



# Low-Carbon Resilience and Green Asset Management

September 30, 2019

Partners for Climate Protection (PCP) Webinar

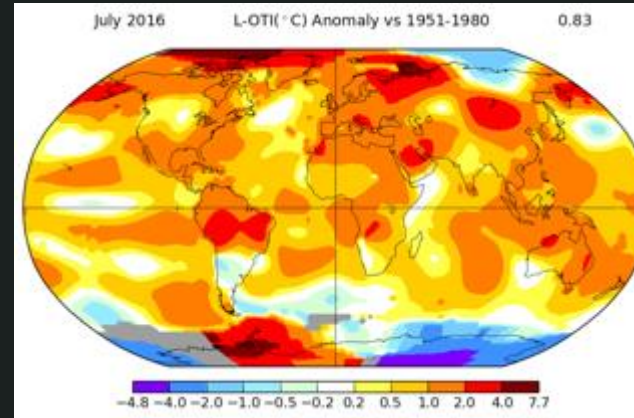
Presented by:

**Deborah Harford**, Executive Director, Adaptation to Climate Change Team, Simon Fraser University

**James Lane**, Manager, Natural Heritage and Forestry, Regional Municipality of York

ACT

Adaptation  
to Climate  
Change Team



## Low Carbon Resilience: Integrating Adaptation and Mitigation

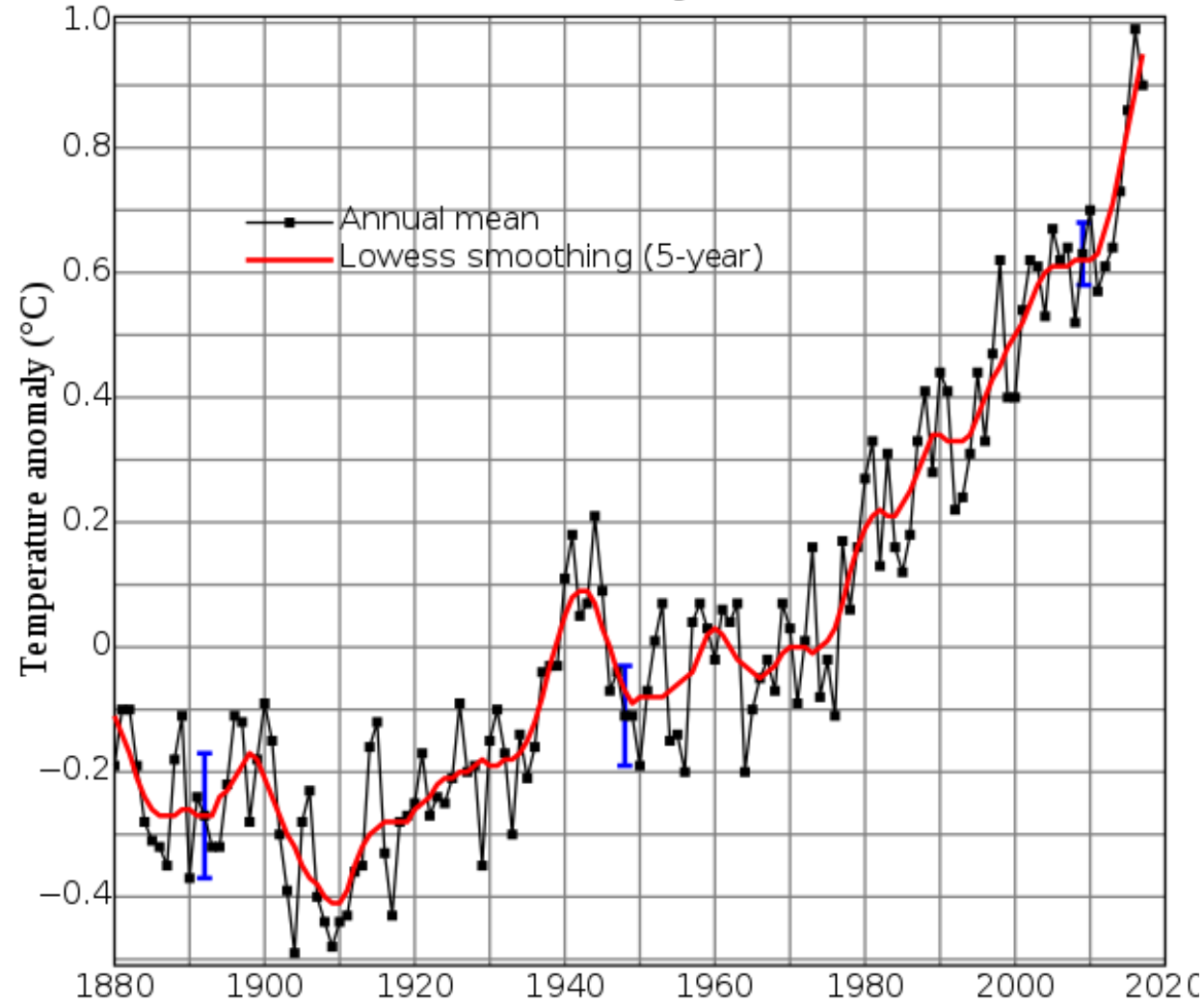
**Deborah Harford, Executive Director, ACT, SFU**

**Dr. Alison Shaw, Lead Researcher, ICABCCI, ACT, SFU**

September 30, 2019

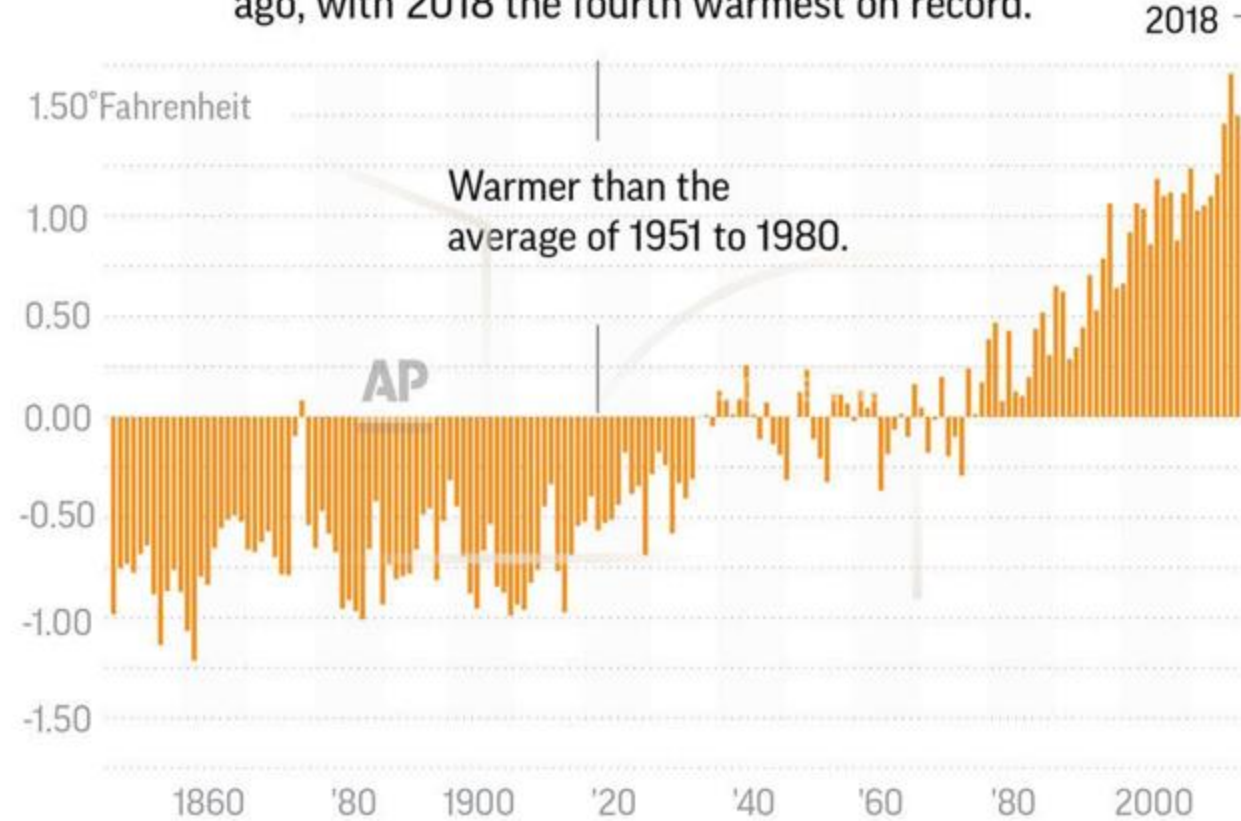
# Global Climate Change

Global land-ocean temperature index



## 2018 was fourth hottest year on record

Temperatures around the globe are far hotter than they were years ago, with 2018 the fourth warmest on record.



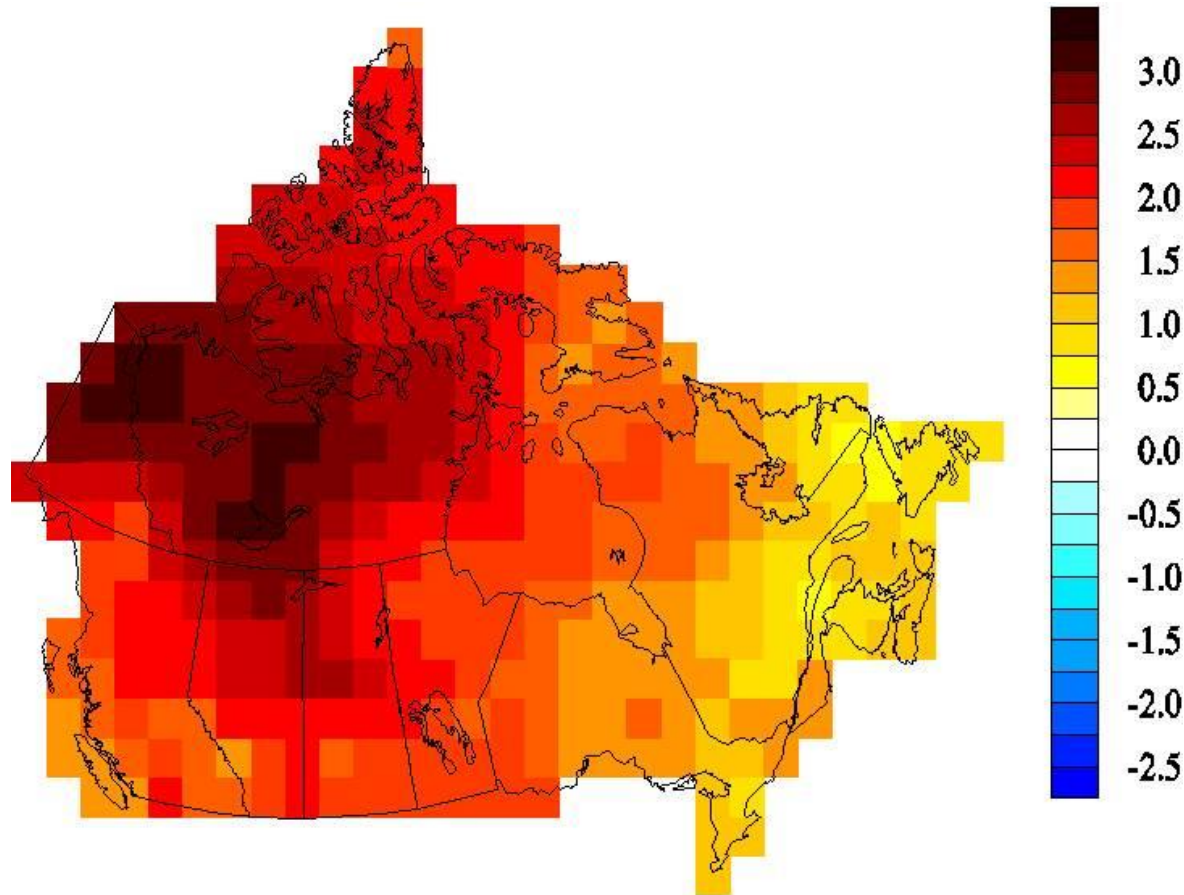
SOURCE: Berkeley Earth

AP

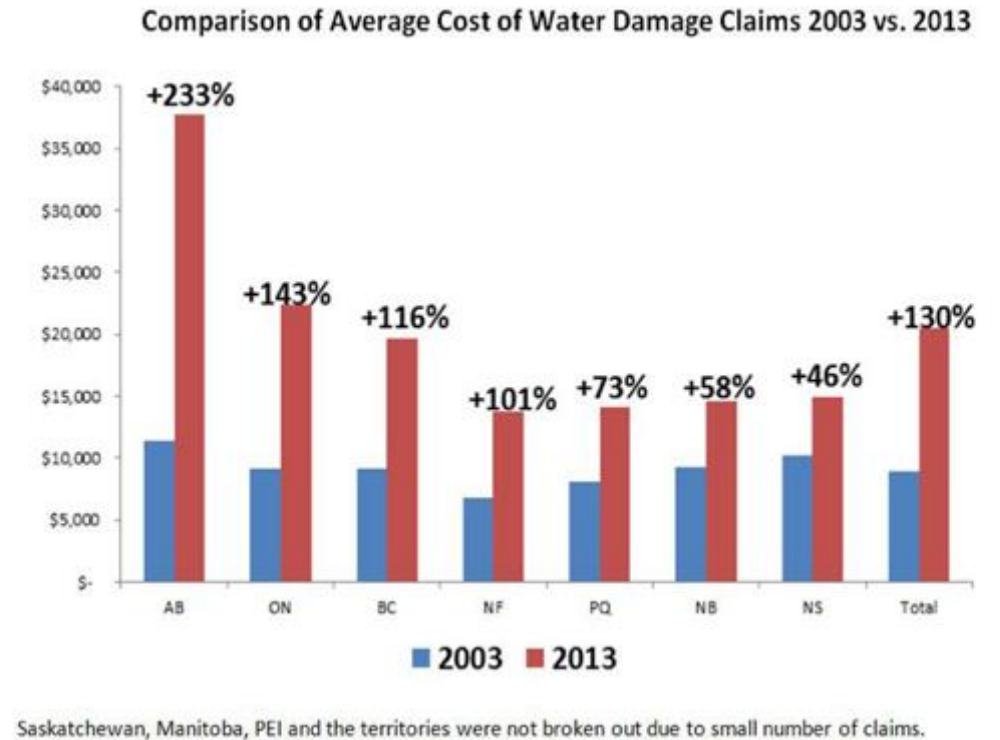
Global land-ocean temperature change 1860-2018



# Climate Change in Canada

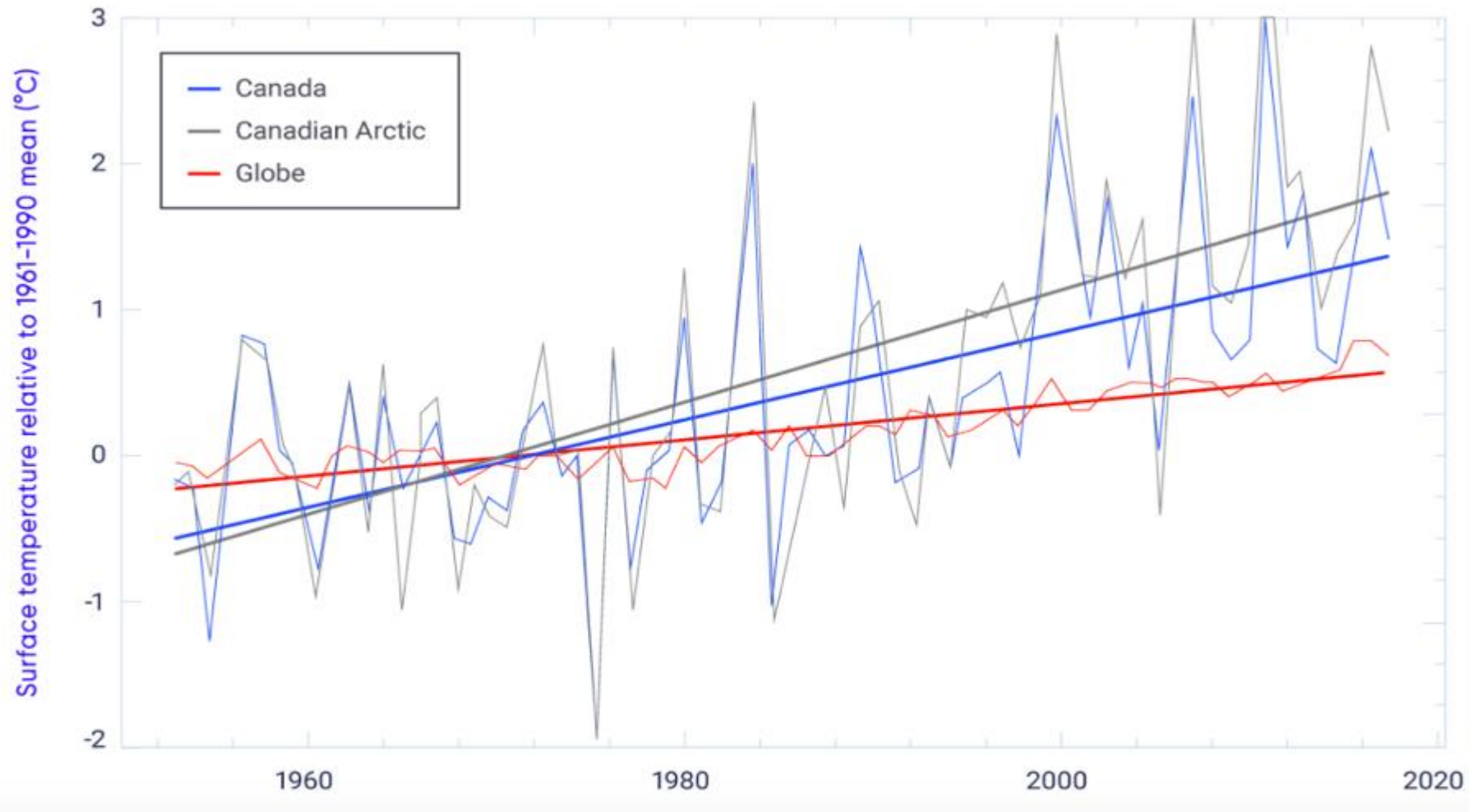


Temperature change 1948-2012  
(ECCC)



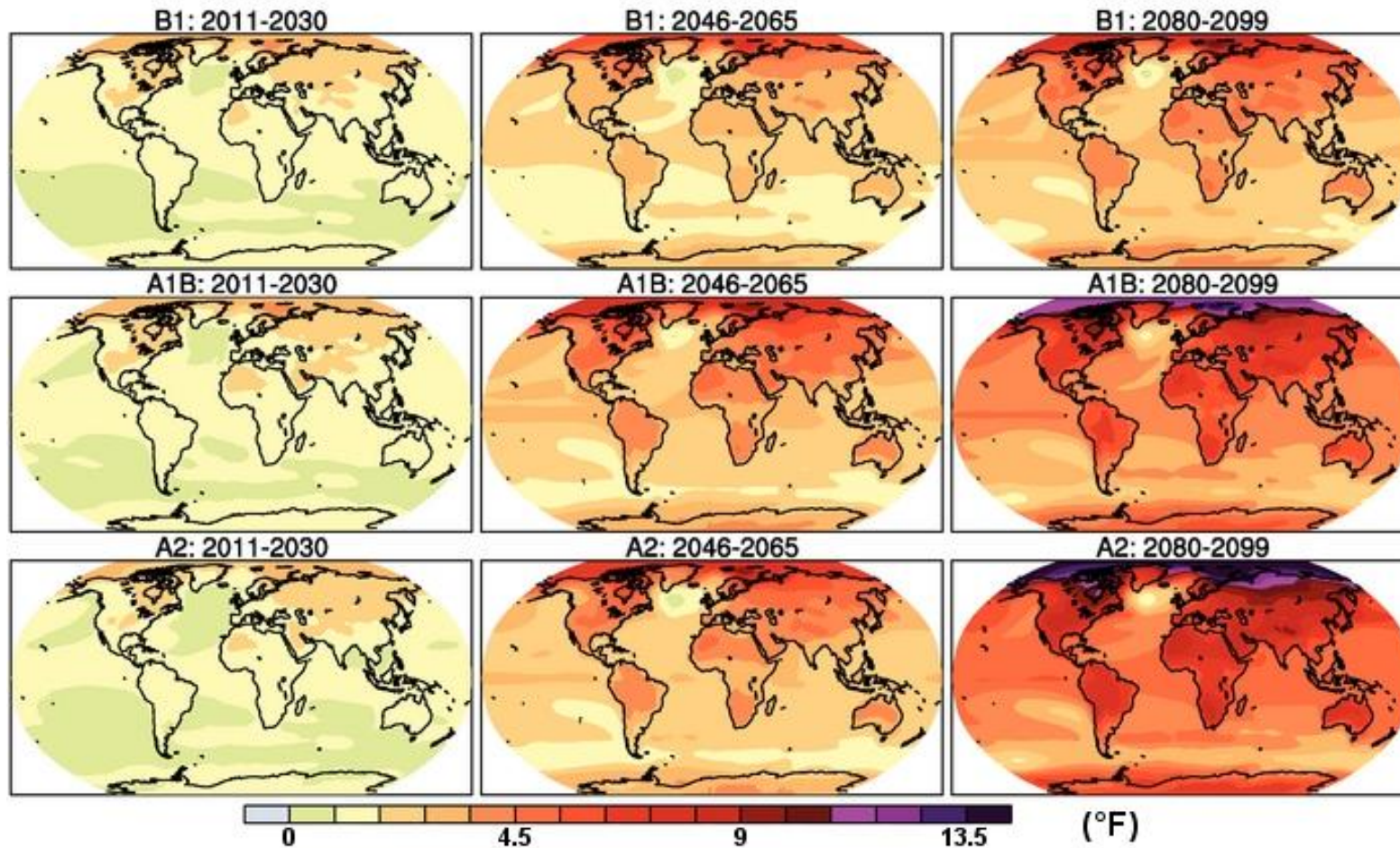
Water damage claims: 2003 vs 2013  
(IBC)

# Climate Change in Canada



Canada's Changing Climate Report  
ECCC, 2018

# Climate Change Projections



Projected temperature change 2011-2099:  
3 emissions scenarios (ECCC)

## Complex impacts:

- Loss of stationarity
- Sea level rise
- Health risks
- Equity/social justice
- Displacement
- Food/water security
- Biodiversity crisis

**require complex solutions... e.g.**

- **Interdisciplinary**
- **Co-benefits/win-wins**



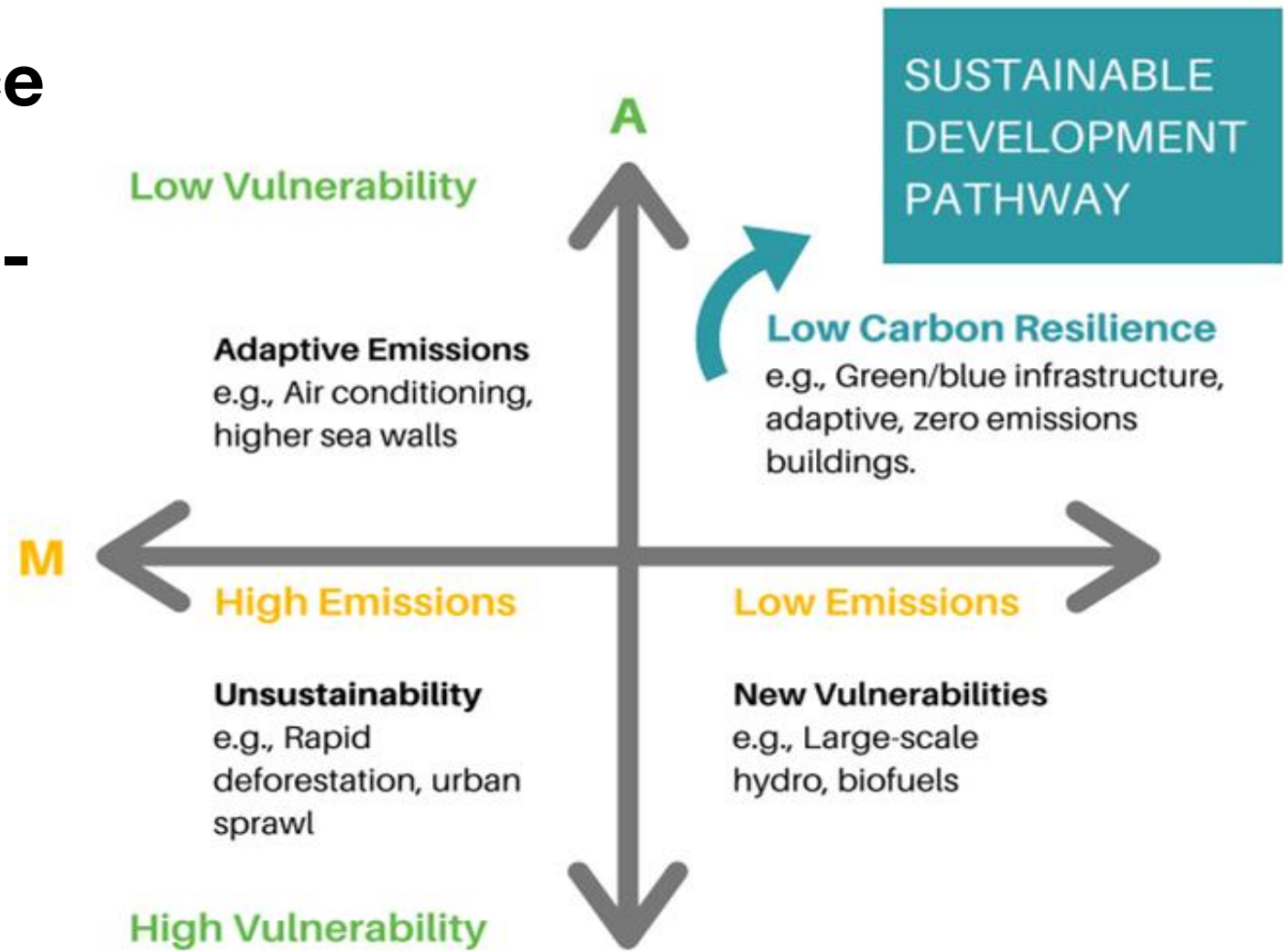
# Benefits of Integrated Climate Action

**“A mix of adaptation and mitigation options to limit global warming to 1.5°C, implemented in a participatory and integrated manner**, can enable rapid, systemic transitions in urban and rural areas (high confidence). These are most effective when aligned with economic and sustainable development, and when local and regional governments and decision makers are supported by national governments. (D3.3.) (IPCC 2018)

**Adaptation options that also mitigate emissions can provide synergies and cost savings in most sectors and system transition**, such as when land management reduces emissions and disaster risk, or when low carbon buildings are also designed for efficient cooling.” (D3.4.) (IPCC 2018)

# What is Low Carbon Resilience (LCR)?

**Low carbon resilience (LCR) is a lens used to coordinate and co-evaluate adaptation and mitigation strategies in policy, planning and implementation processes to reduce both emissions and vulnerability.**



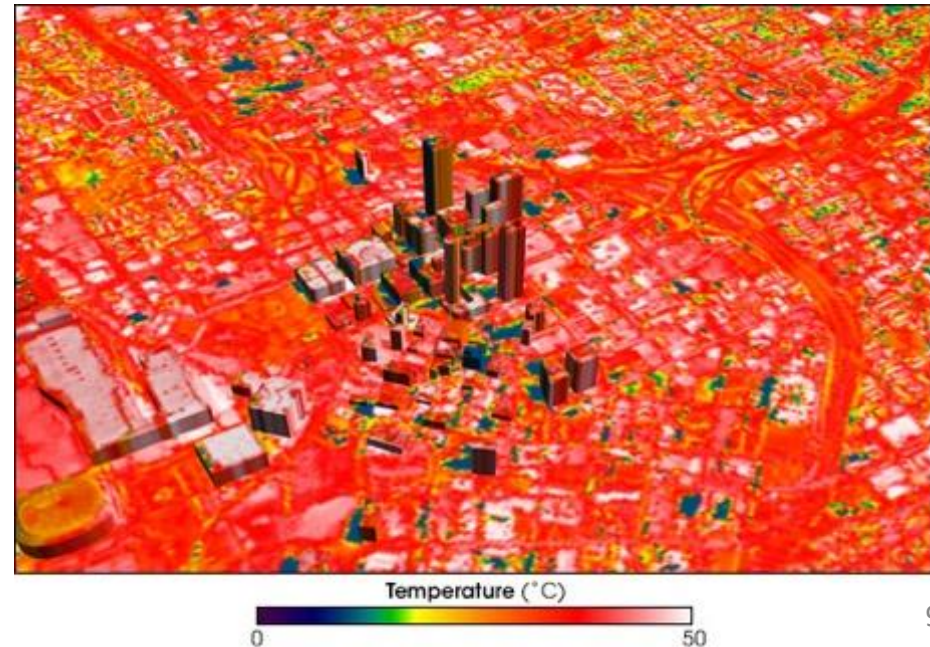
Adapted from: *Cohen and Waddell, 2008*



# LCR Momentum is Building

LCR is an emerging priority area:

- Infrastructure Canada Climate Lens
- Municipal Natural Assets Initiative
- Livable Cities Forum (Oct 2019)
- LCR interventions emerging at building, neighbourhood and community levels
- Innovative tools and funding options emerging
- Climate Emergency declarations
- Urgency to reduce emissions
- Visibility and severity of climate impacts



# LCR Emerging as a Priority

Many communities of all sizes planning for emissions reduction

- Adaptation becoming a priority (wildfires, floods, heat, drought risks)
- Pressure to undertake both processes points to opportunity to integrate

LCR is an emerging priority area:

- Infrastructure Canada Climate Lens
- Municipal Natural Assets Initiative



# LCR Conceptual Process (2018)

## Integrated Adaptation and Mitigation Planning

**Purpose:** Developing an action plan and implementation strategy

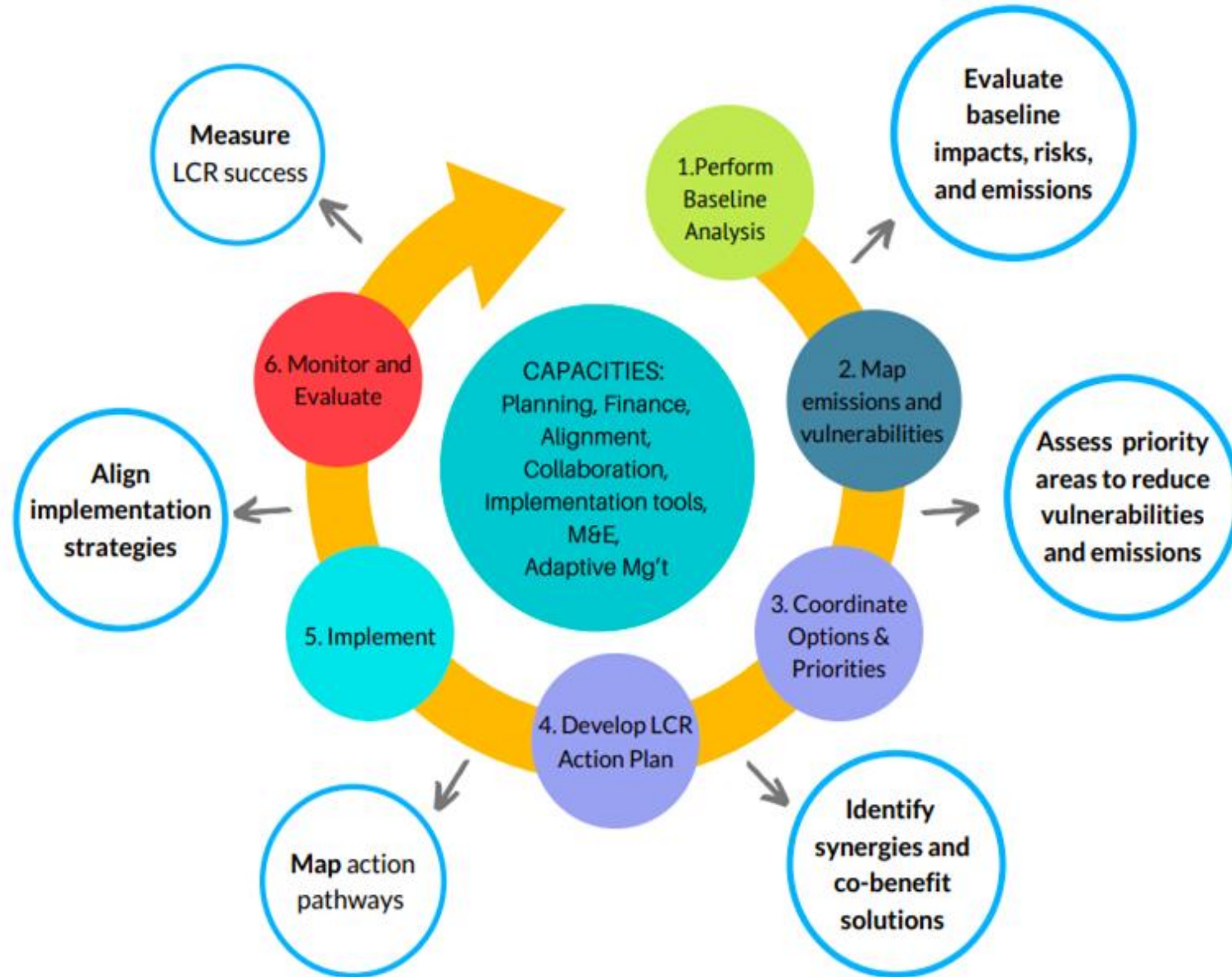
- Think through:
  - What to think about
  - When to think about it

**Use:** Identifying opportunities and resources for effective integration

- Major Steps
  1. Situation Analysis
  2. Risk Evaluation
  3. Solutions Analysis
- Action Plan & Implementation
  - Prioritization & assigning responsibilities
  - Financing & resources
  - Implementation timelines



# LCR Process Draft 2019



ICABCCI LCR case studies, resources and planning tools forthcoming in 2020-2021
















# LCR Planning Frameworks Case Studies 2018

## Community Planning Processes

- **Purpose:** Examined options for incorporating into existing planning processes
  - Official Community Plans
  - Comprehensive Community Plans
- Potential tools
  - Development Permit Areas (DPA)
  - Environmentally Sensitive Areas (ESA)



# LCR Synergies & Co-benefits

	Improved biodiversity		Cost savings		Local control of power
	Energy savings		Green job creation		Increased property values
	Reduced waste		Improved human well-being		Reduced congestion
	Improved water collection & absorption		Carbon sequestration		Reduced burden on grey infrastructure
	Improved air/water quality		Reduced extreme temperatures		Pollutant capture



# Barriers to LCR Implementation

## **Framing**

- Emphasis on emissions reduction since 1980s; adaptation a last resort

## **Siloed business models**

- Professional silos with different resources and tools

## **Sources of funding**

- Mitigation grant-funded
- Adaptation supplementary

## **Institutional inertia**

- Cumbersome add-on, rather than embedded practice
- Emphasis neither on systems functions nor on achieving multiple objectives

# LCR Opportunities in Local Government Contexts

## **Organization benefits**

- Streamlining resources - financial & human
- Efficacy in capital and infrastructure planning
- Seizing opportunities that achieve multiple objectives

## **Policy synergies**

- Land-use planning, buildings, water and agriculture planning, energy supply, parks and biodiversity planning, urban forestry, transportation planning, etc.

## **Co-benefit strategies**

- Opportunities that respond to climate projections and have additional benefits for other community development objectives, minimizing threats and transitioning toward sustainable development

# Funding Opportunities for Local Governments

## **Internal Funding/Financing Sources**

- Property taxes, tax levies
- Tax Increment Financing, Local Improvement Charges
- User fees, Development Cost Charges (DCCs)

## **• Local Financial Incentives and Rebates**

- Development Cost Charge reductions
- Local Improvement Charge financing (PACE loans)
- User fee rebates/credits

## **External Sources of Revenue**

- Conventional sources: Gas tax, Infrastructure Canada programs
- Merit-based: MCIP, GMF, MAMP, Disaster Mitigation and Adaptation Fund
- Carbon revenues

Report coming shortly - *see ACT 2015*



# Toronto Green Roofs Bylaw





# Victoria Stormwater Runoff Utility Bills





# Percé, Quebec Naturalized Shoreline





# Fredericton Active Transportation Corridors



# Integrated Climate Action for BC Communities Initiative (ICABCCI)

**PRACTICE: To increase local governments' capacity to act** on climate change by promoting LCR as a lens in local government decision processes.

1. Helping to streamline resources and capacity for adaptation and mitigation planning.
2. Synergizing LCR-friendly policies across departments.
3. Strategizing at a systems-scale to identify co-benefit opportunities.
4. Developing practical and effective LCR planning-to-implementation pathways.
5. Evaluating LCR benefits, challenges, and trade-offs in practice.

**RESEARCH: To co-develop a leading-edge an LCR framework** to be mobilized as best practice in other local governments across BC and beyond.

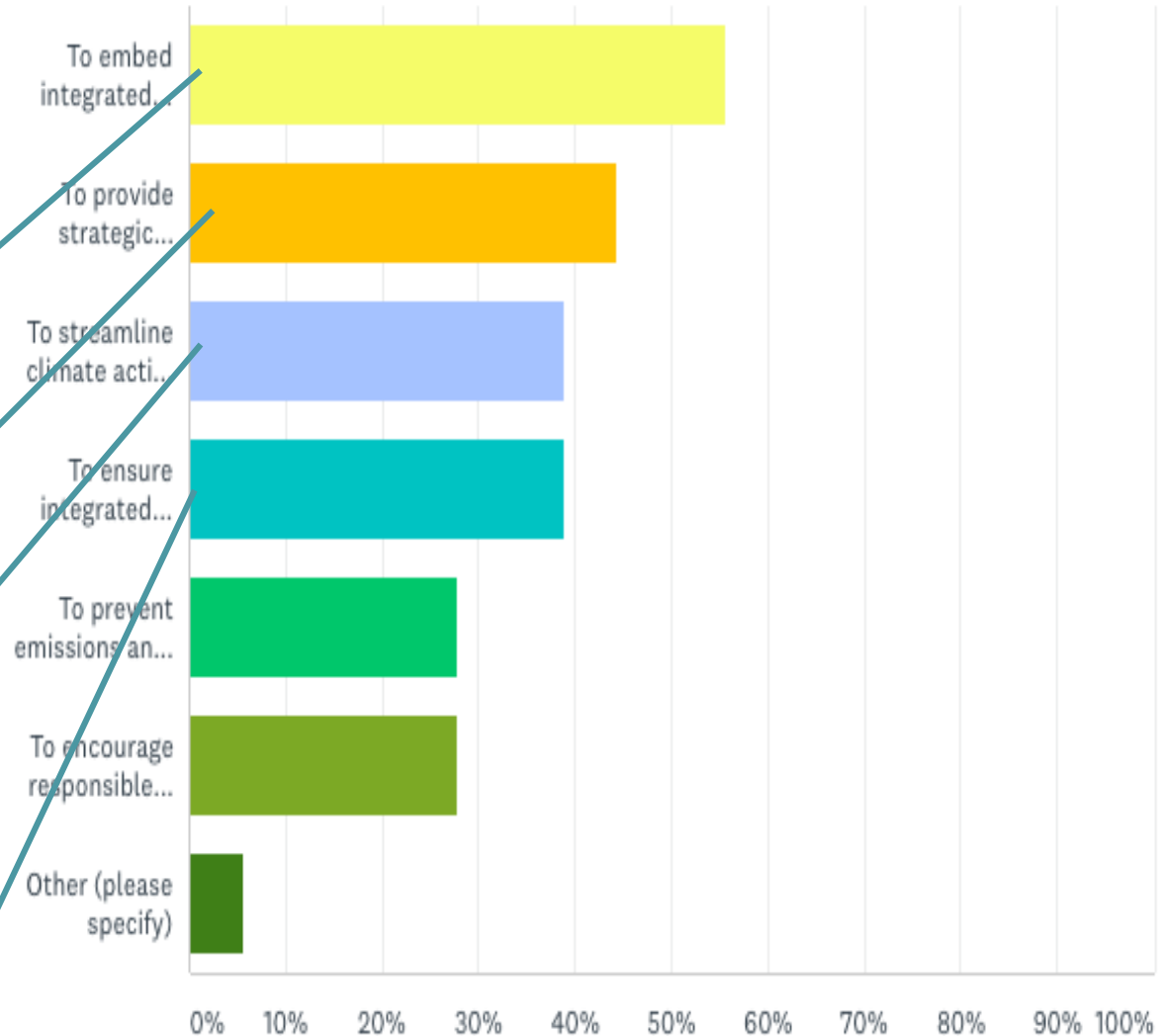
# ICABCCI Community Priorities

## Results of Survey

**#1**

Communities are primarily interested in applying an LCR approach to:

- Embed integrated climate action in current planning processes
- Provide strategic direction on long term infrastructure decisions and investments
- Streamline climate action
- Ensure LCR is a corporate priority



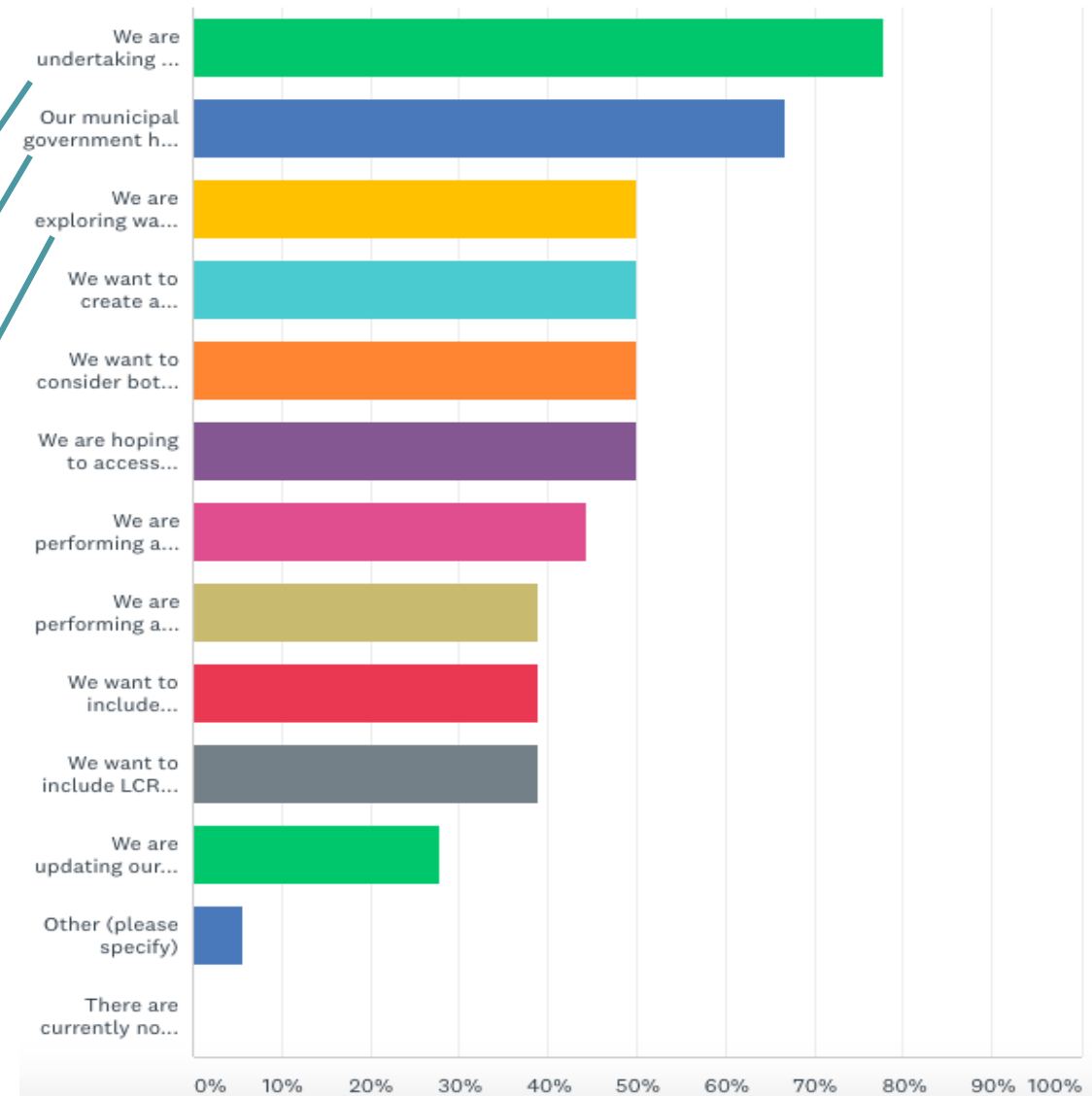
# ICABCCI Community Priorities

## Results of Survey

### #1

Priority opportunities for applying an LCR approach are:

- Asset management planning
- Corporate strategic planning
- Climate action implementation, land-use planning, business plan, funding





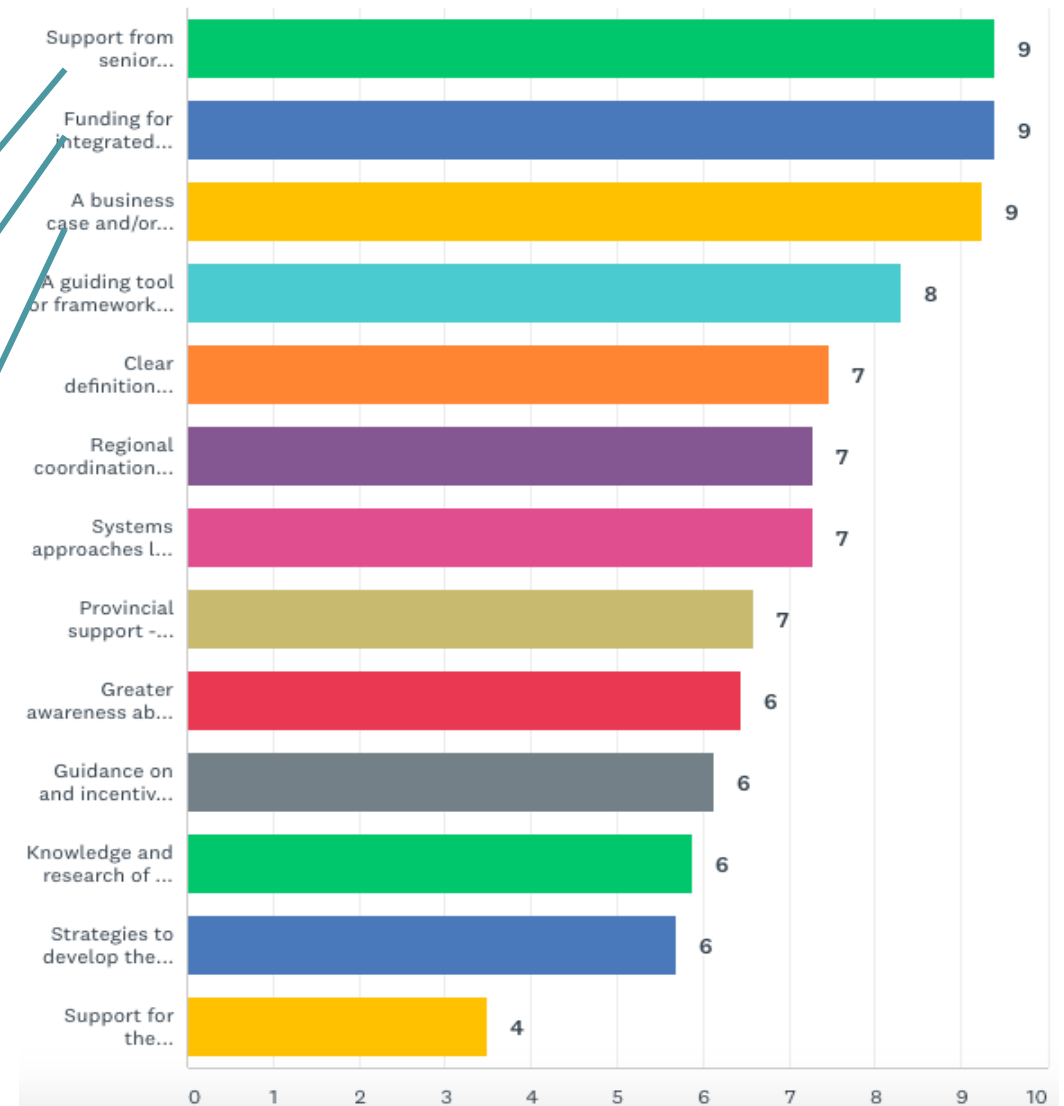
# ICABCCI Community Priorities

## Results of Survey

### #1

Communities identify their priority needs to integrate LCR as:

- Support from senior leadership
- Funding for integrated climate action
- A business case or cost benefit analysis to determine costs of taking action and costs of inaction



# ICABCCI Case Study Communities

## **Silverton & Slocan and Summerland**

LCR asset management approaches, including natural assets

## **Port Moody, Colwood and Nelson**

Integrated climate action strategies for their communities

## **Gibsons**

Natural asset inventory and valuation tools as an LCR strategy

# ACT

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For more information about ACT, our policy reports, and adaptation resources, please go to **[act-adapt.org](https://act-adapt.org)**, or contact us at **[adapt@sfu.ca](mailto:adapt@sfu.ca)**.

Climate Risk Institute - Webinar

# From Nice to Have to Must Have

Managing Green Infrastructure as a Municipal Asset

James Lane, R.P.F.  
Manager, Natural Heritage and Forestry  
The Regional Municipality of York

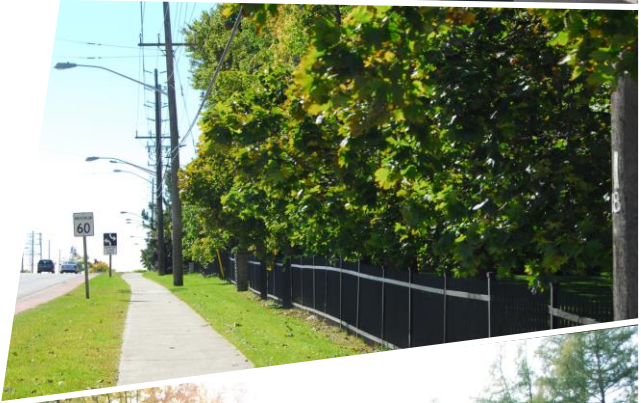
September 30, 2019





# Overview

1. What is asset management
2. Why manage green infrastructure as an asset
3. Incorporating green infrastructure in asset management
4. Green Infrastructure Asset Management Plan
5. Putting the plan into action



# Regional Municipality of York

- Upper tier municipality located in the Greater Toronto Area of Ontario
- 1766 sq. KM
- Population of 1.11 million
- Forestry Services include:
  - Urban forestry/street trees
  - York Regional Forest
  - Invasive species management
  - Forest Conservation By-law
  - Green Strategy
  - Strategic Forest Management Plan





# What is Asset Management

- An asset is an item, thing or entity that has potential or actual value to an organization (ISO-55000-2014)
- Asset management is the coordinate activity of an organization to realizes value from assets (ISO-55000-2014)
- Asset management planning is the process of making the best possible decisions regarding the building, operating, maintaining, renewing, replacing and disposing of infrastructure assets.
- The objective is to maximize value, manage risk, and provide satisfactory levels of service to the public in a sustainable manner.



# Why Manage Green Infrastructure as an Municipal Asset

- Recognize and communicate the services provided by green infrastructure
- Provides a defensible approach to identifying investment requirements – levels the playing field
- Increase access to infrastructure funding programs
- Green infrastructure can provide a lower cost solution than traditional grey infrastructure





# Municipal Asset Management in Ontario

- Ontario Regulation 588/17: Asset Management for Municipal Infrastructure – sets the minimum requirements for asset management
- Regulation includes green infrastructure in the scope of municipal infrastructure
- Requires that municipalities prepare asset management plans which include green infrastructure by July 1, 2023



# Types of Green Infrastructure Assets

- Biological or living assets, including:
  - Street or park tree
  - Forest/woodland
  - Soil
  - Wetland
- Engineered or civil assets, including:
  - Soil cell
  - Rain garden
  - Permeable paving



# Green Infrastructure Asset Management at York Region

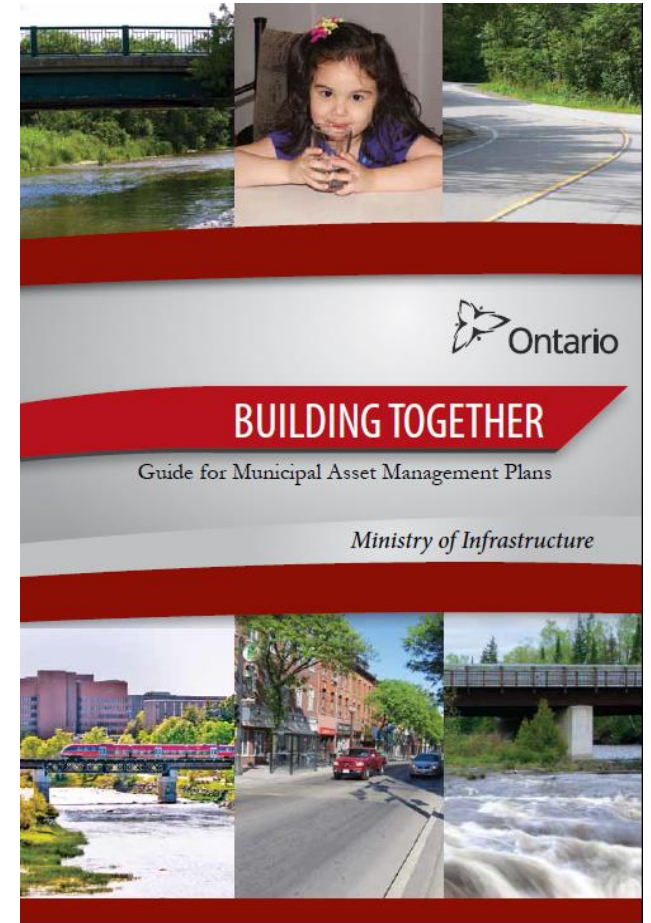
- 2013, 2015 and 2017 – Green infrastructure included in state of the infrastructure reporting
- 2014 - Green infrastructure included in the development of a Environmental Services Asset Management Strategy (draft)
- 2017 – Complete the development of its first Green Infrastructure Asset Management Plan

<b>A</b> Very Good	<b>Fit for the future:</b> Well maintained, good condition, new or recently rehabilitated.
<b>B</b> Good	<b>Adequate for now:</b> Acceptable, generally approaching mid-stage of expected service life.
<b>C</b> Fair	<b>Requires attention:</b> Signs of deterioration, some elements exhibit deficiencies.
<b>D</b> Poor	<b>Increasing potential of affecting service:</b> Approaching end of service life, below standard, significant deterioration.
<b>F</b> Very Poor	<b>Unfit for sustained service:</b> Near or past service life, advanced deterioration, assets may be unusable.



# Green Infrastructure Asset Management Plan

- Joint project between Forestry and Infrastructure Asset Management
- Plan included all assets managed by the Forestry Division
- Plan followed the Ministry of Infrastructure Guide
- Key components included:
  - State of the infrastructure
  - Levels of service
  - Asset management strategy
  - Financing strategy
  - Continuous Improvement



# Green Infrastructure Asset Portfolio

- Assets organized into biological assets and civil assets under three categories:
- Urban Forest
  - Biological – street trees, shrubs, perennials and growing media
  - Civil – soil cells, irrigation and drainage
- York Regional Forest
  - Biological – vegetation communities
  - Civil – trails, parking lots, fences, culverts, etc.
- Bill Fisch Forest Stewardship and Education Centre



# State of the Infrastructure – Urban Forest Asset Valuation

**What is the most appropriate and defensible method to value urban forest biological assets?**

- Street trees – Use CTLA trunk formula method
- Shrubs and perennials – replacement cost
- Growing media – replacement cost
- Assessed ecosystem services using I Tree Eco
- Civil assets valued using depreciated replacement cost





# State of the Infrastructure – York Regional Forest Asset Valuation

What is the most appropriate and defensible method to value Regional Forest biological assets?

- Forests – Timber value, land value, re-establishment cost
- Wetlands and prairies – land value, re-establishment (future)
- Assessed ecosystem services using I Tree Eco
- Civil assets valued using depreciated replacement cost



# Asset Valuation Results

	Asset Group	Valuation
Urban Forest	Biological Assets	421,493,342
	Civil Assets	1,981,140
	Urban Forest Total	423,474,482
YRF	Biological Assets	22,788,989
	Land	30,483,900
	Civil Assets	6,976,624
	York Regional Forest Total	60,249,513
Bill Fisch Forest Stewardship and Education Centre	Civil Assets	4,577,174
	Bill Fisch Forest Stewardship and Education Centre Total	4,577,174
	TOTAL	\$488,301,169

# Defining Levels of Service

- Identifying levels of service to be provided by green infrastructure was challenging
- Level of service includes:
  - Community level of service
  - Technical level of service
  - Performance measure

TABLE 3-3: URBAN FOREST PROPOSED LEVELS OF SERVICE

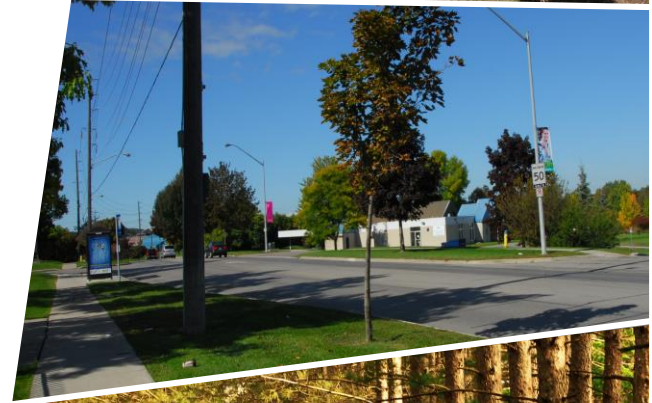
Community Level of Service	Service Attribute	Technical Level of Service	Technical Performance Measure	Planned Target	Reported 2016	Data Source
<b>Will street trees, landscape vegetation and supporting infrastructure provide the expected benefits to residents over the long term?</b>	Scope	% of available space along urban Regional roads occupied by street trees.	% of urban Regional roads meeting applicable landscaping standards.	95%		GI AMP 2017
	Quality	Health of street tree and landscape plantings as a measure of aesthetics and performance of supporting assets (e.g. growing media and irrigation systems).	Tree health condition (% of street trees meeting satisfactory or better health rating).	90%	84%	2015 Street Tree Health Assessment
	Reliability	Annual ecosystem benefits in amounts and dollars including carbon sequestration, air quality impacts, <u>stormwater</u> runoff benefits.	Ecosystem benefits (e.g. kg/year).	> current	Carbon - 293,102 kg/yr  Pollution - 9,478 kg/yr	<u>Silvecon</u> Effective Valuation Tech Memo



# Asset Management Strategy

## Life Cycles

- Street trees - identify three growing environments and estimate average lifespan
  - Urban – 35 years
  - Suburban – 44 years
  - Rural – 53 years
- York Regional Forest – natural communities are self perpetrating (with maintenance)



# Green Infrastructure – Asset Management Strategies

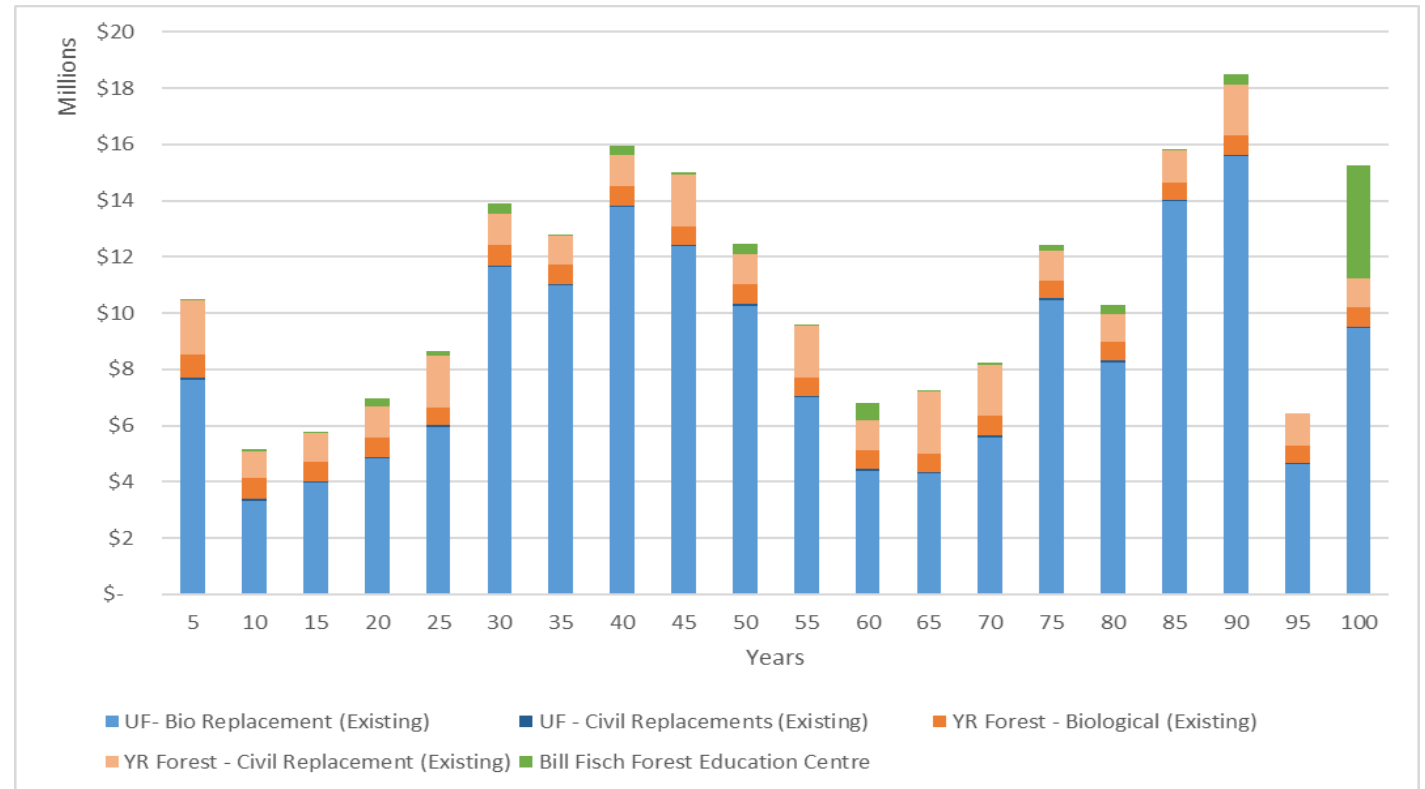


TABLE 4-6 – URBAN FOREST MANAGEMENT STRATEGIES (BIOLOGICAL ASSETS)

Management task		Type	Treatment Location & Rationale	Frequency	Delivery
Trees					
Planting (Under Warranty)	Installation	Capital	To upgrade Regional corridors not meeting current landscaping standards, and to support transportation renewal plans. Additional warranty for 1 year if tree replaced under warranty.	As suitable transportation corridors are refurbished	Contract
	Watering	Capital	To ensure healthy establishment of new trees.	14 times each summer season (weekly) for 3 growing seasons	Contract
	Warranty Maintenance	Capital	Re-mulch at end of year 1. Re-mulch, fertilize, and remove stakes, watering bags at end of warranty (year 2). Conifer trees are wrapped in burlap during the first two winters.	At milestones as per establishment plan	Contract
	Tree Inspections	Capital	Detailed inspection at the time of planting and at least 1 warranty inspection per tree.	Assessed during the 3rd growing season.	YR Staff
Juvenile Tree Maintenance		Maintenance	Structural pruning, mulching, fertilizing. An average of 4 treatments per tree.	Every 3 years, post warranty period	YR Staff
Intermediate Tree Maintenance		Maintenance	Structural pruning.	Every 7 years	Contract
Mature Tree Maintenance		Maintenance	Removal of dead or hazard trees and pruning of hazard trees to manage risk in public rights of way.	Every 4 years plus requests and emergency tree work as required	Contract
Tree Removal and Stumping		Capital	All trees are removed and stumped at end of life.	As required	Contract

# Green Infrastructure – Financial Strategy

- Funding plan to put asset management strategies into action, required investment to meet service levels
- Key outcomes from financial strategy
  - Need to review service levels and return on investment for some treatments
  - Need to establish reserve to minimize impacts of funding peaks





# Putting the Plan into Action

- The plan has resulted in securing additional capital funding
- Implementing improvements in data collection and management
- Identified the need for a forestry replacement reserve
- Plan meets the requirements of Ontario Regulation 588/17
- Plan scheduled for review and update in 2020



# Questions

## Contact

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Manager, Natural Heritage and Forestry

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An aerial photograph of a modern, multi-story building with a complex, stepped design. The building features extensive green roofs and terraces, with lush vegetation and trees integrated into its structure. The building's facade is composed of light-colored, horizontal slats. In the foreground, there are paved walkways, a small basketball court, and a covered outdoor seating area. The overall scene is bright and sunny, with a clear sky.

# Questions?