SCHOOL OF
Urban and
Regional Planning
Queen's University

Planning for Climate Change Adaptation

in the Cataraqui Region

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CATARAQUI REGION CONSERVATION AUTHORITY

Standard Limitations

This report was prepared by students at Queen's University in the School of Urban and Regional Planning enrolled in SURP 825: Environmental Services Project Course for the account of the Cataraqui Region Conservation Authority. The disclosure of any information in this report is the sole responsibility of the Cataraqui Region Conservation Authority. The material in this report reflects the researchers' best judgment in light of the information available at the time of preparation. The findings and recommendations herein are the opinions of the researchers and have not been reviewed or endorsed by the Cataraqui Region Conservation Authority.

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Queen's School of Urban and Regional Planning

The project course is an intensive four month course designed to give students in the School of Urban and Regional Planning (SURP) an opportunity to engage with planning professionals and apply newly acquired theories and skills in a professional setting. The course results in a high-quality report and final research project produced by students in the program, under the guidance of project coaches and a coordinator. This year, the School of Urban and Regional Planning was retained by the Cataraqui Region Conservation Authority for a project involving planning for climate change adaptation in the Cataraqui Region.

The project aimed to evaluate whether the existing land use planning policies in the Cataraqui Region were supportive of climate change adaptation. Students enrolled in the Environmental Services and Land Use and Real Estate concentrations completed an extensive review of existing literature and best practices, an analysis of existing planning documents, and provided recommendations for further adaptation policies. The skills, experience, and knowledge gained from this project enhance the students' education and prepare them for professional planning careers.

Project Team

Back row (left to right): Dr. John Meligrana (faculty supervisor), Spencer Skidmore, Daniel Kucharczuk, Jim Avram, Eric Joyal, Graham Rathwell, Matthew Marsili.
Front row (left to right): Rob McRae (project coach, Cataraqui Region Conservation Authority), Ryan Snowball, Megan Rueckwald, Andrew Carr, Amy Shanks, Ashley Taylor.

Executive Summary

Overview

Changes in the global climate have become increasingly evident in recent decades. While scientific and media rhetoric have demonstrated the anticipated effects of climate change on a global scale, local impacts are less understood and often overlooked. However, the past few years have shown warmer, wetter, and more variable weather at a local scale. As such, municipal policy and decision-makers may lack the necessary knowledge or tools to effectively manage climate change.

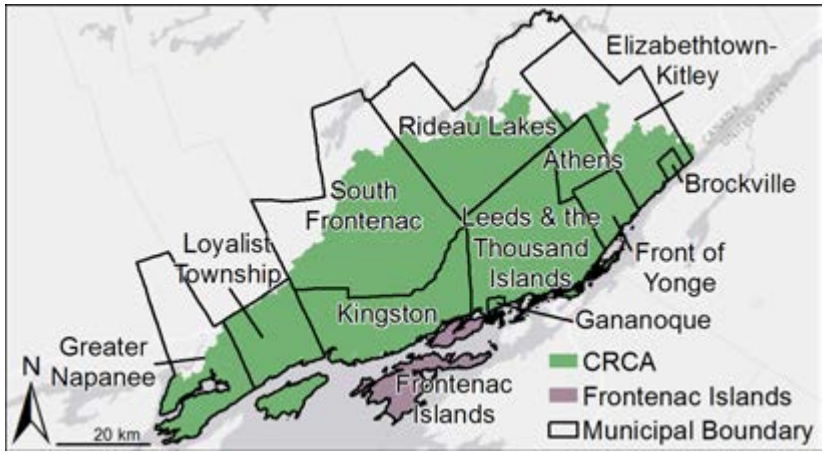
In the 2015 fall academic term, the Cataraqui Region Conservation Authority (CRCA) engaged a student project team from the Queen's University School of Urban and Regional Planning to contribute research towards the development of their climate change adaptation strategy. This research seeks to answer the following research question:

Are the current land use policies in the Cataraqui Region supportive of climate change adaptation?

Historically, much of the global discourse has revolved around mitigation strategies; those focused on reducing greenhouse gas (GHG) emissions. However, with mitigation alone the impacts of climate change are unavoidable. Mitigation strategies should be implemented in tandem with adaptation strategies, wherein adjustments are made to natural or human systems to moderate harm. One method for climate change adaptation is effective land use planning. Municipalities in the Cataraqui Region can minimize the negative effects of climate change by regulating the form and function of land and the built environment.

The Cataraqui Region

The Cataraqui Region extends over approximately 3,500 square kilometres of land in southeastern Ontario (see below). Its boundaries are defined by watersheds under the jurisdiction of the CRCA. The Region consists of fifteen distinct municipalities, including three counties, eight townships, and three separated municipalities. The Township of Frontenac Islands is not formally included within CRCA boundaries, but works with the conservation authority on matters of shared interest.



Map showing the extents of the Cataraqui Region, one of 36 Conservation Authorities in Ontario.

Methodology

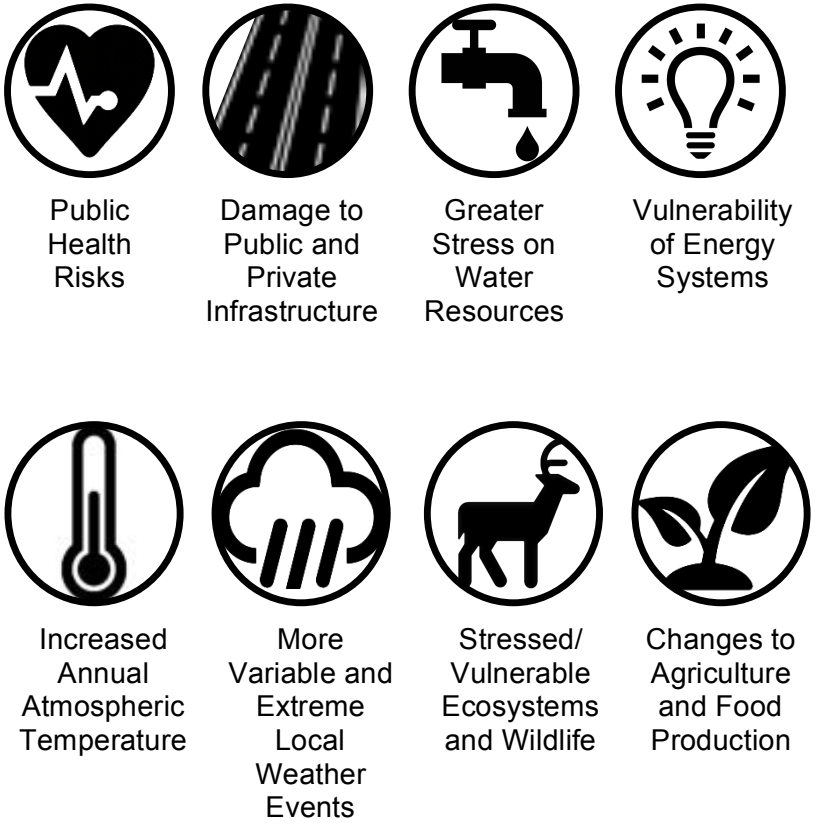
The project was completed in four stages:

- Background research;
- Official Plan review;
- Review of common and innovative land use solutions; and
- Development of model land use policies.

Initial background research was conducted to establish the broad global impacts of climate change. Further research revealed the anticipated local impacts of climate change for the Cataraqui Region.

From this research, eight major impact themes were identified (shown on the right). Using these themes, a detailed review of ten of the Region's fifteen municipal official plans was conducted to determine their level of support for climate change adaptation.

A review of academic and grey literature was then completed to compile common and innovative land use solutions from around the world. After selecting those most applicable to the Cataraqui Region, these solutions were translated into an extensive list of model land use policies.



Eight major anticipated impact themes for the Cataraqui Region.

Policy Context

Both the Canadian federal and Ontario provincial governments advocate for climate change adaptation and mitigation. In Ontario, however, the provincial government has constitutional authority over municipal governments and local planning matters.

The 2014 *Provincial Policy Statement,* issued under the *Ontario Planning Act,* contains a series of broad policy directives that ensure climate change is a priority in land use planning decision-making. The Ontario *Planning Act* includes a number of planning tools that can be used by municipalities to implement specific adaptation measures. Some of these tools include official plans, Community Improvement Plans, zoning by-laws, and site plan control. The provincial government also recently passed the *Great Lakes Protection Act*. It focuses on ensuring that communities in the Great Lakes/St. Lawrence River watershed are prepared for the effects of climate change around these large bodies of water. It also encourages action throughout the Great Lakes – St. Lawrence River Basin with respect to environmental protection and stewardship.

When creating or updating official plans, municipalities must abide by the overarching policy directives in these acts.

Official Plan Review

Ten of the fifteen municipal official plans in the Cataraqui Region were reviewed to determine their level of support for climate change adaptation. Policies with both direct and indirect climate change-related objectives were reviewed and summarized. While some plans have dedicated climate change sections, most plans do not. Generally, existing official plans in the Region fail to consider or account for the anticipated impacts of climate change.

Cataraqui Region Official Plans reviewed for this report (shown in black).

Separated Municipality	
City of Kingston City of Brockville Town of Gananoque	
County	**Township**
County of Frontenac	Township of South Frontenac Township of Frontenac Islands
County of Lennox and Addington	Town of Greater Napanee Loyalist Township
United Counties of Leeds and Grenville	Township of Athens Township of Elizabethtown-Kitley Township of Front of Yonge Township of Leeds and the Thousand Islands Township of Rideau Lakes

Land Use Solutions

An extensive review of both academic and grey literature was completed to inform the recommendations for official plan policy improvement. This research identified common and innovative land use planning solutions for climate change adaptation from elsewhere in Canada and in other parts of the world. Multiple solutions were identified for each of the eight major anticipated climate change impact themes.

Notable Land Use Solutions

- Urban greening
- Green roofs
- Bioswales
- Riprapping
- Firebreaks
- Conservation easements
- Land Trusts
- Compact growth
- Speciality crop designation
- Mixed-use development
- Resilient materials
- Community solar gardens
- Alternative Land Use Systems
- Land use regulation around Wellhead Protection Areas

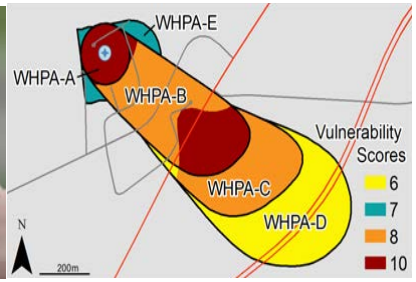
Green roof in Waterloo, ON

Bioswale project in Kingston, ON

Riprapping in St. Clair Region, ON

Road used as firebreak in B.C.

Ontario wine grapes



Cana WHPA in Kingston, ON

Recommendations

Feasible land use solutions for the Cataraqui Region were identified and translated into model official plan policies. These policies were grouped into new themes to better reflect common official plan objectives. Policy recommendations are intended to show local municipalities how existing land use planning policies may be modified to better support climate change adaptation.

Policies fall under themes of: rural agriculture, urban agriculture, water conservation, energy management, natural hazards, air quality and urban heat island effect, infrastructure, stormwater management, winter preparedness, active transportation, and natural heritage.

Notable Model Policies

Rural Agriculture: Identify the need for, and incorporate a Unique Agricultural Area designation, in order to maximize opportunities for specialty crop production.

Urban Agriculture: Encourage and promote opportunities for urban agriculture such as green roofs and home/community gardens through the development application process.

Water Resources: Incorporate special land use zones to protect and preserve groundwater recharge areas.

Energy Management: Incentivize, through the use of Community Improvement Plans, that any new construction, retrofitting or redevelopment within [*The Municipality*] meets LEED, BOMA BEST or other industry standard of efficiency in capital projects.

Natural Hazards: [*The Municipality*] will undertake periodic studies to refine natural hazard areas that reflect the impending impacts of climate change.

Air Quality and the Urban Heat Island Effect: Through incentives, demonstration projects, height and density bonusing, and educational programs [*The Municipality*] shall promote tree planting and innovative green spaces, such as green roofs and green walls, with the goal of reducing air temperature and energy use through shading and sheltering.

Infrastructure: Where feasible and reasonable, seek opportunities to coordinate efforts to bury existing utilities and require underground installation of utilities in new developments.

Stormwater Management: Promote the use of Low Impact Development when reviewing design standards that reduce stormwater runoff such as permeable surfaces, green roofs, and native landscaping.

Winter Preparedness and Safety: Ensure adequate space to store increased volumes of snow is provided during the development application process. [*The Municipality*] shall encourage these spaces to be designed using permeable surfaces to minimize snowmelt runoff.

Active Transportation: Prioritize sustainable transport, by providing required infrastructure, regulations, safety measures and funding to take advantage of more favourable climate conditions.

Natural Heritage: [*The Municipality*] shall consider the establishment of a permissive By-law that permits the naturalization of yards on private residential and institutional properties.