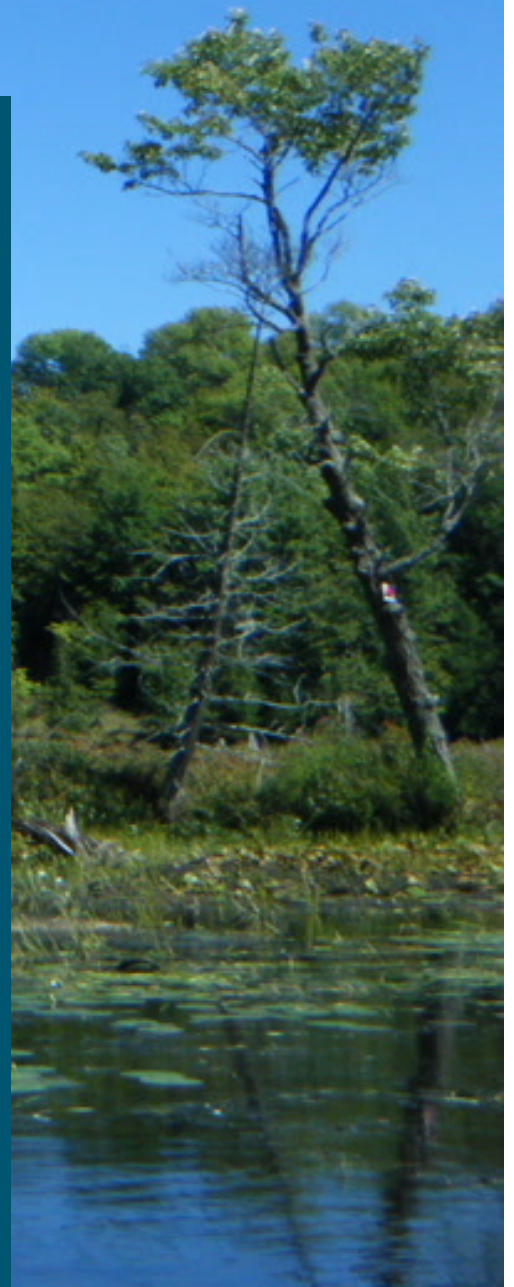


Increasing Resilience to Climate Change through Natural Shorelands



Impacts of Climate Change

Canada is warming at twice the rate of the global average. This rapid increase is expected to significantly impact severe weather events, precipitation patterns, water quality, aquatic habitat, and human well-being.

Rising air and water temperatures can have significant impacts to aquatic ecosystems. For example, lake water temperatures in Eastern Ontario have increased by 1.2C since 1921 and are predicted to increase 3C in the coming decades. This warming can create new habitat for warm-water species while affecting the distribution, growth, reproduction and survival of cold-water species such as lake trout.

Warmer temperatures combined with excess nutrients (eg., phosphorus) from surface runoff is also increasing the frequency and severity of toxic blue-green algae blooms, which are now being reported later into the fall than they were during the 1990s. This can lead to decreased oxygen levels as algae decomposes, thereby limiting oxygen levels for aquatic species in deeper waters.

This can have significant impacts on Ontario's economy which heavily relies on a healthy natural environment. For example, in 1999, visitors spent nearly \$1.1 billion nature-based tourism.

Snow precipitation and ice cover is expected to decline in many parts of Canada. With limited ice to protect shorelines during winter storms, erosion impacts are expected to become more severe. Eastern Canada's shorelines are particularly vulnerable with the added risk of rising sea levels.

Although snow precipitation across Ontario has declined, summer precipitation is expected to increase as a result of climate change. The most serious impacts are expected to result from extreme weather, including precipitation, which significantly increases the risk of flooding across the province.

Flooding is one of the most severe effects of climate change to Canadians, affecting safety, livelihood and mental health. According to the Insurance Bureau of Canada (2019), there were 1.7 million Canadian households (19% of Canada's population) that were at risk of river or surface water flooding, some of which with limited or unavailable insurance coverage.

Since 2009, flooding from coastal and inland waters has been identified as the most common and costly natural disaster in Canada, leading to detrimental financial and mental distress to homeowners. It is estimated that flood and erosion mitigation are among the climate risks that require the greatest investment, associated with 1.25% and 0.12% of GDP, respectively.

A study of those affected by the 2013 Alberta floods also found a 164% increase in the use of anti-anxiety medication and a 232% increase in the use of sleeping aids among women in High River, one of the hardest hit areas.

Building Resilience with Natural Shorelines

To adapt and mitigate the effects of climate change, natural infrastructure (e.g., natural shorelines) can increase a community's resilience to such events while providing other valuable ecosystem services such as natural habitat and recreational activities.

Research has shown that natural infrastructure solutions are often more cost effective than engineered

infrastructure (e.g., dikes and retaining walls).

Engineered infrastructure and its benefits are well documented and understood. But natural infrastructure is harder to quantify and its benefits are still being explored. However, below are some of the known benefits of natural shorelines in building resilience.

FUNCTION	DESCRIPTION
Moderates Temperatures	Shade from plants maintains cool temperatures providing relief from summer heat.
Prevents Erosion	Deep, intricate root system holds soils together, stabilizing banks, and preventing sedimentation. Thereby maintaining or increasing property value.
Flood Mitigation	Slows surface runoff, allowing water to get absorbed into the ground, thereby redirecting water away from surface water and retaining water levels.
Protects Water Quality	Filters sediments and pollutants from surface runoff before reaching the water, thereby preventing algal blooms.

The degradation of Canada's freshwater resources is expected to be exacerbated by the effects of climate change.

We must take meaningful action to build our resilience to change by re-naturalizing our shorelines so that future generations are given the same opportunity we have had to enjoy the natural environment.

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