepticism.

What types of constraints can this resource help overcome?

- Authorization: *This resource could support the individual(s) leading the adaptation effort in receiving the authority to sign off on the implementation of adaptation actions.*
- Skills/Expertise: *This resource helps to build in-house capacity by guiding and informing implementation activities.*
- Stakeholder buy-in: *This resource could help spark the commitment of interested or affected parties to support an action.*
- Political will: *This resource could help inspire the political support required to implement an action.*

How can this resource be replicated and used in a variety of contexts?

Though this is a U.S. resource, it is applicable and can easily be used in Canadian municipalities. The use of multiple examples, including ideas from Vancouver (BC) and Toronto (ON), show clearly and easily how these ideas can be implemented in a variety of ways with great success. This resource does not prescribe a set way of implementing each option, but rather shows various ways each can be implemented. This flexibility allows for local governments to fit each option into their own context by taking into account factors like local laws, political considerations geography, and climatic zone. Local governments can then use the analytical framework given here in order to analyze what would work best for their own needs. Therefore, this resource is easily transferable to a number of legal, administrative, and governance situations and constraints.

To access this resource visit: http://adaptationlibrary.com/#/option/379#top

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Paying for Urban Infrastructure in Canada:

An Analysis of Existing and Potential Economic Instruments for Local Governments

Author: The Adaptation to Climate Change Team (2015)

Climate change-related outcome addressed

- △ Change in precipitation
- ▲ Change in temperature
- △ Changes to lake and river levels
- ▲ Climate change in general
- ▲ Extreme weather event
- △ Sea level rise
- △ Volatile weather

Type of implementation activity this resource supports

- △ Communications and marketing
- △ Education, training, outreach
- △ Municipal policy tools
- △ Pilots and demonstrations
- ▲ Other: Financing

Stage of implementation

- ▲ Starting implementation
- ▲ On the path of implementation
- △ Advanced implementation

Resource needs for application

Staff—Moderate

Staff expertise and skills—Moderate

Funding—Considerate

Material requirements—Considerable

Keywords

Infrastructure deficit, reserve funds, green bonds, climate bonds, tax increment financing, property tax, tax levy, local improvement charges, development cost charges, carbon fund, financing, funding

Resource Overview

This resource addresses the challenge of financing adaptation infrastructure in municipalities by providing information on financial tools and instruments that are available for local governments. It is geared toward local governments, who typically have authority over land use decisions and the selection of infrastructure projects at the municipal level. Several economic instruments are analyzed for their design, application, benefits, and limitations. Each is demonstrated with case studies, in order to better inform local level decision-makers about the financial tools that are available and most helpful for them to fund and finance the development of climate resilient infrastructure. The report also identifies and similarly evaluates financial tools that can incentivize behavioural changes at the local level and reduce the need for public investments in adaptation infrastructure.

Key Sections

The resource examines 18 financial tools that have the potential to address the challenge of paying for adaptation infrastructure. In Chapter 4, each tool is evaluated based upon seven objectives and 12 criteria. According to the report, some of the tools that are found to be the most effective are traditional property tax and outside revenue streams. In Chapter 5, internal financing mechanisms (e.g. tax levy, local improvement charges, climate bonds, user fees) are evaluated based on a structured framework that addresses: Application for Climate Change Adaptation, Benefits, Limitations, examples from Canadian case studies, and Feasibility for each mechanism listed. In Chapter 6, the study provides examples of external revenue streams that local governments can access outside of municipal jurisdiction, for instance the federal gas tax. It also explores innovative external revenue sources to fund infrastructure adaptation, such as public-private partnerships and carbon funds, however these require strong political will to implement.

Key Sections continued

The study finds that sources of revenue currently available to local governments in Canada are inadequate to raise the kind of capital that will be needed to invest in adaptation projects and upgrades. As a solution, the study identifies external revenue streams that local governments can access, including public-private partnerships, carbon funds and climate action revenue incentive program grants (BC case studies). As well, it encourages local governments to create incentives for climate change adaptation at a local level to encourage public buy-in and help address the funding gap through instruments like local improvement charge financing, density for benefit agreements, and natural area tax exemption.

How does this resource support implementation?

The study addresses paying for urban infrastructure, one of the largest challenges faced by local governments in the implementation phase. It has the potential to increase users' knowledge and capacity to pursue a variety of innovative options for funding and implementing resilient adaptation infrastructure through a variety of financial mechanisms ranging from provincial grants and strategic taxing to innovative public incentives. It presents a broad picture of implementing resilient infrastructure by extending the tools available to reach beyond government funding, identifying ways to involve the private sector and lot-level owners in order to reduce municipal costs and increase public buy-in. The study acknowledges that many of the tools included are not sources of fiscal revenues to local governments, rather they are designed to reduce the need for public investment in adaptation infrastructure by incentivizing residents to make changes on their own. Key chapters supporting implementation are chapters 4-6.

What types of constraints can this resource help overcome?

- Insufficient resources (financial): *This resource proposes innovative approaches to access sufficient financial resources to support short- and/or long-term implementation*
- Clarity/specificity of option: *This resource could help build specificity into the actions identified in the adaptation plan to allow for timely implementation and for the measurement of progress and effect.*
- Legality and/or procedural feasibility (municipality): *This resource identifies ways to ensure that the actions proposed in the adaptation plan are legally and/or procedurally "doable" within the confines of the municipal administration.*
- Stakeholder buy-in: *This resource could help spark the commitment of interested or affected parties to support an action.*

How can this resource be replicated and used in a variety of contexts?

Using case studies, this resource presents examples of success and barrier in funding infrastructure adaptation, demonstrating best practices in selecting and capitalizing on the various economic tools reviewed in the study. This resource can be used across Canadian municipalities as urban infrastructure is almost unanimously within the jurisdiction of local governments. The challenge of funding resilient infrastructure is echoed across the country and the financial tools identified can be pursued from anywhere in Canada. Although the amount of resources required to pursue some of these funding mechanisms will vary, the wide range of tools presented offers a diverse set of options for different levels of local capacity and needs.

To access this resource visit: http://www.adaptationlibrary.ca/#/option/455#top

PLEASE REVIEW THIS RESOURCE ON THE ADAPTATION LIBRARY!

This resource is included in a collection of documents that have been abridged by ICLEI Canada and the Adaptation to Climate Change Team (ACT) as part of the Making Strides on Community Adaptation project. The purpose of the abridged resources is to increase accessibility and uptake of the resources, specifically to further the implementation process in communities pursing adaptation. Please note the information included in these resources do not represent the resource as a whole and are largely focused on the contents of the documents pertaining to implementation.