Climate Change and Watershed Management
Moving to a Living City

OSEE Conference 2009
by

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Focus of Presentation

• About TRCA

• Urban Watershed and Climate Change

• Urban Watershed - Management Guidance and Implementation Model

• Urban Watershed Implementation Priorities

• Living City Adaptation and Mitigation Programs Promoting Community Transformation
The TRCA's area of jurisdiction includes:

- 3,467 sq. km: 2,506 on land and 961 water-based.

This area is comprised of nine watersheds including:

- Etobicoke Creek
- Mimico Creek
- Humber River
- Don River
- Highland Creek
- Rouge River
- Petticoat Creek
- Duffins Creek
- Carruthers Creek

The TRCA’s jurisdiction also extends into Lake Ontario to a point defined by the Territorial Divisions Act, R.S.O. 1980.
15,000 hectares greenspace
The Living City
Vision and Objectives

• Healthy Rivers and Shorelines
• Regional Biodiversity
• Sustainable Communities
• Business Excellence
Healthy Rivers and Shorelines

To restore the integrity and health of the regions rivers and waters from the headwaters in the Oak Ridges Moraine, throughout each of the nine watersheds in TRCA’s jurisdiction, to the Toronto waterfront on Lake Ontario.
Regional Biodiversity

To protect and restore a regional system of natural areas that provide habitat for diverse plant and animal species, improve air quality and provide opportunities for the enjoyment of nature.
Sustainable Communities

To facilitate broad community understanding, dialogue and action toward integrated approaches to sustainable living and city building that improves the quality of life for residents, businesses and nature.
By 2100...Climate Models Project
Global Climate Warming of 1.4 – 5.8°C

IPCC, 2001
• GETTING WARMER
• NON-LINEAR
Projected Seasonal Precipitation Changes between 1975-1995 and 2080-2100

WINTER

SUMMER

Canadian Model (CGCM1)  Source: CCCma

Projected changes in seasonal precipitation:

- **WINTER**
  - *S’rn Ontario*: 10-30% increase
  - *Within +/-10%*

- **SUMMER**
  - *S’rn Ontario*: Within +/-10%
2005 Toronto Flood Damage

- Up to 183 mm rainfall over a few hours: a 100+ year return period event overwhelming urban drainage systems
- Ontario’s costliest weather disaster: $500 million in insured losses
- Impacts included thousands of flooded basements, flooded interchanges, sink holes, erosion impacts to critical infrastructure and a large section of Finch Avenue washed away
Effects of Water Balance Changes on Stream Corridors

Changes to Stream Flows
- increased peak flows
- higher flow velocities
- increased flooding
- increased frequency of bankfull
- increased runoff volumes
- reduced aquifer recharge & baseflows

Alteration to Channel Geometry
- change to planform
- widening & bank erosion
- stream downcutting
- streambed sedimentation
- loss of riparian cover

Impaired Water Quality
- reduced DO
- nutrient enrichment
- hydrocarbons & metals
- microbial contamination

Degraded Aquatic Habitat
- destroy habitat structure
- loss of channel structure
- reduced baseflows
- higher water temperatures
- reduced biodiversity

Hydrologic Cycle
(Adapted from Conservation Ontario)
Habitat Loss

- 70% of woodlands south and east of the Canadian Shield have been lost.
- More than 75% of wetlands in southern Ontario have been lost.
- In southern Ontario forest interior, bird populations have declined by more than 50% since 1961.
- More than 30% of Ontario’s native plant species are rare.
Addressing Climate Change

Climate Change including variability

Mitigation
via GHG sources and sinks

Impacts
autonomous adaptation

Responses

Planned Adaptation
TRCA’s Approach to Mitigation and Adaptation

Mitigation

• Focus on conservation, eco-efficiencies and human health benefits.

• TRCA is showing leadership by reducing greenhouse gases (GHG) within its own operations.

• New partnerships to accelerate the knowledge and implementation of new technologies. i.e, Canada Green Building Council & LEED, STEP for LID and renewable energy.

• Increasing awareness through the Living City Campus and Education Programs.

• Reaching out to the community through several community transformation programs.
TRCA’s Approach to Mitigation and Adaptation

Adaptation

• CA’s are inherently in an adaptive management business—Watershed Management. (Long range planning)

• Our adaptation approach is based on reducing harm to individuals and building resilient natural systems and watersheds.

• We have initiated work to identify climate risks to our communities and natural systems.

• Adaptation strategies will be implemented over a long period of time as our understanding of systems improves through watershed planning, monitoring and evaluation.
Management Guidance

- Integrated Watershed Management Plans
- Sub-watershed Studies
- Conservation Area Master Plans
- Watershed Report Cards
- Watershed Planning Policies
Key Water Management Strategies:

1. Increase natural cover
2. Maintain water balance
3. Build “sustainable” communities
Stormwater Management – Water Balance Approach
Transforming the Community

Collaborative Watershed Management - From Planning to Implementation
Engaging leadership in programs that achieve substantial, measurable improvement in the sustainability of city regions.

www.trca.on.ca/living_city/
Region Watershed Monitoring Program

- Provides the essential data for reporting tools.
- Monitoring data is the foundation for the “science” that guides environmental decision making.
- On-going monitoring using standardized approaches ensures that data can be used for multiple purposes and benefits.
Sustainable Technologies Evaluation Program

- Monitor and evaluate clean water and clean air technologies.
- Develop strategies to overcome implementation barriers.
- Develop tools, guidelines and policies.
- Education, advocacy and technology transfer.
Greenroof Findings

**Water Quantity**

- 63% retention over three years of monitoring (excluding winter).
- Performance varied depending on rainfall intensity and soil moisture.
- Retention capacity was highest during the summer.
Greenroof Findings

Water Quality

- Reduction in loads due to low runoff volumes for:
  - TSS (88%);
  - E. coli (39%);
  - most nutrients (i.e. nitrate 92%);
  - most metals (i.e. copper 87%);
  - all PAHs (up to 97%).

- Total phosphorus load from the garden was 242% higher than from the control roof, primarily due to garden growing media.
Permeable Pavement and Bioswale Demonstration Project

Interim Monitoring Results

Water Quantity
- No runoff from permeable pavement for events up to approx 40 mm.
- Bioswale infiltrated all runoff for events up to approx. 25 mm.

Water Quality
- Both infiltration practices were effective in removing most contaminants typically found in parking lot runoff, with some exceptions, such as chloride.
Community Transformation Programs

- Renewable Energy/Energy Efficiency
- Mayors’ Megawatt Challenge
- Greening Health Care
- Sustainable Schools
- Greening Retail
- Eco-Industrial Network
- Sustainable Community Development
Sustainable Schools

• Best practices in green design, commissioning and operations.

• Improve the environmental performance of new and recently built schools.

• 4 school boards – 53 schools
Ontario EcoSchools Program

• Public and Catholic School Boards

• 5 TRCA facilities among the 112 Ontario Certified EcoSchools

www.yorku.ca/ecosch/index.asp
Healthy Yards/ Greening Neighbourhoods Program

What is a Healthy Yard?

Healthy Yards Connection – Natural Gardening Resources in Your Neighbourhood

Fact Sheets

Recommended Books

Events

Municipal Initiatives Green Neighbourhoods

Natural Alternatives

Contact Healthy Yards

www.trca.on.ca/yards
Eco-Industrial Networking
Pearson Eco-Industrial Park

• Demonstrate that simultaneous pursuit of ecological and economic development results in greater benefits;
• Restore the area’s natural heritage system;
• Improve the area’s water quality through enhanced stormwater controls;
• Lower ICI sector operating costs by reducing energy, waste and water use;
• Identify and utilize waste and energy synergies within the ICI sector;
• Promote eco-economic development; and,
• Build capacity for sustainable development within the community.

“To communicate and demonstrate a commitment to our community through active engagement and enabling economic development”
GTAA
Our schools can be leaders in energy efficiency….

- More than 16,000 buildings providing educational services
- About 20% of all building floor space in Canada
- Opportunities- land, rooftops, building infrastructure, operations
- Youth green job and training through energy retrofits
- Financial, social, and ecological benefits can be achieved simultaneously
... creating The Living City