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## An urban watershed approach to climate resilience

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The Conservation Authorities Act of 1946 was enacted by the Province of Ontario in response to concerns that many of the province's renewable natural resources were in an unhealthy state due to poor land, water, and forestry practices. In 1954, Hurricane Hazel helped convince decision makers of the need for a body to oversee management of water-related hazards in the growing region around Toronto. This resulted in the amalgamation of smaller conservation authorities into the Metro Toronto and Region Conservation Authority in 1957.

It was a unique innovation in environmental governance of the day, and investment in conservation authorities in Ontario has paid huge dividends over the past decades. Progressive hazard-management programs have led to greater resilience, resulting in less damage to human life, property, and infrastructure due to

**01** For the San Romanoway Revival Project in the Jane and Finch neighbourhood in Toronto, SNAP converted three hectares of underutilized, privately owned public spaces into a vibrant community hub that also achieves strategic sustainability, resiliency, and socio-economic objectives. It includes urban agriculture supported with rainwater harvesting, hundreds of native trees, pollinator gardens, educational signage, shade structures, and community amenities. Formal skills training and green job opportunities are offered to residents on these grounds.

**02** Green-roof development is another example of how privately owned space can be converted to achieve strategic sustainability, resiliency, and socio-economic objectives.



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frequent extreme weather than would have been the case. In addition, across the 36 provincial conservation authorities, the province has an exceptional cohort of professionals capable of addressing climate risks and vulnerabilities.

#### STRATEGIES TO COPE WITH WEATHER EXTREMES

Climate change is exacerbating many of the risks that currently exist due to the already high degree of urbanization in our watersheds. Infrastructure, historic built form, and greenspaces have already been impacted by weather extremes.

So how do we cope with new risks from weather extremes? Municipalities are at the forefront of dealing with ground-level impacts and are being supported by conservation authorities with sound science, technical advice, and best practices to enhance community resilience and mitigate risks.

Managing future growth on a watershed scale is a proactive adaptive-management approach embraced by conservation authorities. To address additional risks from weather extremes, Toronto and Region Conservation Authority (TRCA) watershed-management programs focus on integrating several climate strategies. Some examples include:

- **Development of climate information** (historic climate trends and future projections) at a local and regional scale to support municipalities and regional agencies with a better understanding of climate risks and vulnerabilities. This and other leading-edge climate information is being mobilized through a partnership project with academic institutions

called the Ontario Climate Consortium ([climateconnections.ca](http://climateconnections.ca)).

- **Assessment of climate impacts on a watershed scale** through next-generation watershed plans. These include extensive modelling to determine impacts of new growth and climate on proposed and existing settlement areas and associated infrastructure, such as the work currently being undertaken for the Carruthers Creek Watershed Plan, led by the Regional Municipality of Durham and TRCA.

**“...sustainable, resilient watersheds are key factors in urban growth and redevelopment”**

- **Regional scale modelling of natural heritage** across TRCA's jurisdiction to assess the effects of climate change on natural heritage. Work in Peel Region has demonstrated that urban areas with less natural cover are the most vulnerable to climate change and extreme weather. To assess vulnerability, the model considers conditions such as poor habitat connections, low natural cover, high ground-surface temperatures, poor soil drainage, etc.
- **Comprehensive assessment** for the 41 historic flood-vulnerable areas in the region to combine current riverine flood-hazard information and flood exposure to calculate vulnerability and quantify risk. This leading-edge work will result in updated inundation mapping for our stakeholders and a ranking of TRCA's

41 historic flood-vulnerable areas. This project also provided updated damage estimates and cost-benefit analysis of flood remediation capital works and informed site-specific emergency planning. With support of our partners, including all levels of government, several flood-remediation projects are currently underway.


- **An integrated approach to stormwater management**, which blends grey and green infrastructure and integrates low-impact development technologies for new water-management regimes, is being implemented through the Sustainable Technologies Evaluation Program, jointly managed by TRCA, Credit Valley CA, and Lake Simcoe CA ([sustainabletechnologies.ca](http://sustainabletechnologies.ca)).
- **New approaches to avoid risk** are being recommended for greenfield development, such as securing and adequately buffering and intensively managing greenspace systems and incorporating green infrastructure on the periphery to maintain valuable ecosystem services. Redevelopment of urban areas is supported by remediating flood and erosion hazards and improving functions of natural features.
- **Transformative programs**, such as Sustainable Neighbourhood Retrofit Plans (SNAP) and Partners in Project Green: A Pearson Eco-Business Zone, are being implemented to support the resiliency of residential communities and industrial/commercial/institutional (ICI) lands within our watersheds ([partnersinprojectgreen.com](http://partnersinprojectgreen.com)). See SNAP case study on next page.
- **TRCA is also making certain that lands in populous areas** with high agricultural and recreational values, versus ecological

values, are available for local food/urban agriculture initiatives to solidify support for the agriculture sector and local food movement.

- **Naturalization of the mouth of Don River** has been identified as a key priority in the Don Watershed Plan. It is a major step in linking city building directly with the natural environment. The newly created Don Mouth habitat will reduce flood risk and become central to the creation of new, sustainable communities in downtown Toronto. This linkage of flood protection to city building and revitalization is a direct manifestation of the partners'

understanding that sustainable, resilient watersheds are key factors in urban growth and redevelopment.

Watershed-based management has enabled innovation and work on an appropriate local and regional scale to develop practical solutions to current and emerging issues (e.g., flood management, drinking water and Great Lakes water quality, climate change, rapid urbanization/growth). Over the past seven decades, conservation authorities have become critical implementers for a number of provincial and municipal goals related to natural resource management and protection of the natural environment.

The importance of this critical work and its support by all levels of government has never been more important than now. 



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## → CASE STUDY

### SNAP: Climate Action

TRCA'S SUSTAINABLE NEIGHBOURHOOD ACTION PROGRAM (SNAP) is a proven solution for sustainable urban renewal and climate action that places neighbourhoods at the centre of the implementation framework. It helps municipalities improve efficiencies, draw strong community support, and build trust for long-term engagement as a broad range of sustainability and resiliency initiatives are implemented in the public and private realms.

Comprehensive Neighbourhood Action Plans inform how climate actions can be integrated with ongoing sustainable urban renewal to achieve greater co-benefits. Through partnerships with municipalities, local organizations, residents, and business, SNAPs advance four main action areas: multi-objective residential retrofit programs; revitalization of the multi-unit residential, commercial, and institutional sectors; innovative public infrastructure renewal to maximize social and sustainability objectives; and community development.

Examples of resiliency initiatives implemented by SNAP include:

- Flooding protection measures and better lot-level management of stormwater to address high volumes of runoff and flooding.
- Planting trees, planting edible vegetation on balconies, and constructing shade structures to address rising temperatures and urban heat island effects.
- Rainwater harvesting to alleviate water shortages.
- Energy efficiency and sustainable transportation to support infrastructure resiliency.
- Fostering community connections, facilitating increased local food production, and generating work opportunities within the neighbourhood to increase community resilience.



By monitoring biofilter swales in Brampton's County Court, SNAP shows improved water quality and temperature. Green infrastructure retrofits such as this help manage run off from more frequent storms, reduce impacts of urban heat stress, and help restore water balance and biodiversity to the built environment.

In 2019, TRCA is bringing together community stakeholders, the City of Brampton, and the Region of Peel to create a neighbourhood-scale vulnerability assessment and climate adaptation strategy for its County Court SNAP neighbourhood. The study will downscale and refine municipal-scale vulnerability assessments by drawing on community experience, local knowledge, and perceptions of risk to identify vulnerabilities. The adaptation strategy will contain mapping and identification of key climate impacts (e.g. heat waves, electrical outages, floods) on community services and assets, along with adaptive management opportunities. Engaging community leaders in this process will build capacity for local action.