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# FRESH WATER IN A CHANGING CLIMATE

## How climate change affects Ontario's waterways

Joyce Chau, Executive Director of EcoSpark

It goes without saying that water is a necessity for life. But it's also an important part of our well-being and happiness. Whether it's hiking along rivers, swimming in lakes, fishing in streams or building sandcastles at a beach, water-based recreational activities are a significant part of our cultural heritage as Ontarians.

Ontario has 250,000 lakes containing about one-fifth of the world's fresh water. Our Greenbelt, covering 7,200 km$^2$ of environmentally sensitive land, is key to protecting the quality of that water for the 9 million people living in Ontario and New York State that rely on it as drinking water.

The Greenbelt includes 21 urban river valleys and their headwaters in an area stretching from Niagara to Northumberland. It includes iconic rivers and creeks such as the Credit, the Humber, and the Rouge, each of which flow into Lake Ontario. These river valleys run through heavily developed urban areas providing cool natural oases for humans and wildlife during hot summer months. These urban river valleys incorporate parkland, house environmentally significant ecosystems, and provide critical natural infrastructure for cities (e.g. filtering the air, decreasing temperatures, and reducing soil erosion), for the approximately four million residents living within two kilometers of them!

Urban river valleys also connect us with cultural and natural heritage in our communities. The history of many First Nations is linked to the river valleys and lakes that dot Ontario. It is these same rivers and lakes where First Nations and Europeans originally met and exchanged goods. While this is a deeply fraught history, it is certainly a significant one.

## So what if our access to Ontario's fresh waters changed?

Climate change is having profound effects on watersheds across the province. Summers are getting wetter, but inconsistent rainfall also results in lengthy dry periods. Dry spells are compounded by warmer winters with less snowpack, contributing to low water levels in summer. Spring thaws often happen more suddenly, meaning there is less groundwater recharge and more runoff. And, as summers get hotter, water temperatures are also rising.

The recent history of intensive industrial and urban development in southern Ontario has also significantly impacted local water systems. Conservation Authorities have determined that the water quality in half of the rivers and streams assessed in the Oak Ridges Moraine and the Greenbelt area are degraded and at risk of further degradation, potentially exacerbated by future, unaccounted-for development and infrastructure projects.

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## CLIMATE IMPACTS ON FRESH WATER

The Greenbelt offers a rich variety of recreational and educational opportunities for local residents who want to connect with water in and around the Greater Golden Horseshoe. Unfortunately, this unique offering could be undermined by climate change. While warmer weather can increase the time that people want to spend outside, the increase in extreme weather events that comes with it can also negatively affect our health, well-being, and safety.

Weather extremes include higher humidex values and heat warnings. In the Greater Toronto Area, heat warnings are issued when there are 2 days with temperatures at or above 31˚C and evenings at or above 20˚C. During these alerts, older adults, infants, people with chronic illnesses, the homeless, low-income workers, and people who work in the heat are all at the greatest risk of adverse health impacts.

Warmer air temperature means warmer waters, which increases the likelihood of algal blooms. The growth of algal blooms depletes the oxygen in the water, lowering water quality and making it difficult for fish and other species to survive. Increased temperatures also cause stress on cold-water fish by reducing the number, size and quality of places where they can reproduce. The Toronto and Region Conservation Authority is particularly concerned about Brook Trout, a cold-water species, which has been in steady decline in the area over the past 16 years, as noted in a study done between 2001 and 2017.

Increasing temperatures leads to more extreme rain and storm events. These events can reduce access to water-based recreation due to flooding, soil erosion, and damage to infrastructure. At the same time, climate change can also reduce water levels and lead to droughts. This starts with a shorter snow season and increased precipitation as rain throughout the winter months. A reduced snowpack means less opportunity for groundwater reserves to be replenished in the Spring, reducing baseflow for streams and rivers during the summer. In addition, higher water temperatures lead to increased evaporation, which when in concert with a reduced spring melt, means lower water levels in the summer impacting farmers and summer recreational activities like boating and fishing.

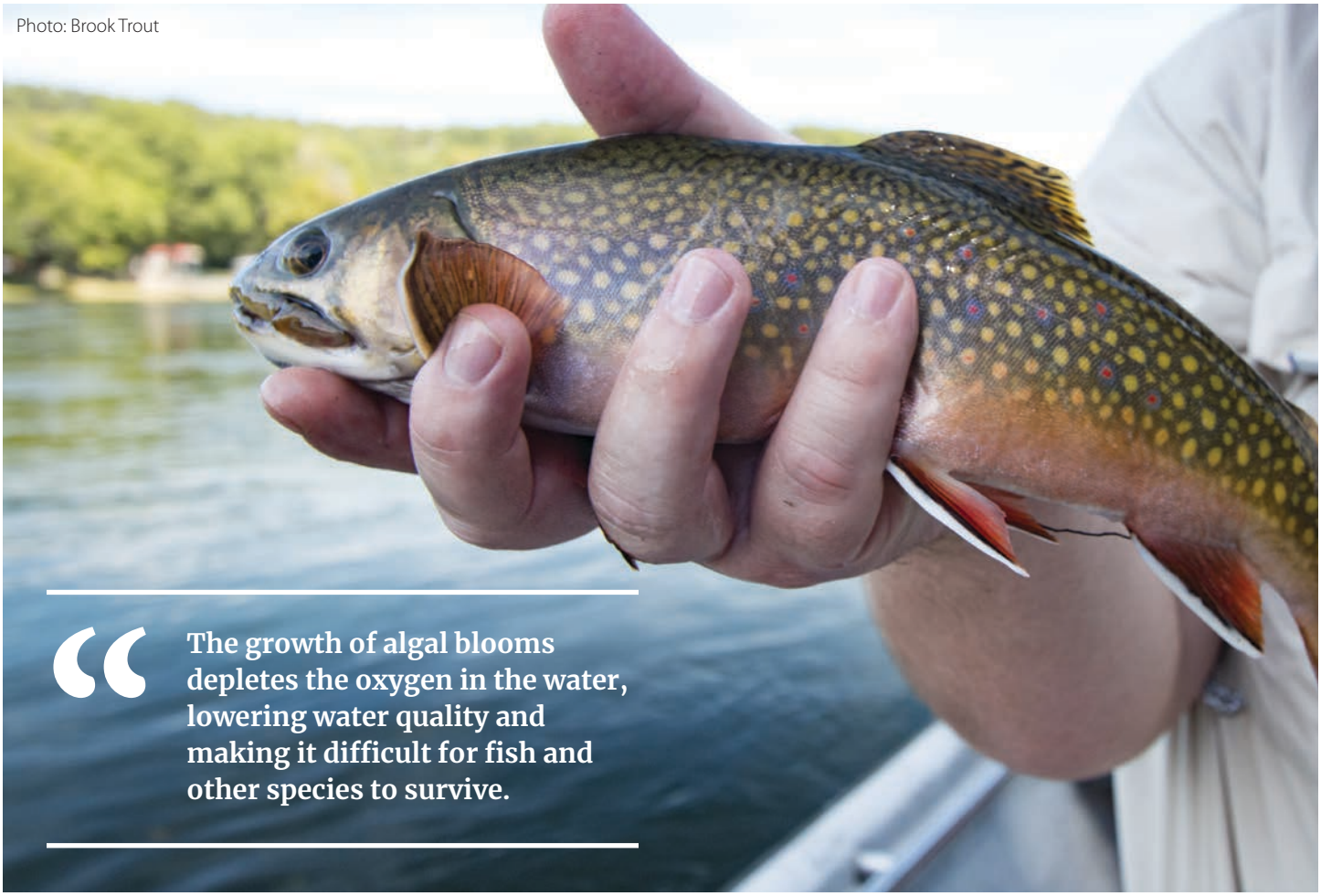

Photo: Brook Trout

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## ECOSPARK

EcoSpark is an environmental charity whose mission is to empower communities to take an active role in protecting and sustaining the nature that surrounds them. We do this by educating youth and giving them
the opportunity to act as stewards of their local watershed. To date, we have worked directly with over 80,000 people from across southern Ontario in over 20 watersheds.

*Changing Currents* is our award-winning program that gets kids from grade 6 to 12 to perform hands-on water quality assessments. These activities take place in the Greenbelt during the Spring and Fall, and allow students to become scientists for the day, donning hip waders, exploring local streams, and monitoring water quality.

In *Changing Currents*, we assess water quality by examining the number and diversity of critters that live in the stream. These critters are known as benthos - they lack a backbone, live in the stream bed and are visible to the naked eye. Benthos includes many common insects such as beetles, dragonflies, damselflies, mosquitoes and blackflies (when immature).

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Once we monitor and assess water quality, we spark student-led environmental action. We engage the students in removing invasive species, planting native trees and shrubs, and cleaning-up garbage along riverbanks. Through this program, we facilitate a transformative journey for our participants; students learn things like the role that native plants play in maintaining stream health and in doing so, are compelled to become active stewards of their own local watershed.

The impact of climate change has also been detected firsthand through our *Changing Currents* program. During the wet spring of 2017, the rain washed away many of the benthos that we use to determine water quality (a minimum of 100 are needed in order to have a valid study). In contrast, 2016 was a dry year where the lack of rain meant fewer benthos in the stream beds, resulting again in a lack of the data needed to undertake water quality assessments. With ongoing changes in the weather and climatic unpredictability, it will be increasingly difficult for EcoSpark to obtain meaningful water quality assessments.

## ACTION YOU CAN TAKE

The good news is that we have the ability to mitigate carbon emissions and adapt to the effects of climate change across the Greater Golden Horseshoe, as individuals, students, and families.

We can support natural infrastructure initiatives that protect natural assets like forests and wetlands, or rehabilitate riverbanks and waterfronts, collectively preserving habitat, preventing excess evaporation and keeping our waterways cool and clean. We can also utilize green infrastructure by installing rain barrels, creating rain gardens and choosing permeable paving options in driveways, which reduce runoff and prevent flooding.

On a personal level, we can take action to reduce our emissions by driving less, and carpooling and taking public transit more. We can organize school-aged children to participate in active transportation initiatives such as the walking school bus. We can also reduce our electricity use by spending more time enjoying the outdoors; urban river valleys, lakes and ponds are great places to explore and stay cool during hot summer months. We can also relieve pressure on the grid (and our wallet) by using electricity during off-peak times and by using less air conditioning.

Do you live in an apartment or condominium? Check out the Greater Toronto Chapter of the Canada Green Building Council's Green Condo Checklist to get ideas about the kinds of changes you can encourage management to make in your apartment or condo building. Don't forget to ensure your building coordinates these green activities with their next scheduled renovation!

Teachers and students also have important roles to play in combating climate change. If your school is not already among the 1,800+ certified EcoSchools in Ontario, create an EcoTeam and undertake climate change education and leadership activities that will count toward your Ontario EcoSchool certification. Activities can include school-ground greening projects such as building native plant gardens, installing rain barrels, and creating outdoor classrooms.

Participating in EcoSpark's Changing Currents and School Watch programs also counts toward your Ontario EcoSchool certification. With the addition of the 21 Urban River Valleys to the Greenbelt, our program not only monitors water quality of local streams, we're also monitoring the water quality of the Greenbelt! In partnerships with Conservation Authorities and non-profit groups, EcoSpark combines water quality assessment activities with stewardship and restoration initiatives.

Wherever you live, work or play, you are within a watershed that is part of a larger ecological system, and so, the actions you take in your community impact the larger region. There are many opportunities to learn, monitor, protect and enhance green spaces beyond our backyards. You can be active in your community by participating in community stewardship events. Learn more about local green spaces through public initiatives. Paddle the Don and Paddle the Rouge are excellent ways to get your feet wet. Sign up for your local Conservation Authority's newsletter to hear about upcoming stewardship and restoration efforts.

You can explore the Greenbelt through its extensive trail systems or bike routes, and visit its unique features, such as the Oak Ridges Moraine or Niagara Escarpment. You can also support initiatives geared to expanding the Greenbelt. In particular, there is the need to protect an even greater area of our region's watersheds in order to ensure the long-term health and sustainability of the Greater Golden Horseshoe.

Climate change is having a serious effect on fresh water in Ontario; one of our province's greatest natural assets. This calls upon each of us – individuals, families, communities, organizations, businesses and government – to do our part. As Margaret Mead put it, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has."

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**ABOUT THIS SERIES:**

The Greenbelt Foundation partnered with experts to understand how climate change is affecting our daily lives, and ways that we can individually and collectively respond to these challenges. For other installments in the series, visit www.greenbelt.ca/changing_climate

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