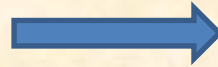


Landscape Contractors: The New Eco Warriors

Landscape Ontario Congress 2020

L.H. McCarthy, Ryerson University
January 8, 2020

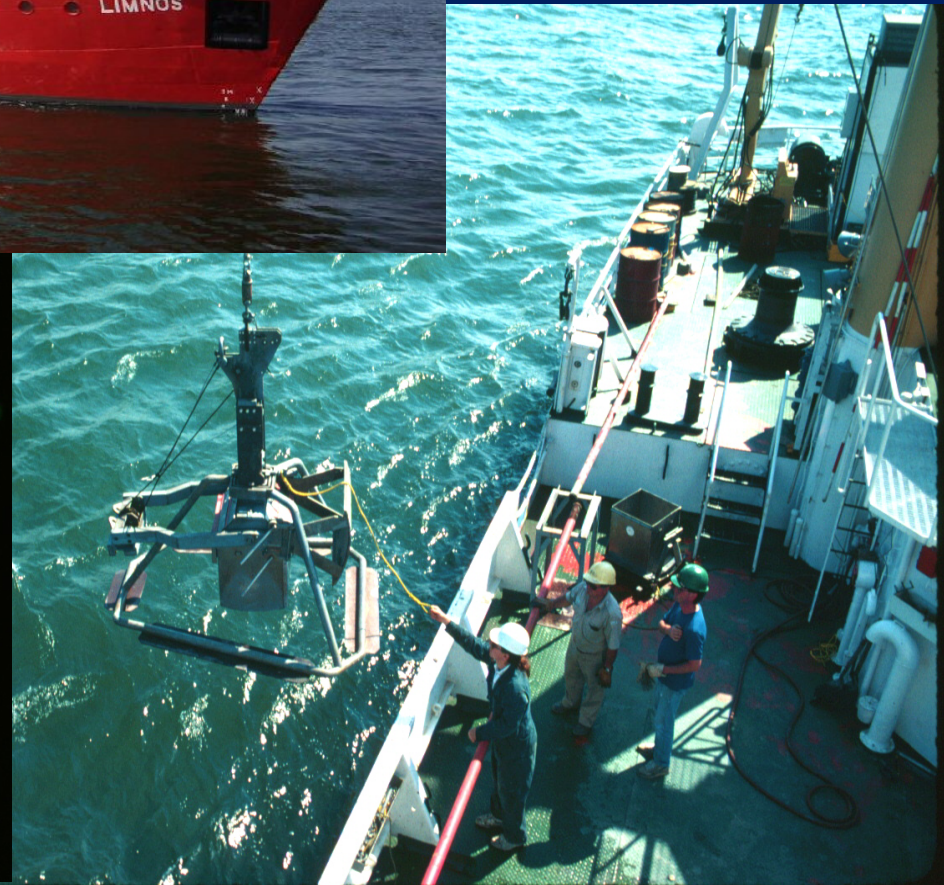


Great Lakes ecotoxicologist



Canada Centre for Inland Waters
Department of Fisheries and Oceans



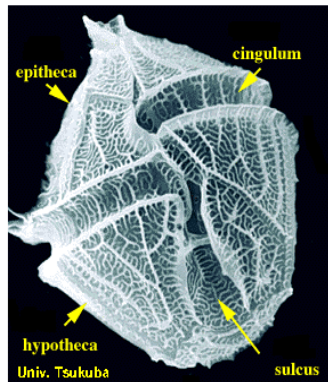
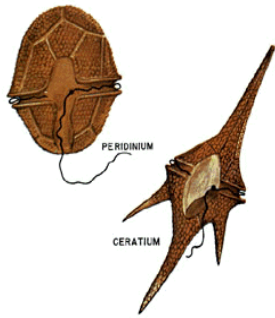


Great Lakes Biota - fish

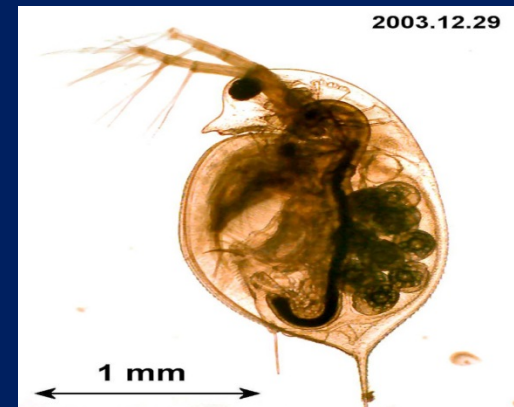
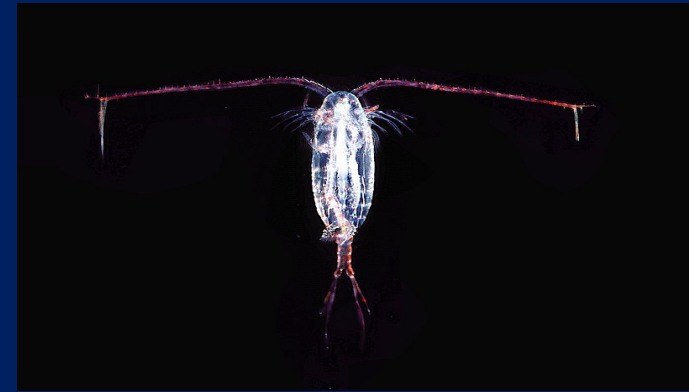
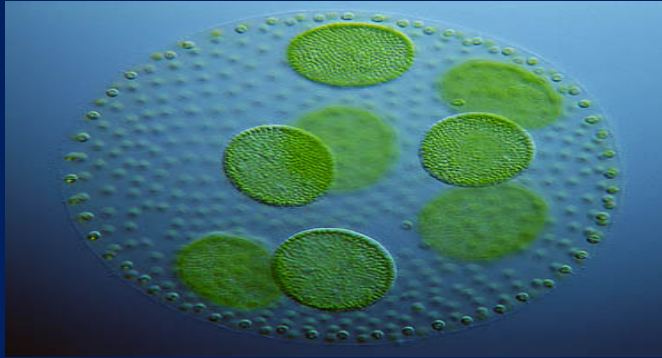


primary producers

Dinoflagellates

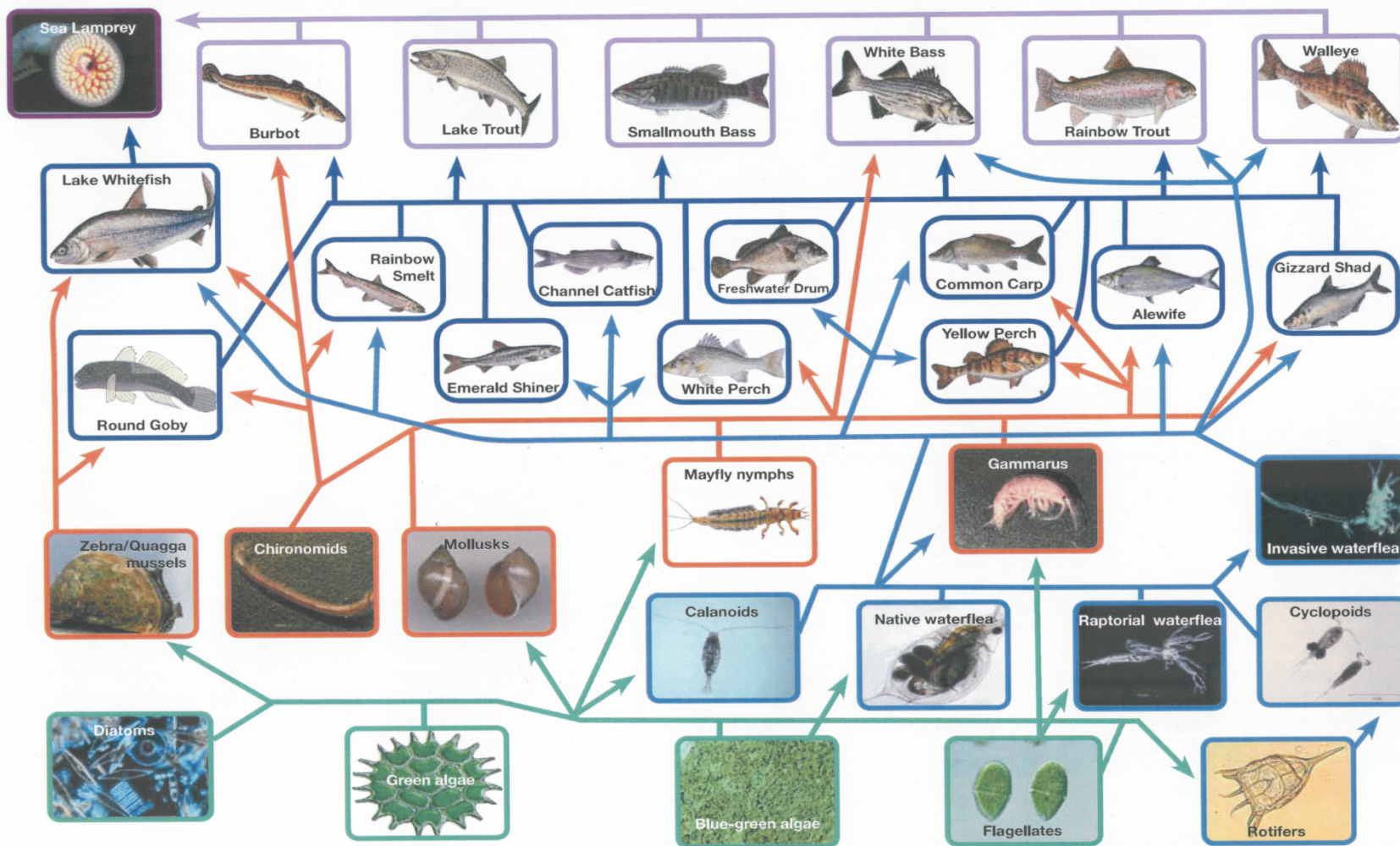


primary consumers





Lake Erie Food Web



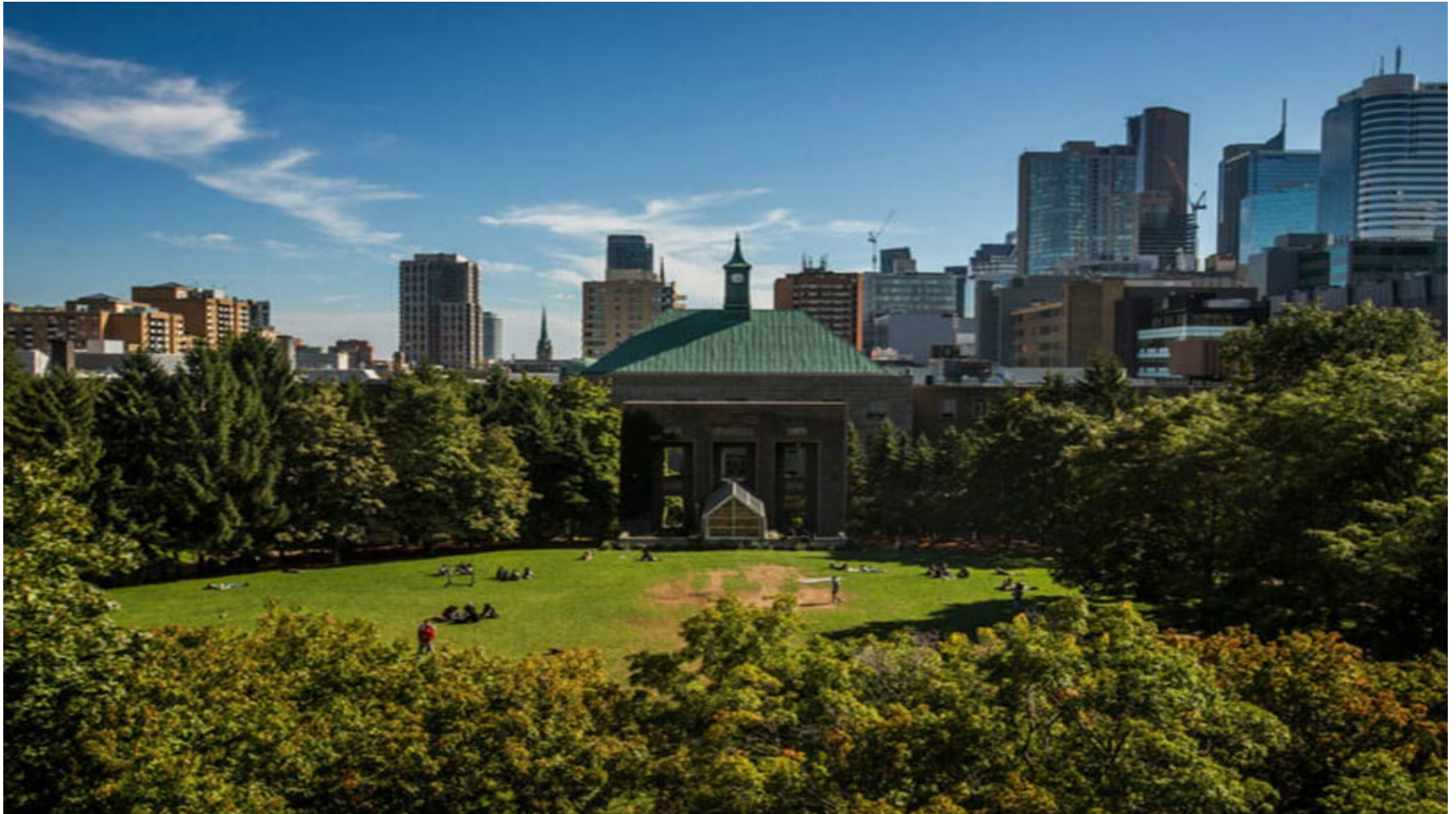
Foodweb based on "Impact of exotic invertebrate invaders on food web structure and function in the Great Lakes: A network analysis approach" by Mason, Krause, and Ulanowicz, 2002 - Modifications for Lake Erie, 2009.

NOAA, Great Lakes Environmental Research Laboratory, 4840 S. State Road, Ann Arbor, MI 734-741-2235 - www.glerl.noaa.gov



Professor: Ryerson University

downtown Toronto



Dundas Square (Dundas Ave., Yonge St.)



How is landscape impacting source waters?

1. contaminated watersheds (ie. rivers) impact receiving waters (ie. lakes)

ie. Humber and Don Rivers

R.C. Harris *drinking water* intake pipe

2. horizontal impermeable hardscapes (asphaltenes, pesticides)

ie. roads, bridges, driveways

3. vertical impermeable hardscapes (PBDEs, etc.)

ie. Skydome, condos, business towers, bridges



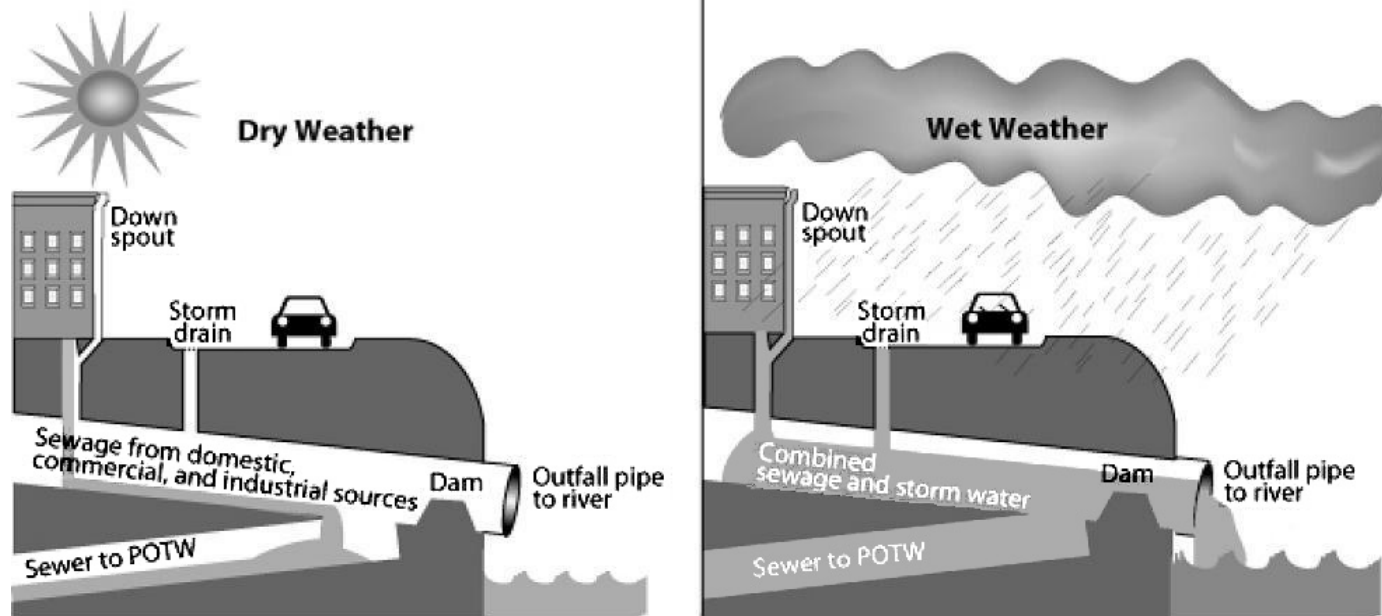
4. lack of clean *industrial* effluent at source

ie. slaughterhouses on major rivers: wastewater either trucked away or flushed down sewer

5. lack of clean *municipal* effluent at source (ie. homes)

ie. grey-water return, domestic wetlands, down-spout water capture, etc.

6. combined sewer overflows (CSOs)



7. *aging* sewer, drinking water infrastructure



8. lack of deeply-developed water conservation strategies

9. *Lack of public awareness of urban water issues*

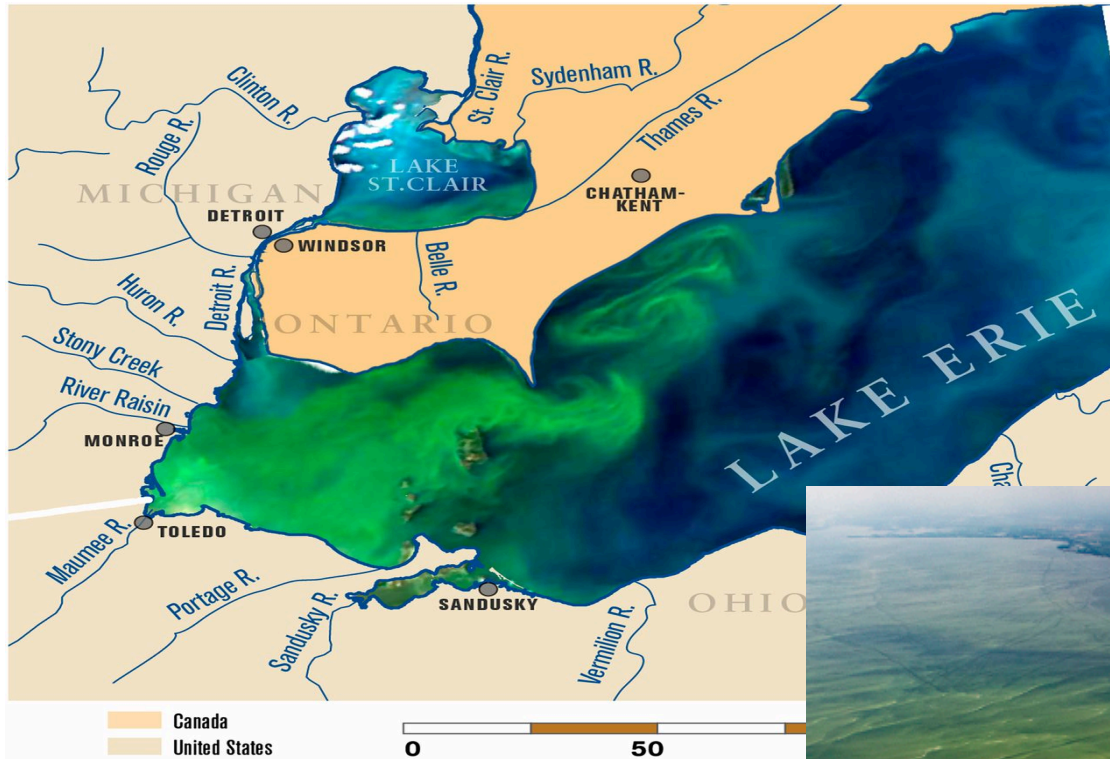
Other Great Lakes issues:

As urban impermeability increases, *loss of wetlands*

- lack of filtration of runoff pollutants
- lack of aquatic nurseries



huge algal blooms causing unsafe drinking water



Algae Bloom in western basin of Lake Erie: 2017

Photo: [NOAA Great Lakes Environmental Research Laboratory](#),



Lack of urban resilience



Problems “come home to roost”:

July 8, 2013: extreme weather event





flash floods primarily due to impermeable
hardscape, lack of rainfall capture

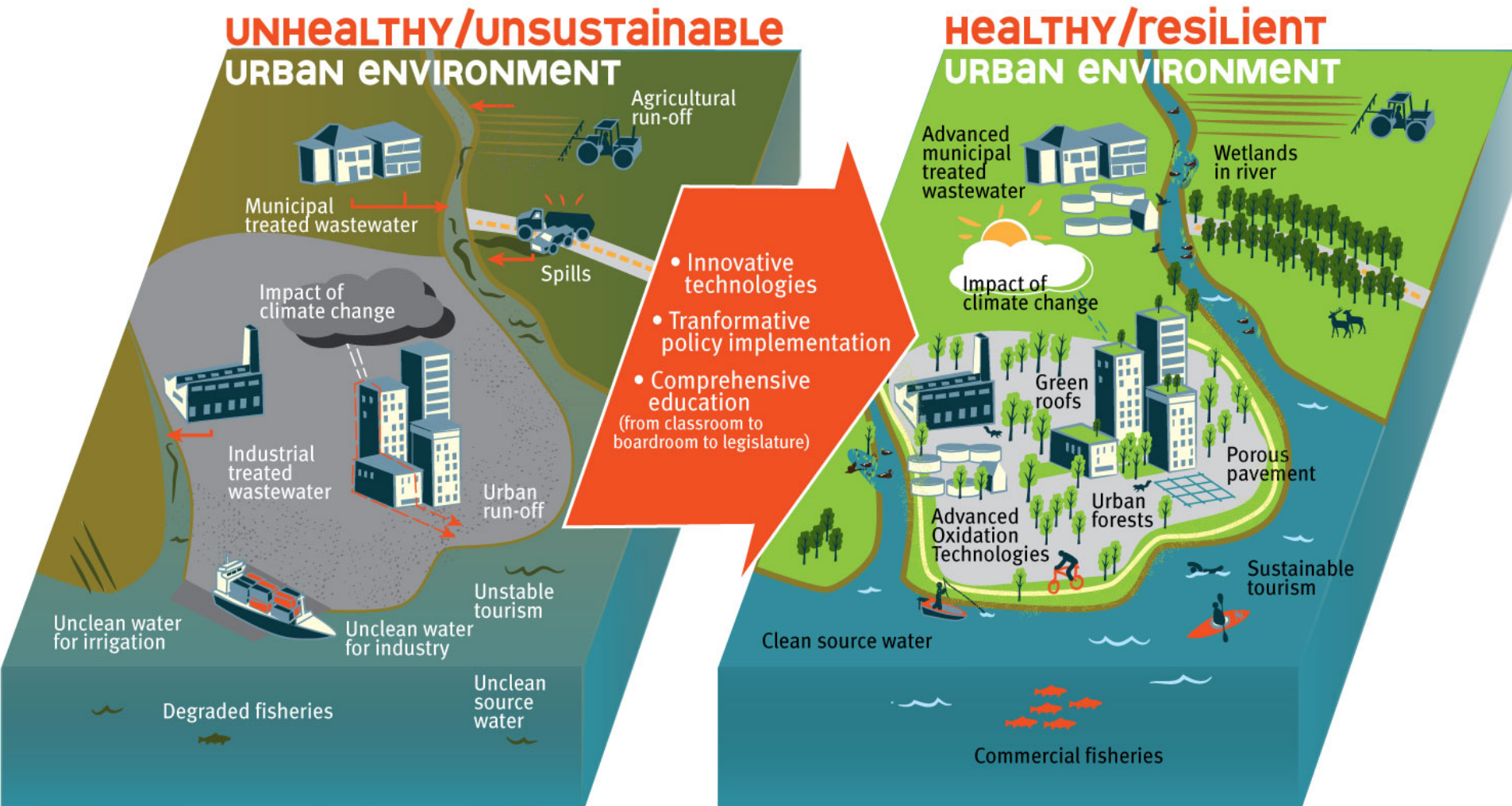


“most costly natural disaster in Ontario”

Insurance Bureau of Canada



Healthy urban water cycle in lock-step with climate change mitigation/adaptation



landscape contractors and climate change solutions

landscape contractors:

- “create/refurbish outdoor spaces: planting trees, flowers, lawns and shrubs, and
- constructing hard landscaping features, such as paths, patios, or decks”
- residential, commercial: homes, office buildings, shopping malls, hotels and public areas: *any urban area*
- knowledge of sustainability to pass along to clients: “citizen scientists”

climate change solutions:

- water capture/retention everywhere: both softscapes, hardscapes
- CO₂ sequestration everywhere
- vegetation planted everywhere

landscape contractors = climate change solutions!

landscape contractors with climate change solutions

1. water capture, retention, conservation

rainwater harvesting

wetlands/stormwater ponds

rain gardens/bioretention facilities

permeable hardscapes

2. CO₂ sequestration

urban forests

urban gardens

green roofs

3. vegetation everywhere (additional)

pollinator gardens

deliberate xeriscaping

1. Water capture, retention, conservation

Rainwater harvesting

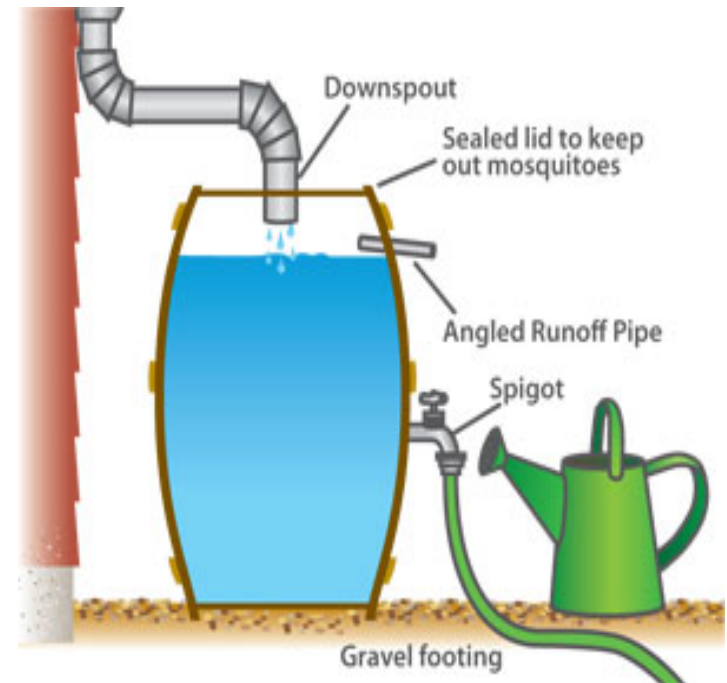
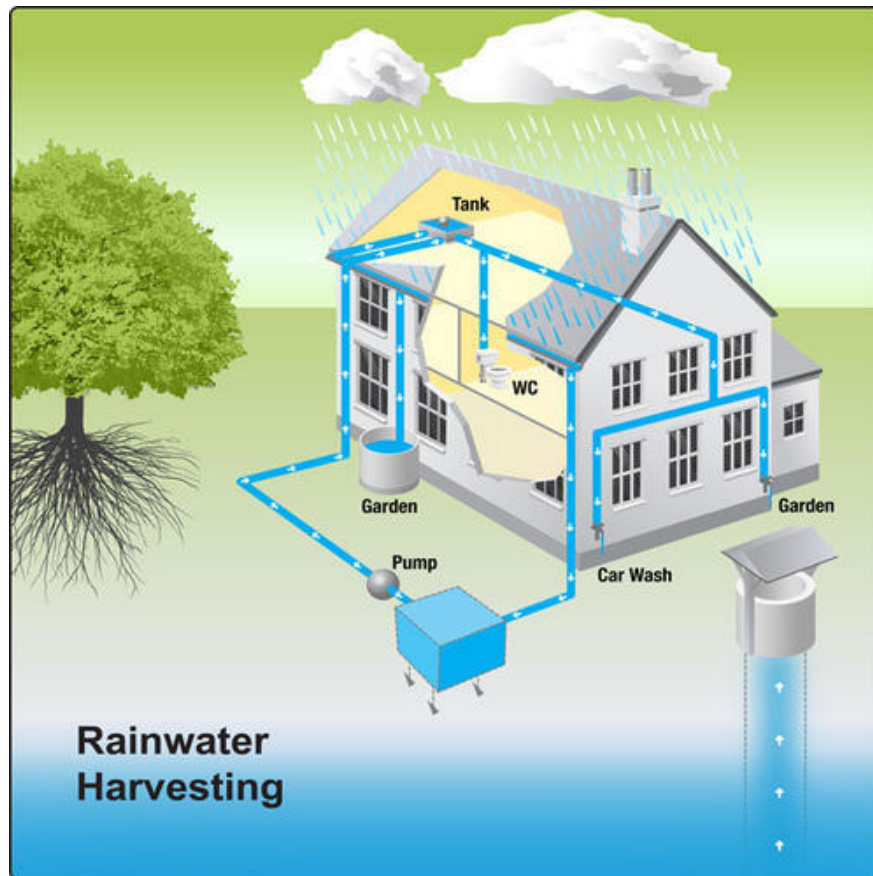
historically:

- freshwater cisterns in Ancient Rome
- at termini of aqueducts
- servicing households, palaces, military
- critical in drier areas
- Shivaganga Tank, South India



Today: rainwater harvesting/rainwater capture

- harvesting rainwater through **downspout capture, cisterns**
- tank storage, pump circulation
- *irrigation, laundry, lavatory plumbing*

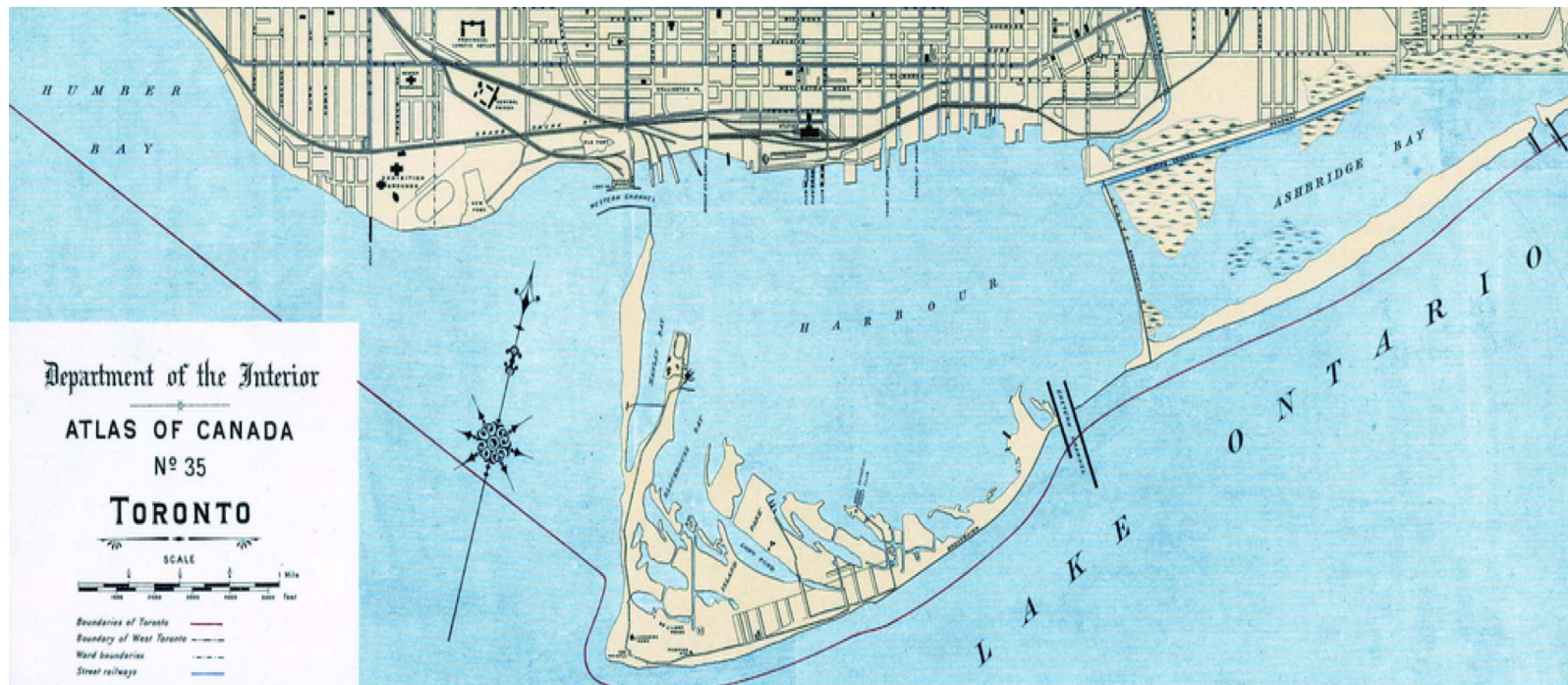


1. Water capture, retention, conservation

Wetlands

Historically: Ashbridge's Bay Marsh: 5km square

- once, one of largest marshes in Eastern Canada
- slowed down flooding from adjacent city lands
- 1912: drained, reclaimed for industry



Today: engineered wetlands/residential stormwater ponds

- i) **backyard ponds:**
- biodiversity
 - rain capture



- ii) **neighbourhood stormwater ponds:**
- rain capture; slow release to lakes
 - macrophyte carbon sequestration
 - biofiltering pollutants



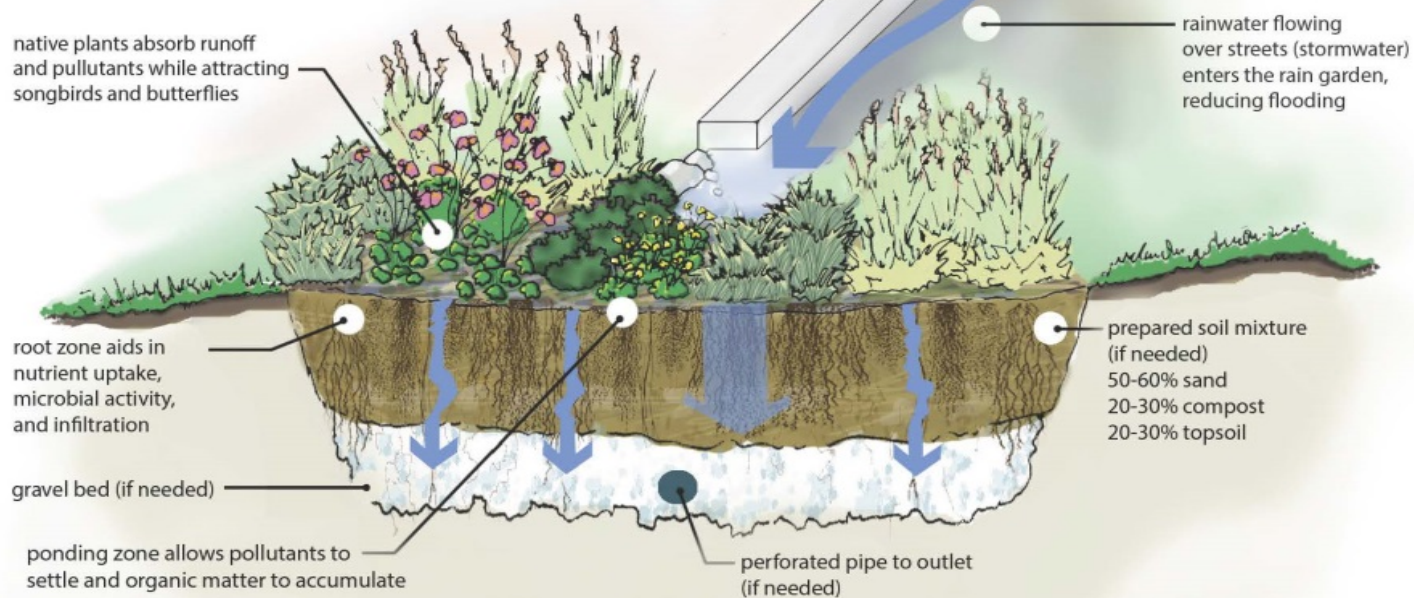
1. Water capture, retention, conservation

Rain gardens/bioretention facilities

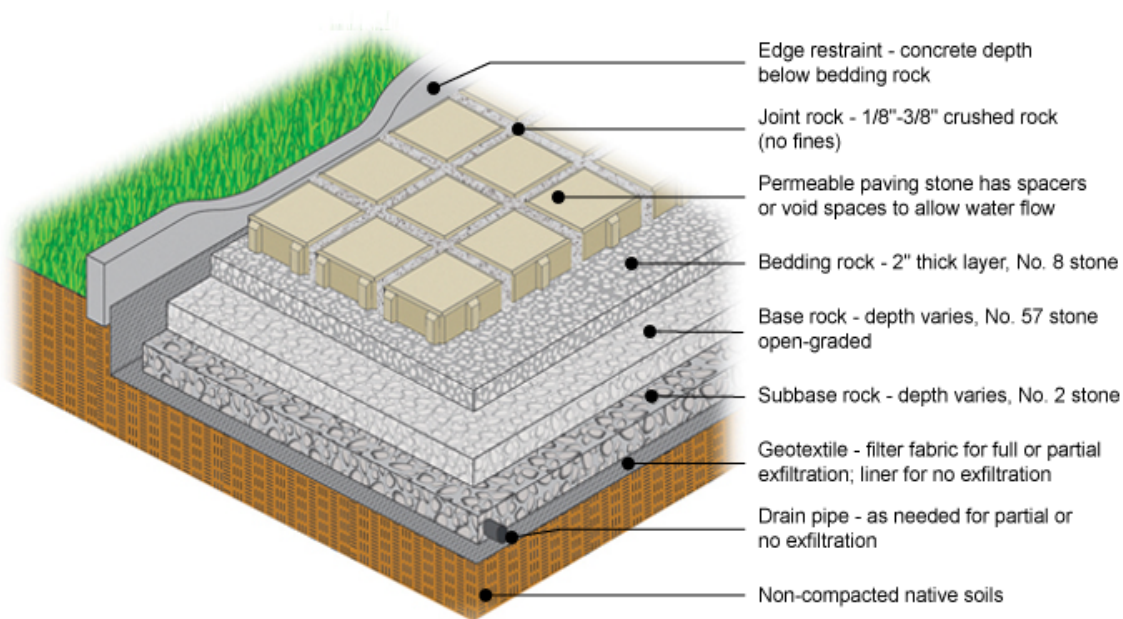
- designed landscape sites to treat polluted stormwater runoff
- from impervious surfaces such as roofs, driveways, parking lots
- *plants, natural or engineered soil* retain stormwater
- increase lag time of infiltration
- remediate, filter pollutants
- reduce “heat island” effect by reducing temperature of air, water



Rain Garden



Permeable hardscapes: *water capture, retention, filtration*



2. CO₂ sequestration

Urban forests/street trees

1853: NYC Central Park:

“a civic space for all to enjoy”

1873 (est): Toronto High Park



today:

- street trees: localized hydrologic cycle through canopy capture, water infiltration, evapotranspiration
- sequester CO₂ emissions through photosynthesis



Urban gardens

Historically:

- community gardens in England: “allotments”
- wartime “Victory” gardens: food shortage

Today:

- food consumption
- restoring nature to industrial areas
- farming traditions to urban cities



Green roofs

Ryerson Urban Farm

- student-run initiative
- 3600 kg fresh, organic, local produce:
 - campus kitchens
 - Ryerson Farmer's Market
 - community food banks
- deeper understanding of urban agriculture issues in broader community: more than 1,000 people visit
- waterproof membrane
- root barrier
- drainage, irrigation systems

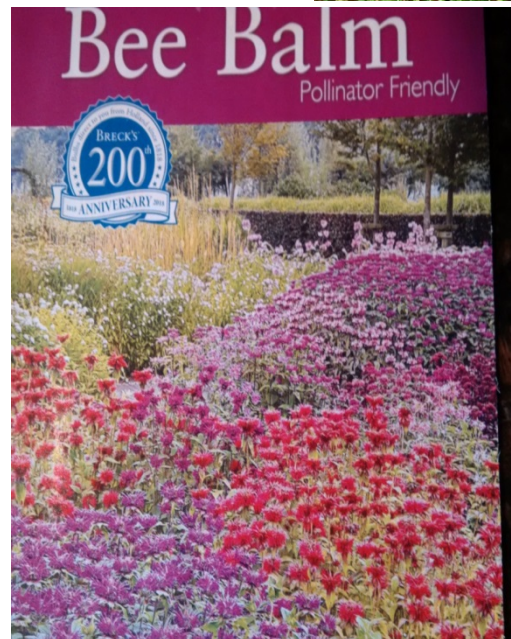


Additional sustainable landscaping:

butterfly/bee pollinator gardens:

2015: *U.S. National Pollinator Garden Network* launched “Million Pollinator Garden Challenge”

“encourages entire nation to become aware of pollinators and their role”



xeriscaping

1981: word coined, meaning “*dry*” landscaping

- emphasis on **water conservation**
- 60% water reduction
- plants find, retain water efficiently
- deep tap root, waxy leaves
- reduced maintenance



landscapers as “citizen scientists”

traditionally:

naturalists, anglers, conservationists, birders

today:

“unprecedented” collaboration between
landscapers, general public

- record living organisms, plants
- *download to Apps*
- observations sent to scientific data banks

iNaturalist: California Academy of Sciences

ie. ***Global Biodiversity Information Facility***
to help scientists



Explore!
Your World!



Learn!
About Life!



Record!
Add Observations!

landscape contractors: eco warriors

- educate clients on sustainable strategies:

xeriscape plants

backyard ponds with native macrophytes,

fire-resistant trees (ie. oak, chestnut)

permeable hardscape

ornamental versus “edible” landscaping



- discuss local hydrologic cycles
- helping developers with wetland macrophytes for stormwater ponds
- key contributor to conservation groups: ie. Toronto Region Conservation (TRCA)
- talk to students: grade schools, high schools, colleges, universities

Landscape contractors: helping citizens change the world towards a more sustainable future

