Carruthers Creek Watershed Plan Update

Urban Forest Assessment and Recommendations

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Toronto and Region Conservation Authority

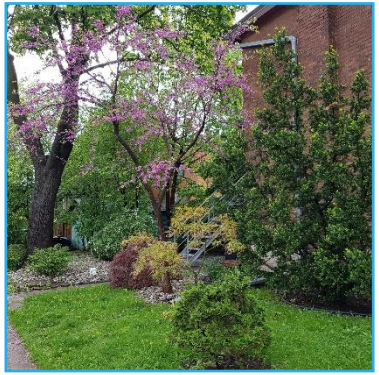
Presentation Outline

- Background
  - Urban forests
  - Ecosystem services and urban watershed forestry
- Methods
- Results and Discussion
  - What we found
  - What the scenarios could mean for the trees
  - What we recommend
- Questions/Comments

What is an urban forest?

Natural areas

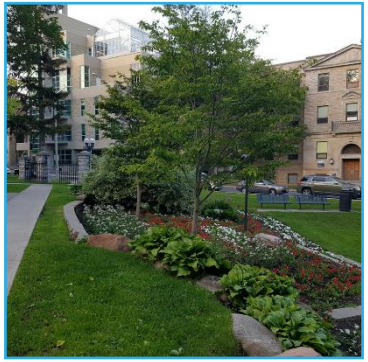
Yards



Roofs

Streets

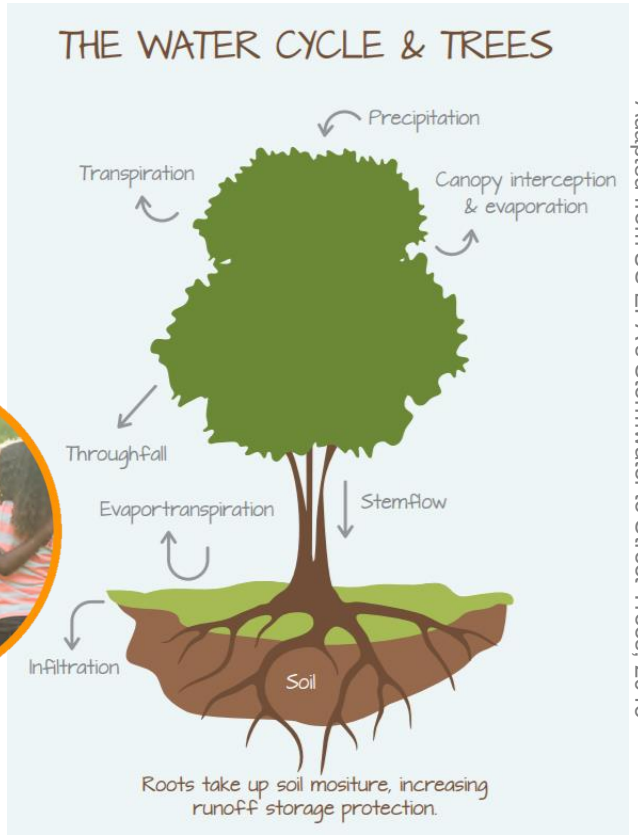
Parks



Everywhere…

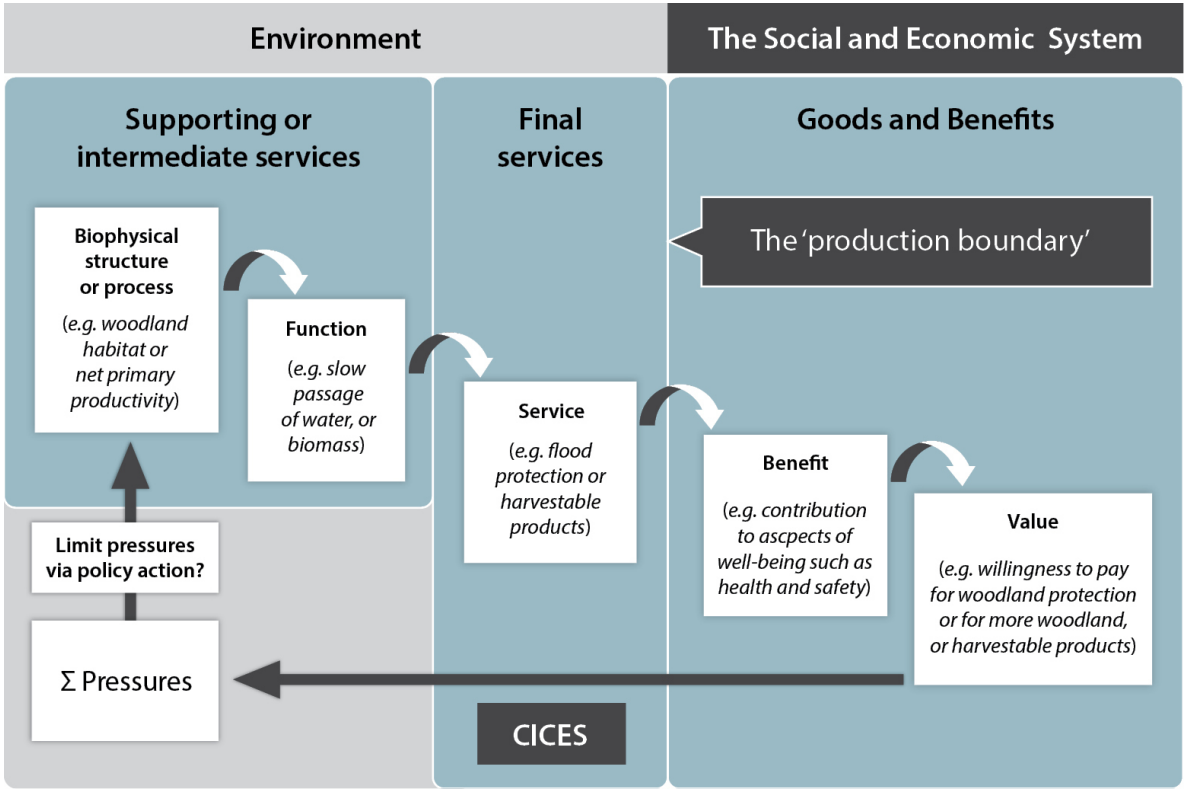
Ecosystem services of the urban forest

- Stormwater management
- Habitat
- Thermal comfort
- UV exposure reduction
- Air quality improvement
- Building energy savings
- Improved mood
- Connection to place
- Conservation ethic
- …



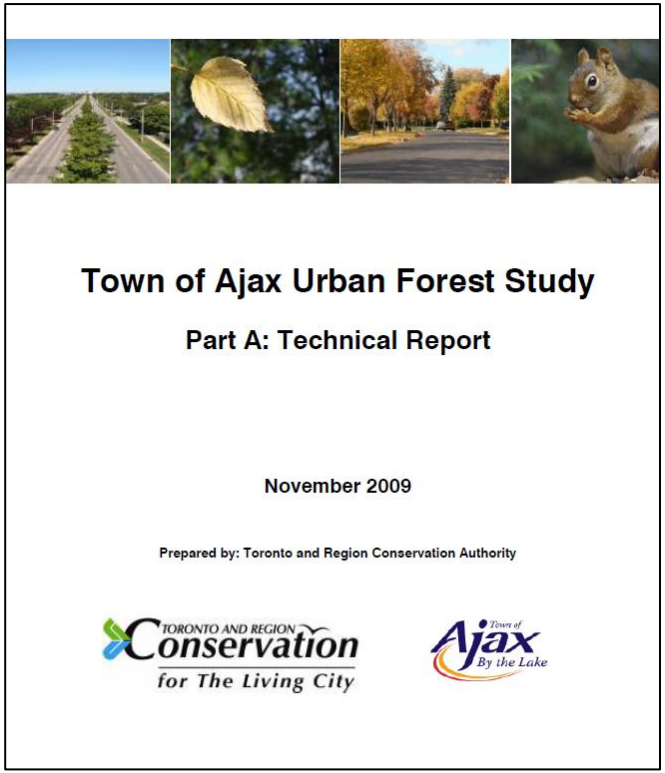
Adapted from US EPA's Stormwater to Street Trees, 2013

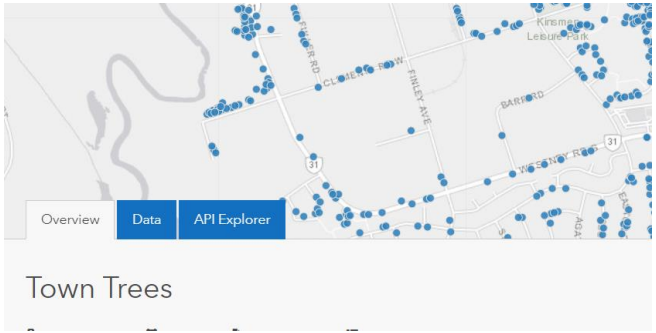
Ecosystem services of the urban forest

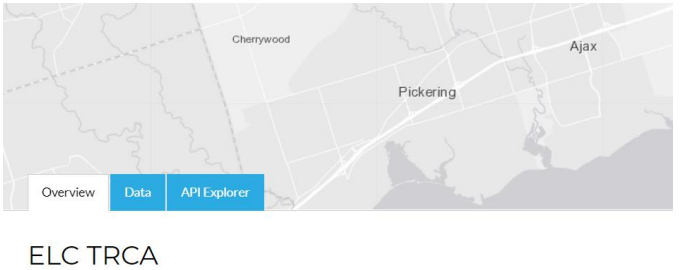


Source: Common International Classification of Ecosystem Services (CICES), adapted from Potschin and Haines-Young (2011)

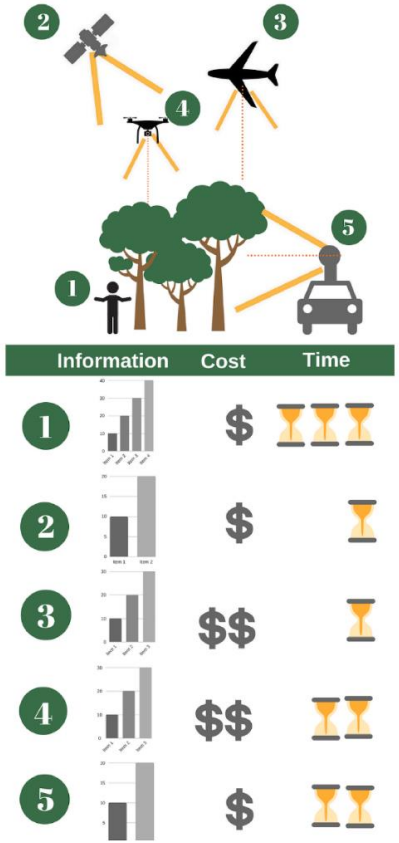
What did we know about the structure of the urban forest in the watershed?

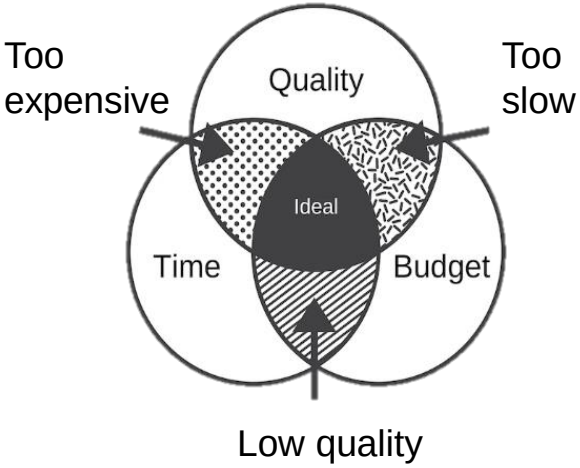






Methods: Measuring the structure of the urban forest



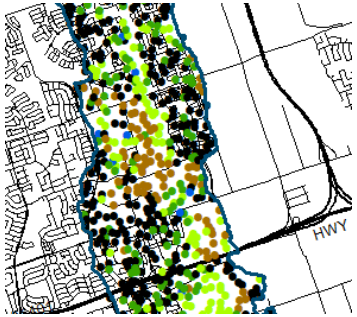


Modeled image analysis

Random point samples

Methods: Random point sampling of orthophotos (2008-2017)

- Technician classified 1616 points across the entire watershed (Ajax = 904)
- Classified into 6 pre-determined categories
- Post-classification into neighbourhoods in urban (Ajax) portion



Legend

Land Cover Classification (2017)

- Impervious (building or road)
- Impervious (other)
- Vegetation or bare ground (not active use)
- Vegetation or bare ground (active use)
- Tree/shrub outside natural cover
- Tree/shrub inside natural cover
- Water

Methods: Urban forest structure and composition

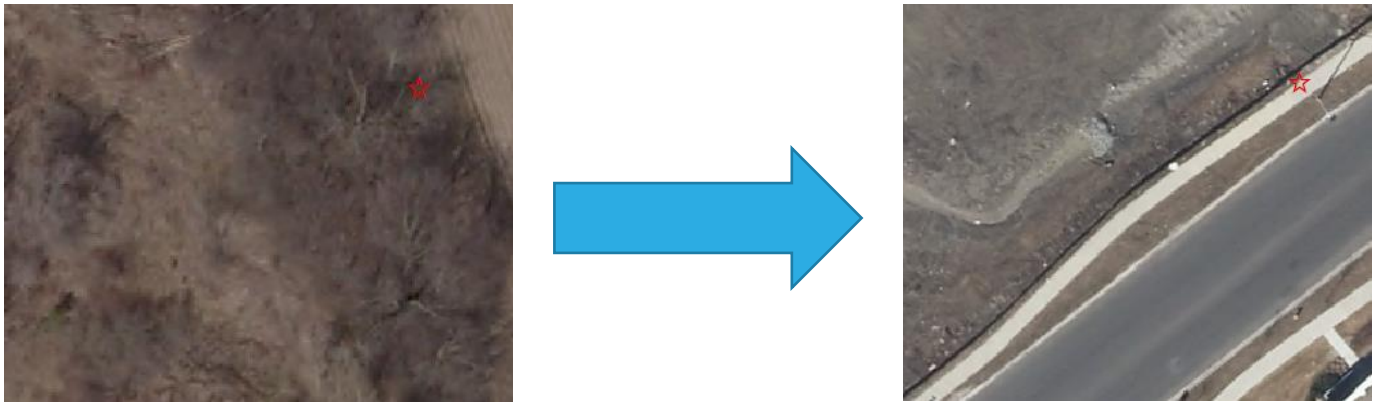
- Used several sources of data:
  - Ajax's tree inventory and climate vulnerability data (n=12,253 trees, 2018)
  - TRCA's flora inventory (2007-2017)
  - TRCA's ELC data
  - Ajax's urban forest plots (n=64 plots, 557 trees, 2011)
- Summarized tree species and size (where available)

Methods: Identifying priority areas for enhancement

- Focused on urban areas (priorities for rural restoration discussed in the TIA Report)
- Identified areas of high opportunity and low existing cover
- Layered in additional support tools for identifying social need including Durham's Health Neighbourhoods and Ajax's Social Vulnerability Index

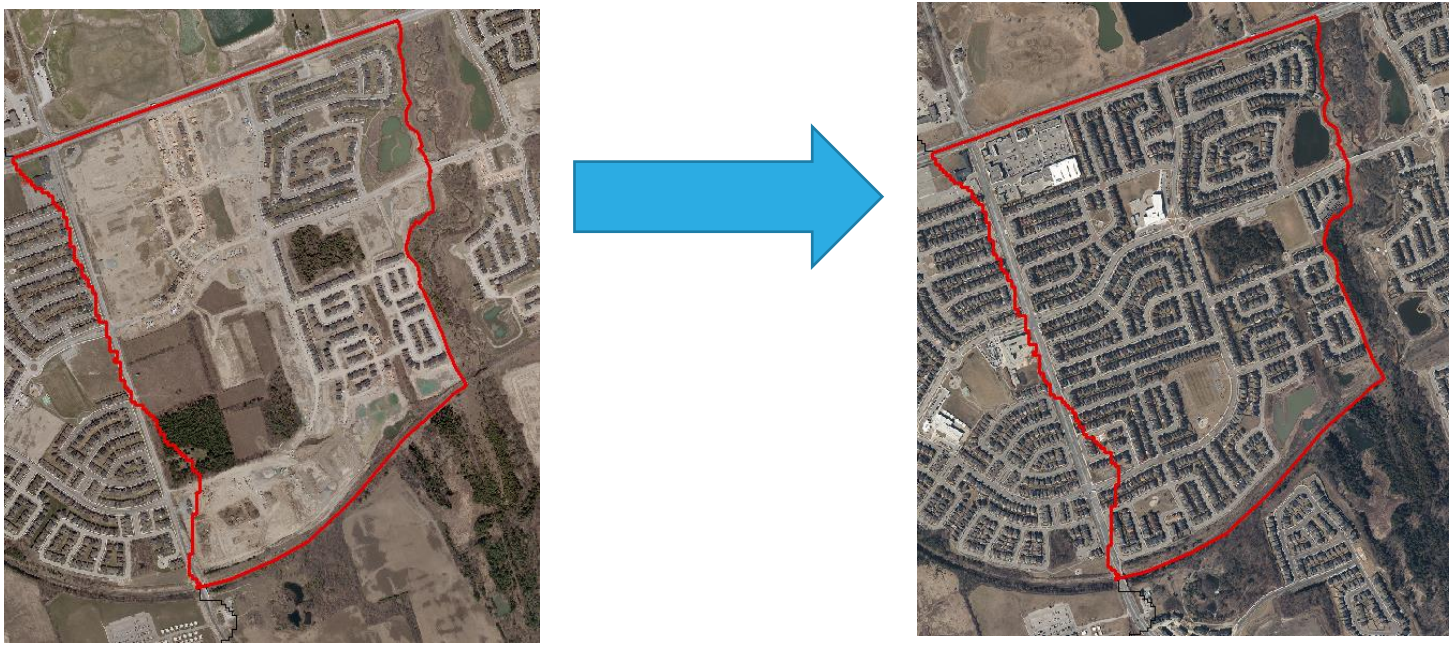
Results: Changes from 2008-2017

- Canopy cover hasn’t changed (in proportion)
- Does not mean changes haven’t occurred (it reflects effort to maintain)



Results: Changes from 2008-2017

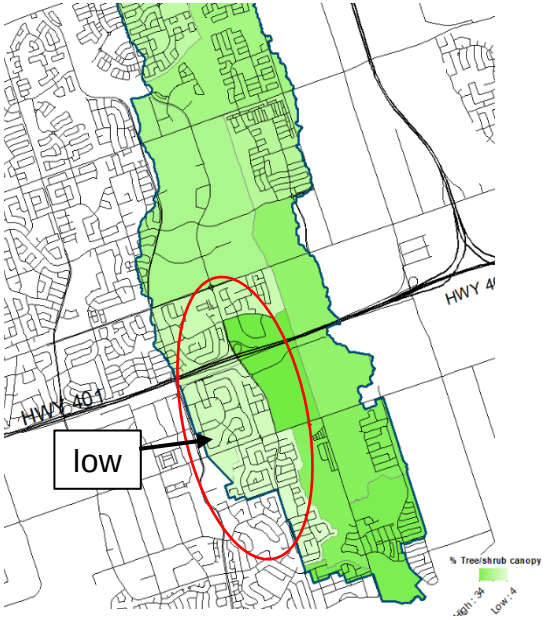
- Not true baseline



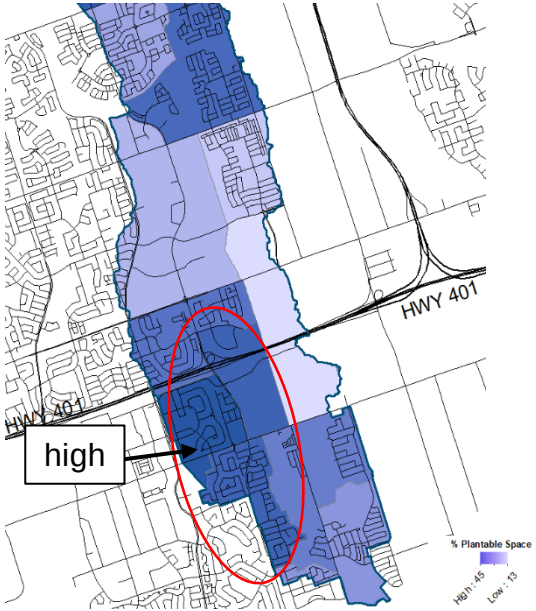
Results: Tree canopy and plantable space by neighbourhood

- Urban area only

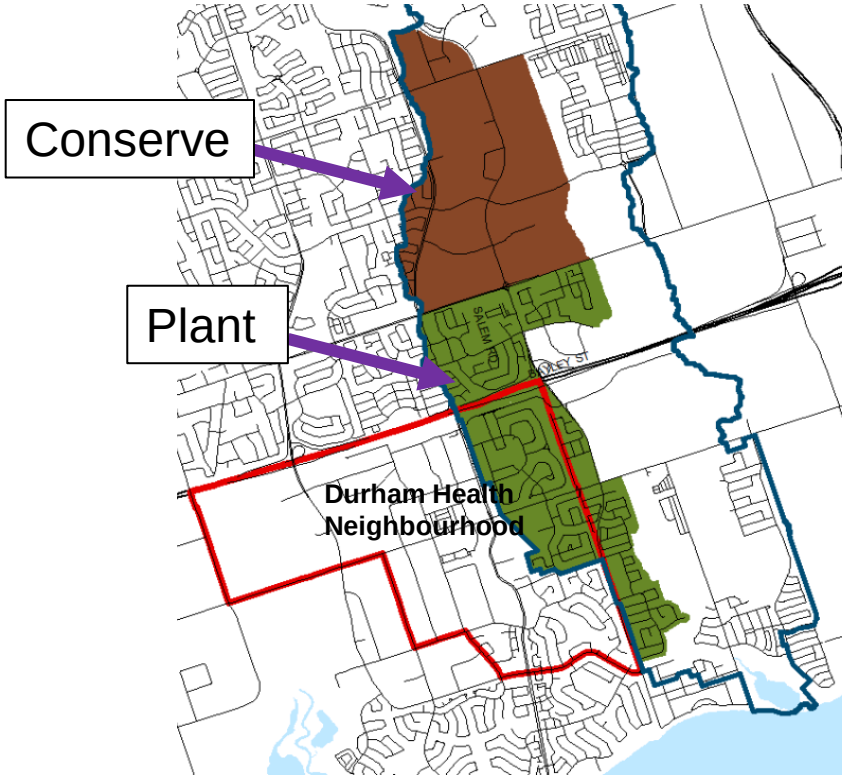
Existing canopy

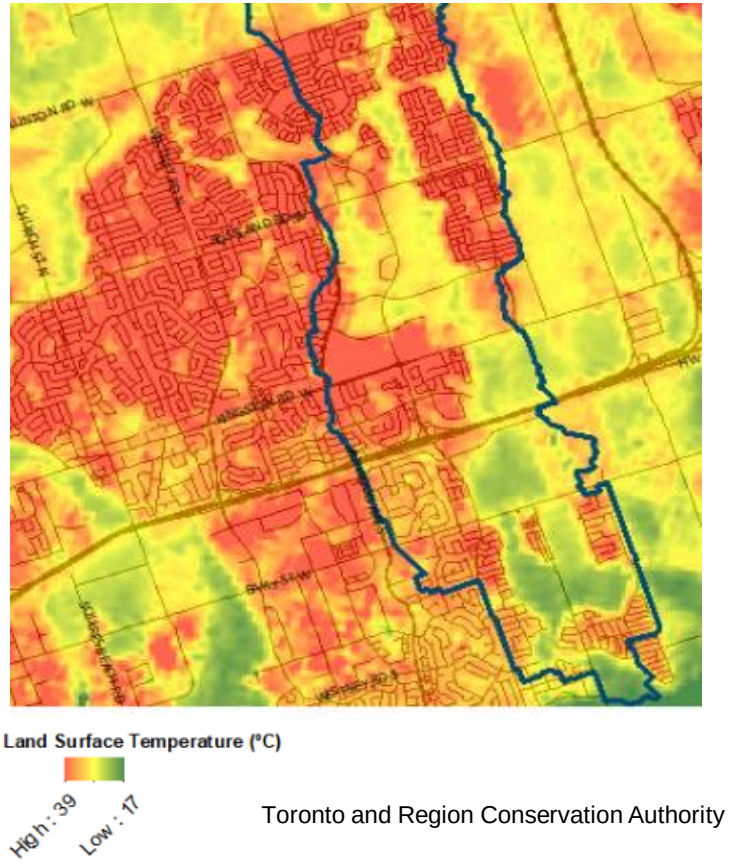


Plantable space



Results: Areas for targeted urban forest enhancement

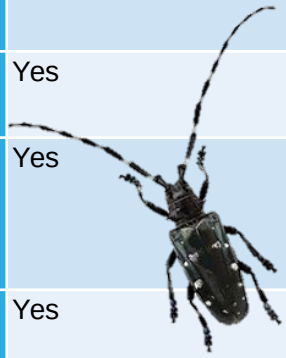




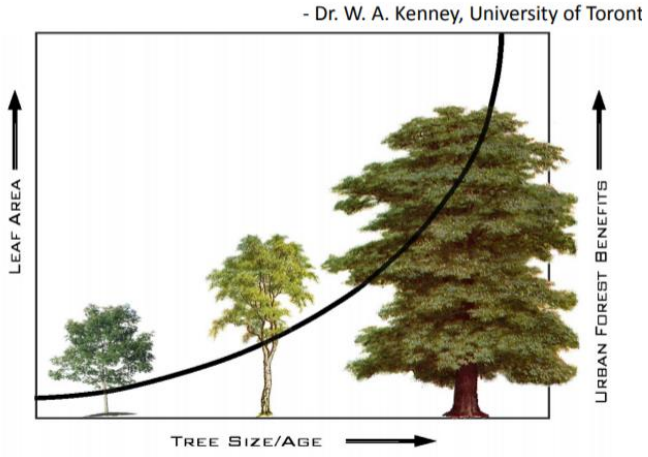
Results: Urban forest species

- 10% of all Town owned trees are Freeman maple (*Acer freemanii*)
- Sugar maple (*Acer saccharum*) forests most common ELC type
- Eastern white cedar (Thuja occidentalis) most common in 2009 urban plots

Pest/disease	Known to be present in Carruthers Creek Watershed	Host and impact
Asian Long-horned Beetle (ALHB)	No, but nearby detection	Multiple hosts including most of the top species. They were last detected in the City of Mississauga and the City of Toronto in 2013 (CFIA, 2019).
Spotted Lanternfly	No, but nearby detection	Many different hosts, and could be of particular threat to fruit trees/vines in the watershed. These insects were detected in Pennsylvania in 2014 (CFIA, 2019).
Hemlock Woolly Adelgid	No, but nearby detection	Hemlocks are one of the most common tree species in the Town of Ajax according to the 2009 Urban Forest Study. This insect was detected in Etobicoke in 2013 (Invasive Species Center, 2018).
Oak Wilt	No, but nearby detection	Fungal pest, infects oaks. Well established in the northern portion of Michigan bordering Ontario.
Emerald Ash Borer (EAB)	Yes	The impact of EAB was very high since its introduction in the early 2000s. EAB will continue to be a threat to natural regenerated ash and those trees being treated, but ash is no longer planted by the main tree planting agencies in the watershed (TRCA, Ajax, Pickering).
Beech bark disease	Yes	Beech would commonly be found in the climax forest type in much of the watershed. Resistance to beech bark disease is very low.
Dutch elm disease (DED)	Yes	This disease decimated the elm population in southern Ontario since its arrival in the 1940s and as such, few elm trees persist on the landscape. New hybrids and varieties of elm are commonly planted urban forest trees and may be at risk to DED in the future, particularly with compounded stressors.
Gypsy moth	Yes	These defoliating insects have been present for over a century. They feed on multiple hosts and can cause damage to many large-growing species. Control measures exist but are costly.



Results: Parks for large trees

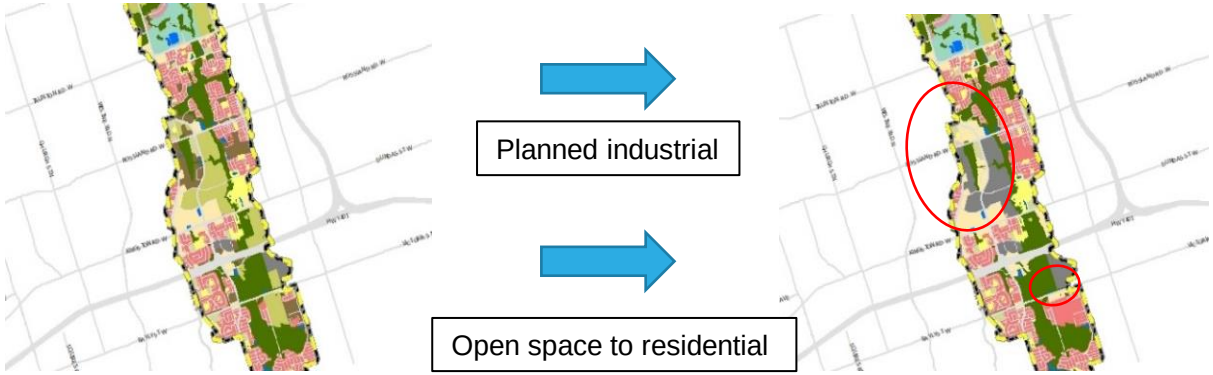


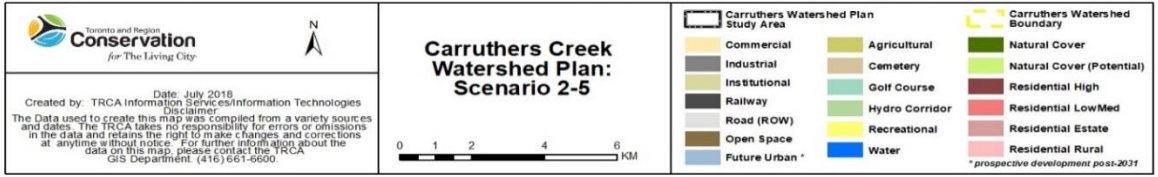
Kenney, van Wassenaer & Satel, 2010

Ajax's Vulnerability Assessment for Natural Capita (Provided by the Town of Ajax)

- Tree/natural area vulnerability model factored in 6 bioclimatic indicators
- Low - moderate vulnerability to urban forests (trees & natural areas) *

Implications of findings: Extrapolation to land use scenarios





Implications of findings: Extrapolation to land use scenarios

Enhanced Natural Heritage System
Increased tree cover and associated ecosystem services. Opportunity to increase diversity by:
1) planting diverse native stock
2) managing for natural regeneration (genetic diversity)

Considerations for future development (planning process):
- Increased demand for ecosystem services
- Soil compaction
- Urban heat island
- Park space
- Utility conflicts
- Land tenure
- Hydrology
- Pollution
- Contract planting of cultivars from the south

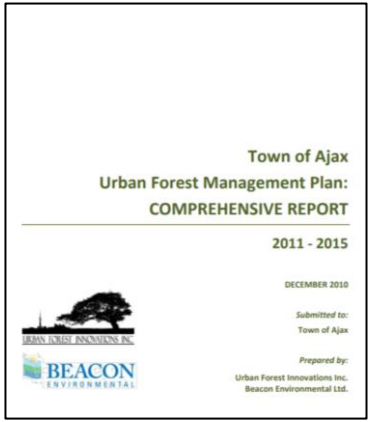
Example of hydrological changes associated with residential development in the watershed impacting tree cover

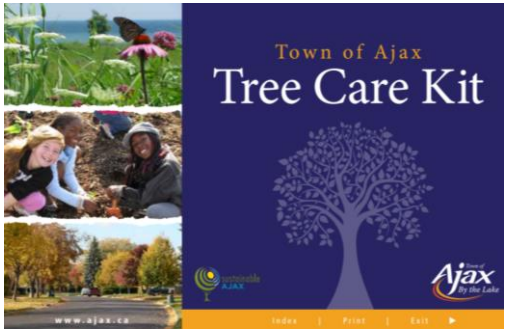
TRCA, 2015

Manion's spiral of tree decline (modified by Mrkva 1993)

Existing efforts

- Bylaws
- Communications
- Education
- Tree planting programs





Recommendations

- With TRCA, establish a regional comprehensive urban forest monitoring program that includes
  - Tree canopy
  - Urban forest structure and composition
  - Vulnerability and risk
- Enhance collaborative effort
  - Support the establishment of a regional forest working group
  - Share pest management work planning

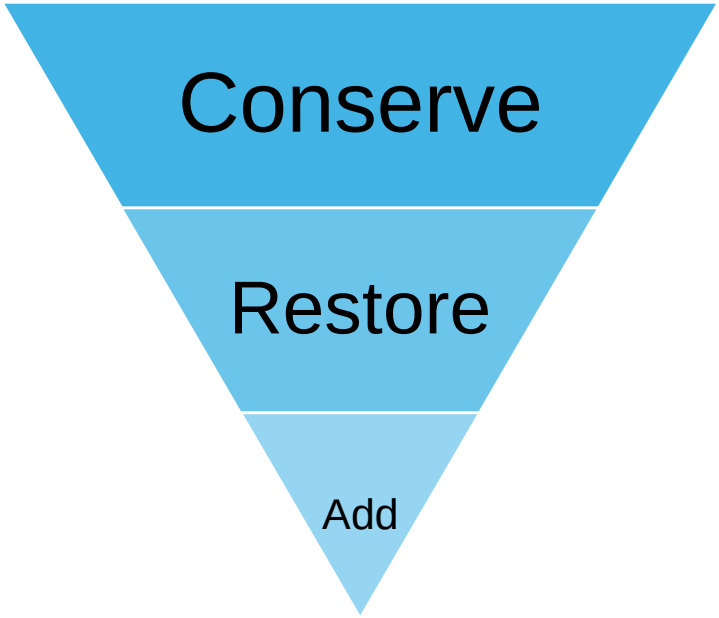
Recommendations

- Invest in green infrastructure
  - Durham should invest in programs already working toward the objectives of Durham's Community Climate Adaptation Plan
  - Expand residential tree planting and education programs
- Conserve trees and soil through development
  - Involve arborists/foresters in site planning
  - Limit the amount of impervious surface
  - Use structured soil cells in new neighbourhoods

Recommendations

- Enhance tree planting on regional lands
  - Create an arborist position
  - Join municipal tech groups
  - Plant/maintain trees along regional roads
- Partake in collective action
  - All municipalities, TRCA and tree nursery industry should plan for resiliency
  - Work with utility companies to limit the impact on the urban forest
- Restore areas identified in the TIA

Tree planting alone is not enough!



Questions/Comments

Toronto and Region Conservation Authority