Climate Adaptation in the Great Lakes Region

A Case Study of Goderich, Ontario

Image Source: Goderich Salt Mine by The Other Dan, Flickr, 2008 <https://flic.kr/p/54Y7P7>

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Fast Facts

Population: 7,251 (2013)

Goderich is located in Huron County, within the province of Ontario.

Primary industries

Salt mining and transportation: The largest industry in Goderich depends on the Sifto Salt Mine, located at the Goderich harbor, which is the only deep-water harbor on the east side of Lake Huron. The salt mine extends for many kilometers beneath Lake Huron.

Agriculture: Huron County is the most agriculturally productive area in Ontario.

Tourism: Goderich's waterfront, surrounding forests, rivers, and outdoor festivals draw thousands of tourists each year.

Major resilience milestones

- 30+ year effort to reduce raw sewage overflow into Lake Huron culminated with completion of CSO separation in 2007
- Goderich's harbor was dredged at several points throughout its history, helping decrease the impact of declining lake levels on the transportation industry
- Lakefront green infrastructure counteracts erosion
- Yearly tabletop and live emergency management drills strengthen city staff's ability to respond to natural disasters

Introduction:

Canada's "prettiest small town" is also one of its most resilient

In 2011, Goderich was hit by an F3 tornado. It tore through Goderich's downtown, causing the death of a salt mine worker and preliminary damage of $100 million. Within 15 minutes, 54 buildings were demolished and 283 more required repair. The entire town was left without power and over three dozen people were injured.

However, thanks to years of institutionalized resilience practices and critical infrastructure upgrades, Goderich recovered from the tornado's damage swiftly. Furthermore, the town's leaders leveraged their experience with the unexpected natural disaster as an invaluable learning opportunity that would strengthen their overall resilience efforts in the years to come.

Herein lies a collection of the best practices that Goderich demonstrates with its dedication to disaster preparedness, community engagement, and collaborative partnerships--all critical components of a holistic resilience strategy.

Climate Change Projections

Temperature and precipitation variability could impact the economic vitality of Goderich by threatening its major industries. Extreme weather can include stronger winds and precipitation, impacting the lake's water quality and shoreline. An increase in freeze-thaw cycles can compromise roads and building structures. GLISA's climate projections (to occur by 2070 if present CO_2 emission levels continue) include the following:

- 2.8ºC warmer on average
- 5 cm more precipitation per year on average, with 1 more heavy precipitation event annually
- 35 fewer nights below freezing
- 20 more days above 32ºC, with 5 more days above 35ºC
- By 2099, 50 more frost-free days

More info: Great Lakes Integrated Sciences and Assessments (GLISA) and National Climate Assessment Midwest & Regional Reports
http://glisa.umich.edu/resources/nca]

Personal insight:

"Those mock exercises we do, that's what really helped us [after the tornado hit], because we had all been through a mock, whether it was a table top exercise or a little more involved.

Everyone knew their role from the moment things happened, knew what needed to be done. That's something that should be encouraged in any municipality—make sure to do those exercises."

- *Jennette Walker, Environmental Services Technologist*

Green infrastructure on shoreline is combined with public awareness initiatives:

Key Lessons Learned

Emergency plans are good, drills are even better

Goderich proactively prepares, reviews, and updates its Emergency Management Program on an annual basis. The Emergency Management Program provides guidance to key officials, agencies, and departments within the city regarding the overall expected response to serious, large-scale emergencies as well as an overview of what their individual duties are in such circumstances.

Goderich is particularly effective at taking its plan a step further by executing tabletop and live practice drills that simulate real emergencies. Goderich's officials stress the importance of these exercises, lauding them for highlighting each person's role in an emergency while surfacing information gaps that would otherwise be missed.

Combine green infrastructure with education initiatives

Increasingly intense precipitation in the Great Lakes can lead to increased erosion levels, threatening Goderich's lakefront. By planting beach grass and trees along its shore, Goderich hopes to counteract damage to its shore.

Recognizing the importance of engaging residents in the protection of their natural resources, Goderich combined the measure with a beachfront education initiative designed to inform community members about the flora and fauna of their local beaches, as well as the various threats to water quality. Thus, Goderich hopes to derive aesthetic, functional, and community engagement benefits from a single measure.

Beach grasses keep shoreline intact by mitigating erosion exacerbated by climate change

Major Partners:

County of Huron: Launched "Take Action for Sustainable Huron", a community sustainability plan with aspirations for what Huron County will be like in 2030. To develop the plan, the County of Huron consulted with Goderich and other municipalities, strengthening resilience by deepening the support network within the county.

Environment Canada: Provides emergency warnings via text message as well as other forms of communication. Goderich incentivizes residents to opt into Emergency Canada's warning system by communicating its own warnings of power outages via the same text message system.

Emergency Management Ontario: Mandates all municipalities and provincial governments to have an emergency management program. EOM also supports municipalities and ministries in implementing their emergency management programs by providing them with advice, assistance, guidelines, training, and other tools.

Small town interconnectivity lends itself to collaborative partnerships

Most of Goderich's municipal officials hold multiple roles and serve in several organizations. The interconnectedness of the municipal staff helps break down the silos that other cities struggle with. For example, due to her role as Environmental Services Technician for both the Town of Goderich and Goderich Hydro, Jennette Walker was able to coordinate efforts between the two entities when responding to emergencies, and while organizing proactive measures.

Furthermore, strong community bonds in small towns such as Goderich can lend themselves to an additional layer of emergency response that complements institutionalized efforts. Following the tornado, social service agencies, the municipality, and neighbors all worked together to help those most affected.

Local identity and community spirit form important components of climate resilience

In the aftermath of the tornado, Goderich lost more than 90% of its tree canopy. Much of the loss occurred in Courthouse Square Park, the former "green jewel" of the town. In November of 2012, Goderich community members gathered to watch a celebratory parade bringing in trees to be replanted in the square. Municipal officials stressed the symbolic importance of this effort.

In addition, the redevelopment of the Square involved a public process in which residents were invited to attend a three-day charrette. By partaking in the rebuilding of the Square, and feeling that their concerns were addressed via the replanting of the trees, Goderich's residents gained partial ownership in the rebuilding of their community, and thus heightened their awareness of future resiliency efforts.

2012 parade of trees in Goderich

Past & Present Funding Strategies

Wastewater infrastructure upgrades in 2005 were funded by **Canada-Ontario Municipal Rural Infrastructure Fund**. COMRIF responds to local needs and priorities by helping to provide cleaner water, better sewage systems, upgraded waste management processes, and safer roads and bridges. 67% of funding went to "green" projects (water, wastewater, and solid waste management), which was a commitment of the program. http://comrif.ca/eic/site/comrif-fimrco.nsf/eng/h_00014.html

The US$47 million dollar expansion of the Goderich Harbour in Ontario, Canada was funded by a **public/private partnership between Sifto Salt, the Goderich Port Management Corporation and the Provincial government.** http://www.sandandgravel.com/news/article.asp?v1=14838

Preventative infrastructure upgrades combined with smarter development standards can provide far-reaching benefits for decades to come

In the past, wet weather and melting snow habitually led to the contamination of Goderich's adjacent waterways due to bypassing of its sewage system for months at a time.

However, after a 30-year, multi-million-dollar separation of combined sewers, sewage overflows became far less frequent by the end of the 1990s. Observing the improvements thanks to the sewage separation, Goderich continued to improve its water infrastructure system with a $3 million upgrade to its water pollution control plant in 2007.

Thankfully, Goderich hasn't needed to bypass since early 2009. That same year, the town also switched to an ultraviolet disinfection system following tightening of chlorine effluent standards by the federal government, ensuring even higher public health achievements.

Goderich also mandated eavestrough disconnections in the 1970s and currently sells rain barrels to residents at cost. Development requirements now include stormwater management on private property as well.

Thanks to all of these infrastructure upgrades, Goderich enjoys stronger assurance that its other public health and environmental efforts will not be made obsolete by an increase of more extreme weather events.

Useful Links

Town of Goderich Emergency Plan:
http://www.goderich.ca/en/townhall/resources/Emergency_Management_Plan_-_2014__3_.pdf

Emergency Preparedness Action Plan Guide:
https://beprepared.emergencymanagementontario.ca/myplan/

County of Huron Community Sustainability Plan:
http://huroncounty.ca/sustainablehuron/sustainablecommunity.php

Great Lakes Adaptation Assessment for Cities (GLAA-C):
http://graham.umich.edu/glaac

Great Lakes Integrated Sciences + Assessment:
http://glisa.umich.edu/

Team's project description

We are a team of seven University of Michigan graduate students, based out of UM's School of Natural Resources and Environment. Our Master's Project focuses on climate adaptation and resiliency planning for Great Lakes municipalities. We work for NOAA's Great Lakes Regional Collaboration Team, in partnership with the Great Lakes and St. Lawrence Cities Initiative (GLSLCI). Our goal is to develop a useful online toolbox of climate adaptation resources, including online webinars, case studies and infographics.

Our city case studies stem from municipal interviews conducted during the summer and fall of 2014. They aim to both capture Great Lakes regional best practices in climate resilience, and also to assess common barriers that Great Lakes communities face in enhancing their climate change adaptation efforts. In August of 2014, we spoke with multiple officials of Goderich Township, including Janice Hallahan, Barb MacKenzie, then-mayor Deb Shewfelt, Jennette Walker, and Chip Wilson. We are very grateful to them for sharing their time and insights with us!