

Chapter 2

Southern Ontario's Disappearing Forests



Abstract

Healthy trees and forests are essential for healthy communities. Forests filter pollutants from our air, absorb and filter storm water, prevent erosion and mitigate drought. Since European settlement, southern Ontario has lost most of its forest cover to land clearing for agriculture and development – and forests continue to disappear. Today, many watersheds have below the 30% forest cover required to ensure marginally functional ecosystems.

To reverse the loss of forests in southern Ontario, the provincial government must take strategic, targeted and co-ordinated action to protect forest cover, increase tree planting, and help landowners keep healthy forests intact on their land. The government must also continue to support the services provided by the Ontario Tree Seed Plant to ensure biologically and climactically appropriate seed is accessible for tree planting projects in all parts of Ontario.

In addition to protecting and adding to forest cover across southern Ontario, the government must also work with partners to conserve and enhance urban forests (which include street, park and privately owned trees, as well as woodlots, ravines and other natural areas) in our towns and cities. With most of Ontario's population residing in urban areas, urban forests are important for our physical and mental health, and are also crucial in our efforts to adapt to climate change.

Municipalities often have limited funds and capacity to manage the complex needs of their urban forests. They require help from the Ontario government, especially when faced with the high and sudden costs of storm damage, invasive insects, and disease; all of which are becoming more frequent and/or severe due to climate change.



People and wildlife need forests. If we don't share the costs of forests fairly, we'll lose them again.

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2.1 Introduction

Many of us who grew up in southern Ontario knew a forest well. We knew the dirt paths where we could build jumps for our bikes; we knew the trees that were easily climbed; we knew where to find mulberries, woody grape vines to swing on, and mushrooms that sent up clouds of smoky spores when you stepped on them. This forest often backed on to a school or a farm field, and had a creek with steep banks. It might have been the size of a city block, or one backyard. The actual size didn't matter – it always seemed big and wild enough to make us feel as if we had been on an adventure each time we explored it.

These forests are typically remnants of woodlots from former farms, or ravines that snake through towns and cities. They are the “back 40” where the firewood

comes from; the un-farmable valleys, slopes, and swamps. They are the crumbs left behind after the march of settlement that has transformed the most populous area in Canada from a vast stretch of forests, prairies and wetlands to a highly developed agricultural and urban continuum in 200-odd years – and they continue to disappear.

Though Ontario's vast boreal forest north of Lake Superior is part of one of the largest intact forests left in the world, southern Ontario has hardly any forest left, and the little that remains is severely fragmented. Viewed from above, these forest fragments are disparate green patches surrounded by farms or development.



A satellite photo of the landscape near Stratford, Ontario (top left), dotted with small woodlots (some circled in yellow) that are surrounded by farmland.

Photo credit: Google Earth.



In this chapter we explore why we continue to lose forest cover in southern Ontario, what needs to be done to better protect forests, and how to plant more of them. We also discuss the importance of urban forests – the public and private trees in a town or city’s parks, streets and natural spaces – the challenges facing municipalities as they struggle to maintain them, and what the province could do to help.

Healthy trees and forests filter air pollution, retain and filter stormwater, and mitigate the increasingly extreme heat island effect experienced in urban areas.

Healthy trees and forests are essential for healthy communities. They are “green infrastructure” that provides us with essential services: they filter air pollution, retain and filter stormwater, and mitigate the increasingly extreme heat island effect experienced in urban areas. They also improve the physical, emotional, spiritual and mental health of residents. One recent Canadian study of over one million people showed that increased amounts of greenness (trees, vegetation and greenspace) was associated with reduced risks of dying from several common causes of death among urban Canadians.¹ Forests within and outside our urban centres also enhance soil biodiversity, provide habitat for pollinators, help prevent erosion, and mitigate drought.

Over half of the 690 species of conservation concern in Ontario use habitat in southern Ontario forests.² Forests and trees are also indispensable for climate change adaptation. They cushion the effects of warming temperatures and changing precipitation patterns by retaining moisture, filtering increased stormwater, cooling the area around them, and providing refuge for species stressed by the rapidly changing climactic conditions.

2.2 Forest loss in southern Ontario

Southern Ontario is made up of 85,000 km² of land stretching from the Quebec border near Ottawa southwest to Windsor, and north from the shores of Lake Erie and Lake Ontario to the top of Lake Simcoe. Before European settlement, the landscape of southern Ontario was almost continually forested. But today, southern Ontario as a whole has only about 25% forest cover, which is less than the minimum needed to support healthy wildlife and ecosystems (see Figure 1).³ Forest cover significantly drops off toward southwestern Ontario, which has only 12.1% forest cover.

Southern Ontario as a whole has only about 25% forest cover, which is less than the minimum needed to support healthy wildlife and ecosystems.

Forest Habitat

30%

FOREST COVER

Minimum forest cover threshold. High-risk approach that may only support less than one half of the potential species richness, and marginally healthy aquatic systems.

40%

FOREST COVER

Minimum-risk approach that is likely to support more than one half of the potential species richness, and moderately healthy aquatic systems.

50%

FOREST COVER

Low-risk approach that is likely to support most of the potential species and healthy aquatic systems.

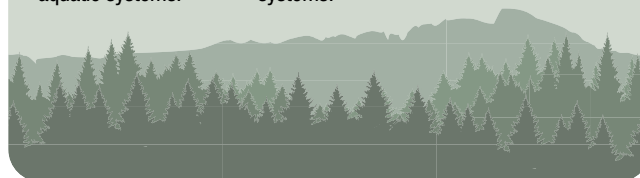


Figure 1. Forest cover thresholds and corresponding consequences for biodiversity and aquatic systems within a watershed, according to Environment Canada.

Source: Environment and Climate Change Canada.

The amount of remaining forest cover varies across southern Ontario. On a map generated from satellite imagery, remaining forest is rendered as splotches of green dotting a sea of urbanization and agriculture (see Figure 2).



Figure 2. Forest cover in southern Ontario and parts of central Ontario. Forest cover is shown in dark green.

Source: Land Information Ontario data mapped by the ECO.

Devastating forest loss occurred when settlers cleared land for farms and communities beginning in the mid-1800s and continuing throughout the following century, and southern Ontario is still losing forest cover today. Data from the Ministry of Natural Resources and Forestry (MNR) shows total forest loss in southern Ontario has increased slightly, from 3,324 hectares in 2000-2005 to 3,786 hectares in 2006-2011. Deforestation from agriculture and development in this region was 631 hectares per year, on average, according to the ministry.

Forest loss in southern Ontario often happens bit by bit. We're not necessarily bulldozing entire woodlands, but we are allowing other land uses to fragment them and chip away at their edges. With so little forest cover remaining on the landscape, each incremental loss has big impacts on the services these forests provide to society and the wildlife they support.

When a road bisects a swath of forest, not only does the road directly displace forested area, it also creates new forest edges, which can have negative

impacts on interior forest-dwelling species. For every tree directly displaced by that road, several more are impacted by soil compaction, air pollution from exhaust, road salt, and increased exposure to wind and sun, stressing them and leaving them less vigorous (i.e., smaller and with less leaf area), which means they will provide smaller benefits (e.g., lower transpiration levels, less carbon storage, less water and air filtration). For communities with little forest cover, every small patch of forest counts as a defense against erosion, stormwater run-off, air and water pollution, greenhouse gas emissions, noise and heat. A mature, diverse forest provides functions and services (seed sources, pollen, healthy soils for regeneration, greater biodiversity) that new plantations won't be able to provide for decades.

Many of Ontario's conservation authorities report on the forest condition in their watersheds. The most recent reports from 2018 show that more than half of the watersheds assessed had 25% or less forest cover, and more than one-third had 15% or less (see Figure 3).

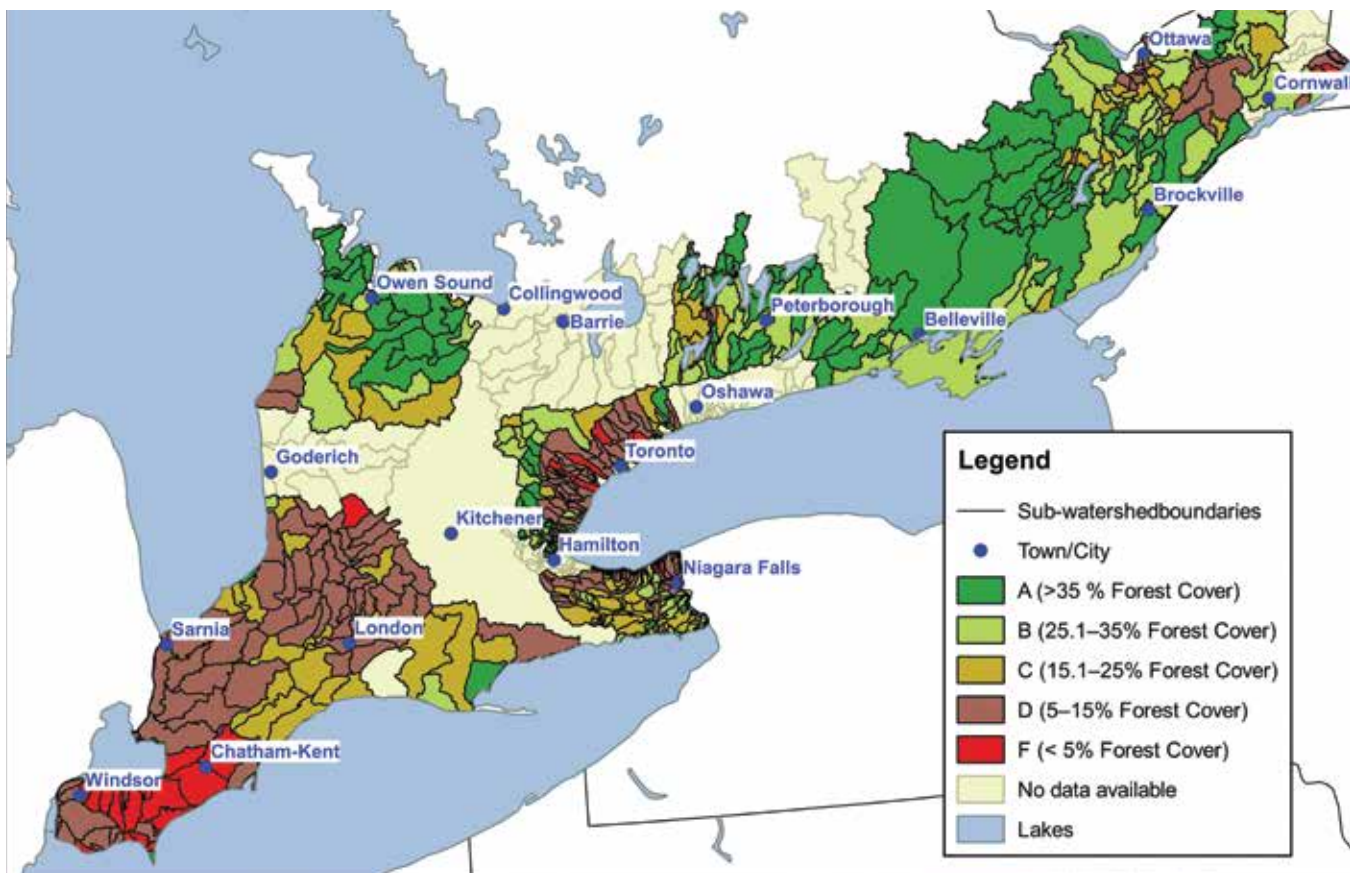


Figure 3. Percent forest cover in the watersheds of southern Ontario, 2018. Colour-coded by percent forest cover grade.

Source: Conservation Ontario data compiled and mapped by the ECO.

Some parts of southwestern Ontario, such as areas around Windsor and Chatham Kent, have less than 10% forest cover. At 30% forest cover, aquatic systems are only marginally healthy, and at anything lower, they are in dire straits.

The vast majority of land in southern Ontario is privately owned, making it vulnerable to clearing for development and agriculture. Some conservation authorities and rural municipalities, including the South Nation Conservation Authority in eastern Ontario, the Upper Thames River Conservation Authority, the County of Middlesex, the County of Perth, Haldimand County, and Grey Sauble Conservation Authority, have determined agriculture is the biggest threat to forest cover on land within their jurisdictions. In more populous areas, development is the

greatest threat to forests, as reported by Halton Region, York Region, the Nottawasaga Valley Conservation Authority (south of Barrie), and the City of London.

Forest loss in southwestern Ontario

The Upper Thames River Watershed, which encompasses the City of London, is losing forest to both agriculture and development. The watershed area lost 8 km² of forest cover between 2000 and 2010.⁴ During those ten years, just over three km² of new forest was planted. The Upper Thames River Conservation Authority determined that 45% of the forest lost was displaced by agriculture, while urban development was responsible for 35% of the forest loss (see Figures 4 and 5).

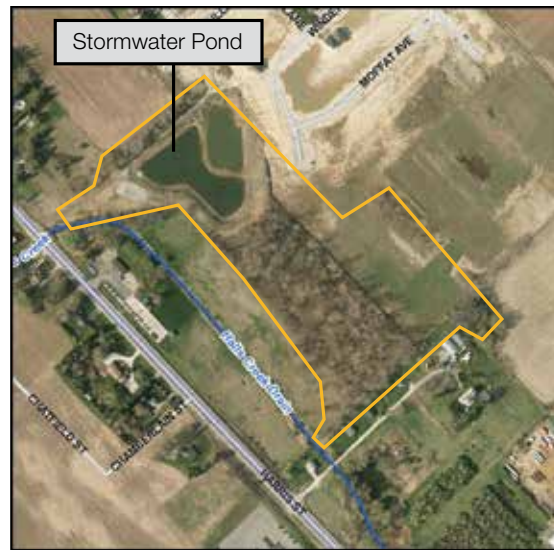


Figure 4. Aerial photos showing incremental woodland loss (red hatching and circle) in Oxford County, Ontario, to agriculture.

Photo Credit: Upper Thames River Conservation Authority, February 2018. 2000 imagery copyright © Upper Thames River Conservation Authority, 2018. 2006 imagery copyright © First Base Solutions Inc, 2018. 2010 and 2015 imagery copyright © Queen's Printer of Ontario, 2018. Used with permission.



2000



2010

Figure 5. Aerial photos showing woodland loss in Oxford County, Ontario, to a subdivision.

Photo Credit: Upper Thames River Conservation Authority, February 2018. 2000 imagery copyright © Upper Thames River Conservation Authority, 2018. Used with permission.

Forest loss in southeastern Ontario

The South Nation Conservation Authority's watershed covers land from south of the Ottawa River to the St. Lawrence River, between Brockville and Cornwall. It lost 53 km² of forest cover between 2008 and 2014 – a 4.1% decline in just six years.⁵

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Forest loss in southcentral Ontario

Halton and York regions, as well as the Toronto and Region Conservation Authority, the City of London and the Nottawasaga Valley Conservation Authority (south of Barrie) identify development as the biggest threat to forest cover in their regions. Forest loss to development often happens one project at a time (see Figure 6 below).



Figure 6. A road and bordering backyards in a new subdivision encroach on existing woodlands in a municipality in York Region. Deforestation is circled in red on the 2015 image.

Photo Credit: The Regional Municipality of York. 2012 imagery copyright © First Base Solutions Inc. 2015 imagery copyright © First Base Solutions Inc. Used with permission.

2.2.1 Why we keep losing forests: inadequate legal protection from agriculture and development

We continue to clear forests for development and agriculture across southern Ontario. Both provincial and municipal policies for protecting woodlands from destruction or encroachment are weak. Forest conservation by-laws enacted by some municipalities across southern Ontario can help protect woodlands on private property, but the types of harvest many by-laws allow are detrimental to long-term forest health. Overall, the good intentions behind provincial and municipal policies for protecting forests have yet to be realized.

Ontario's land use planning rules do not prohibit clearing forests

The Provincial Policy Statement, 2014 (PPS) sets out the general rules for land use planning in southern Ontario. Municipalities then apply these rules in their respective official plans, which must be consistent with the PPS. The PPS prohibits development or site alteration in "significant woodlands" (identified and designated by municipalities) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions. However, the PPS definition of "development" is limited: subdivisions and commercial buildings are included, for example, but roads, sewage or septage treatment and electricity transmission corridors are not.

Some woodlands are ostensibly cleared for agricultural uses, but then the landowner subdivides or develops the property shortly after, free from the constraints that would have applied if the woodland were still present.

The PPS does not prevent landowners from clearing or encroaching on any woodland for agricultural activity, such as expanding cropland. Indeed, the PPS directs that nothing in its natural heritage policies is "intended to limit agricultural uses to continue." Landowners sometimes abuse this allowance. Some woodlands are ostensibly cleared for agricultural uses, but then the landowner subdivides or develops the property shortly after, free from the constraints that would have applied to the development process if the woodland were still present. (For more information, see section 4.1.2 of our 2010/11 Environmental Protection Report.)



Public uses the EBR to ask for woodland protection from agricultural practices

In June 2017, members of the public submitted applications under the Environmental Bill of Rights asking the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the Ministry of Municipal Affairs (MMA) to review the need for a new act or regulation to prevent the cutting and burning of woodlots for agricultural uses in municipalities with less than 30% tree cover. The applicants noted that Environment and Climate Change Canada recommends a minimum 30% threshold of tree coverage. They pointed to their municipality within the South Nation watershed as an example, which they say has 28.1% tree cover and is losing trees at a high rate due to an increase in soybean farming.

The applicants asserted that the loss of tree cover is contributing to increased soil erosion due to wind and run-off, reducing local water quality. They also stated that the loss of tree cover drives the

loss of biodiversity. The applicants stated that their municipality does little to regulate the impact of agriculture on woodlots, having an ineffective outdoor burning by-law and no forest conservation by-law at all. The applicants also noted that the OMAFRA's best management practices for woodlots are only voluntary and are not being applied.

Both ministries denied the application, citing a number of provincial laws, policies and programs that the ministries already have that generally relate to woodlot conservation. The ECO does not believe that the ministries' decisions to deny these applications were justifiable. Although there are indeed, as noted by both ministries, a number of laws, policies and programs intended to protect woodlots, the continuing loss of tree cover due in part to agriculture supports the applicants' assertion that the existing regulatory framework is not sufficient. (For more information on this application, see Chapter 2 in Volume 1 of this report).

Forest protection depends on municipal governments designating significant woodlands in official plans

While the PPS does not protect woodlands from clearing for agriculture, it does direct that woodlands designated as "significant woodlands" be protected from development unless the development will have no negative impact on their ecological functions. However, a woodland is not afforded these protections until the municipality has evaluated it for significance and designated it in their official plan. For example, Haldimand County, Elgin County, and the Counties of Lennox and Addington have yet to designate any significant woodlands in their official plans. If a woodland is not identified and designated as significant, it is not protected by the PPS.

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The MNRF has established criteria for evaluating woodlands for significance, which includes ecological functions, uncommon characteristics, and economic and social functions. If overall forest cover is low across the municipality, the ministry guidelines recommend that even small woodlands be considered significant, but if overall forest cover is higher, the size threshold for significance is also higher.

Many upper-tier municipalities (regions, counties or large cities) can encompass hundreds of square kilometres, and forest cover can be unevenly distributed across their planning areas. Overall, percent forest cover may be relatively high, but the forests could be clustered in only one part of the municipality. For example, in the municipalities surrounding Toronto, the urban areas along Lake Ontario have very little forest cover. However, the northern parts of some of these municipalities, which often include parts of the Greenbelt, Oak Ridges Moraine or Niagara Escarpment, frequently have much more. Identifying woodlands as significant at a higher size threshold might make sense in the treed northern parts of the municipalities, but smaller size thresholds are needed in the less-treed parts to ensure the little forest cover that's left is protected.

According to the MNRF's Natural Heritage Reference Manual, the determination of woodland size should be determined on a municipal (or watershed) boundary. However, the manual also states that forest cover can vary within these areas where there are differences in landscape-level physiography (e.g. moraines, clay plains). For example, Halton Region, which encompasses the municipalities of Oakville, Burlington and Milton, took a novel approach to setting forest cover targets. The vast majority of its forest is located on the Niagara Escarpment, while land off the escarpment is significantly less forested. Thus, the region varied the official plan definition of "significant woodland" for woodlands in "urban areas" below the escarpment and above the escarpment. In an urban area, woodlands two hectares (ha) and larger are significant; outside an urban area but below the escarpment, woodlands four ha and larger are significant, and above the escarpment, woodlands outside urban areas ten ha or larger are significant.



The Six Nations of the Grand River has about 50% forest cover, significantly more than the surrounding area. Home to the Mohawk, Cayuga, Onondaga, Oneida, Seneca and Tuscarora Nations, it is the largest block of Carolinian forest left in Canada.

Photo credit: Bing Maps. Microsoft product screen shot reprinted with permission from Microsoft Corporation.

Forest conservation by-laws should prohibit unsustainable harvesting

Landowners with forest on their property own the trees just like they own the roof on their house. As long as their forest has not been designated a significant woodland in their municipality's official plan, landowners may remove or reduce the size of their forest as they wish, unless there is a municipal by-law that regulates the cutting of trees within a woodland. Such by-laws are commonly referred to as "forest conservation by-laws." Since most forests in southern Ontario are located on private land, the establishment and enforcement of forest conservation by-laws is a crucial check on forest cover loss (along with programs that incent woodland retention, discussed later in this chapter). However, there is no provincial requirement for municipalities to enact these by-laws.

Most forest conservation by-laws allow landowners to take a limited number of trees from their woodlands for personal use (like firewood or fence-rails) without requiring a permit. Landowners are also typically required to obtain a permit to cut trees for purposes other than personal use. Forest conservation does not necessarily mean complete preservation from use, it means careful, responsible and sustainable stewardship of forests by landowners, which well-written and enforced by-laws can support.

At the time of writing, 26 upper- and single-tier municipalities in southern Ontario had tree cutting by-laws to prevent forest loss, and 14 did not. Essex County and the Municipality of Chatham-Kent, both located in southwestern Ontario where overall forest cover is only 10%, are among those that don't have by-laws, as is the County of Renfrew, which has more forest cover but also more forestry activity.

The establishment and enforcement of forest conservation by-laws is a crucial check on forest cover loss. However, there is no provincial requirement for municipalities to enact these by-laws.

The requirements for obtaining a tree-cutting permit vary from municipality to municipality, and they can have a significant impact on the health of forests. Many forest conservation by-laws require logging to be carried out using "good forestry practices," which means using harvesting, planting, tending and other maintenance methods and actions that are sustainable, responsible and appropriate to the forest; it also means minimizing negative impacts on the ecosystem, habitat, soil, water, and general forest health. However, 17 southern Ontario municipalities allow what is known as "diameter limit cutting" (also called "high-grading"), where only trees with trunks over a certain diameter are logged. This type of harvest jeopardizes the health and viability of the woodland by removing the genetically best trees and leaving the weaker trees behind. It also decreases the forest's resilience to disturbance from weather, climate, insects (especially invasive insects) and disease. The MNRF's Guide to Silviculture in Southern Ontario notes that diameter-limit cutting is "not a recognized silvicultural system in Ontario." Municipalities should not permit this practice. Municipalities should also consider requiring longer-term forest management plans as part of their permit application process.



In a southern Ontario hardwood forest, diverse stands of trees with different sizes and ages are optimal for timber quality, biodiversity and overall forest health.

Photo Credit: Dan Bowes/MNRF.

2.2.2 Strengthen provincial policy and protections for forests

There is an opportunity for the provincial government to work with municipalities to tackle the problem of forest cover loss in southern Ontario. The groundwork for a strategic attack on the causes of forest cover loss is in place: the planning system provides some protections for significant woodlands, and forest conservation by-laws can help conserve all forests. These tools should now be wielded together in a co-ordinated effort to protect our remaining forest cover.

To this end, the ECO recommends the province require a goal of net forest cover gain for every upper-tier southern Ontario municipality.

To achieve this, the province should:

1. require all southern Ontario municipalities to evaluate woodlands in their jurisdictions for significance, and designate significant woodlands in their official plans,
2. amend the PPS to achieve a better balance between the protection of significant woodlands and agricultural uses, and
3. require all southern Ontario municipalities to implement forest conservation by-laws, and prohibit diameter-limit cutting within forest conservation by-law frameworks.

2.3 Growing back the forest: the need for provincial support for afforestation and forest stewardship on private land

Imagine towering white pines, gnarled old oaks, dense bush and verdant wetlands stretching across southern Ontario, right to the shores of Lake Ontario. Vast forests covered most of the province before European settlement. But in the early 19th century, extensive logging began in southern Ontario to make way for farms and towns. Even then, the Ontario government knew it had a deforestation problem. The clearing of vast areas for agriculture resulted in erosion and flooding, and large parts of the Oak Ridges Moraine became virtual dustbowls.

In the early 19th century, extensive logging began in southern Ontario to make way for farms and towns. Even then, the Ontario government knew it had a deforestation problem.

Beginning in 1871, the Ontario government used legislation and programs (see timeline below) to afforest^a denuded lands by:

- acquiring unused property
- finding and storing native seed and growing seedlings for planting
- giving away seedlings to landowners or selling them at subsidized prices, and
- providing planting and tending services to landowners.

a. Afforestation is planting trees with the intention of creating a forest on lands not recently forested. Reforestation is planting trees on lands recently cleared of forest (e.g., tree planting after a clear-cut).



Timeline of southern Ontario forest laws and programs

1871

Ontario passes its first law to encourage tree-planting: “An Act to encourage the planting of trees upon the highways in this Province, and to give a right of property in such trees to the owners of the soil adjacent to such highways.”

1883

Ontario passes The Ontario Tree Planting Act, 1883, replacing the 1871 law and directing the provincial government to pay landowners up to 25 cents per tree planted along public highways and farm property lines. This law resulted in 75,000 new trees planted in 9 years.

1905-1908

Edmund J. Zavitz, the “father of afforestation” in Ontario, identified 8,500 square miles of wastelands in southern and central Ontario not fit for agriculture but suitable for trees, leading to the establishment of provincial forestry stations and provincial tree nurseries in those areas. **Free distribution of trees from provincial nurseries to landowners begins.**

1911

Ontario passes The Counties Reforestation Act, enabling counties to pass by-laws for purchasing or leasing lands suitable for afforestation purposes.

1921

Ontario passes The Reforestation Act, 1921, laying the groundwork for the province to establish and maintain “agreement forests” on county (municipal) lands. By 1940, 12 counties were participating. **The Agreement Forest Program** changed the landscape of southern Ontario over the next 76 years; the program presided over the reforestation of 128,853 ha of land, and resulted in the planting of 147 million trees before it was terminated in 1998.

1923

Ontario Tree Seed Plant opens

1946

Ontario passes the **Conservation Authorities Act 1946**, establishing conservation authorities, who would take on reforestation and stewardship programs aimed at private landowners. By 2001, conservation authorities had planted 30 million trees on private lands through various landowner planting programs. In 1946, Ontario also passed the Trees Conservation Act, enabling legislation which would allow municipalities to pass by-laws to control the cutting of trees.

1960

Ontario passes the Forestry Act, 1960, authorizing provincial nurseries to provide tree seedlings to landowners for free.

1966

Ontario passes the **Woodlands Improvement Act**, allowing the provincial government to enter into Woodland Improvement Agreements with private landowners to help them with afforestation and stand improvement. At the program's peak in the early 1980s, over 10,000 properties were enrolled, and over 213 million trees were planted on private land over the duration of the program.

1980

Ontario passes the Forestry Act, 1980, replacing the Forestry Act, 1960, and enabling provincial nurseries to sell seedlings to landowners at a greatly reduced price – this was the beginning of the modern Over-the-Counter (OTC) Nursery Stock Program. Between 1905 and 1996, when OTC was discontinued, provincial nurseries had furnished landowners with 792 million trees for afforestation.

1992

Trees Ontario – a division of the Ontario Forestry Association (funded by the MNRF and now called Forests Ontario) – initiates **Project Tree Cover** with funding from a federal tree planting program called the Green Plan. The program was created to help offset global warming. The MNRF provided trees from its nurseries at a subsidized price as well as technical support, and Trees Ontario coordinated and managed all aspects of the program. Program was terminated in 1997, having planted 6.4 million trees with 700 landowners.

1993

Ontario begins to phase-out **Woodland Improvement Agreement Program** and cancels tax relief program on enrolled properties.

1996

Ontario repeals the Woodlands Improvement Act. The MNRF begins closing down provincial tree nurseries, and terminates **over-the-counter tree seedling sales**.

The MNRF forms a series of local Ontario Stewardship Councils, each with a paid co-ordinator. Local councils are composed of community members that represent a broad spectrum of landowners. Many councils developed small tree planting programs, but were stymied by the closure of provincial tree nurseries and the resulting lack of long-term access to tree seedlings at reasonable prices and with the correct seed source.

1997

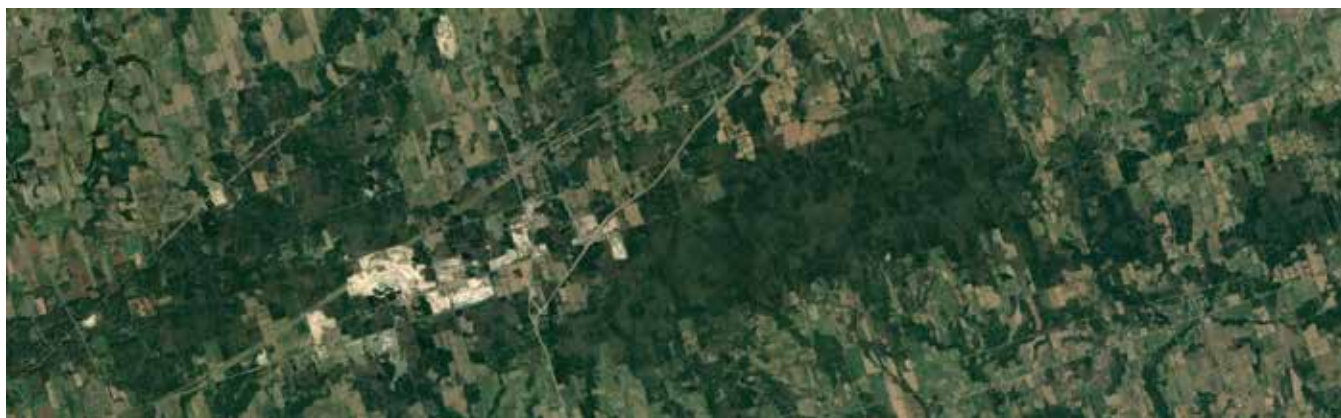
Ontario ends **Project Tree Cover**. Ontario introduces the Managed Forest Tax Incentive Program, giving eligible landowners the opportunity to pay 25% of the municipal residential tax rate on enrolled portions of their property.

1998

Ontario closes the last provincial tree nursery in southern Ontario (St. Williams) and ends the **Agreement Forests Program**.

2007

Ontario establishes the 50 Million Tree Program. The MNRF funds the program, and Forests Ontario delivers the program through planting agents including conservation authorities. As of 2016, 22 million trees had been planted.



Satellite image of Durham East Cross Forest and Ganaraska Forest. A satellite image of Durham East Cross Forest Conservation Area (dark green area at left), and part of the Ganaraska Forest (at right), bisected by aggregate pits (white patches in centre).. Both the Durham and Ganaraska Forests were among the first to be planted through the Agreement Forests Program run and funded by the Ontario Government from 1921 to 1998.

Photo credit: Google Maps.

In recent decades, the Ministry of Natural Resources and Forestry has stopped supporting programs to help plant and take care of southern Ontario forests on private or public land. Since the early 1990s, the ministry has cancelled the Agreement Forests Program, closed provincial tree nurseries, stopped subsidized seedling sales to landowners, and reduced support to regional stewardship councils. In fall 2017, the ministry announced it would close the Ontario Tree Seed Plant – in operation since 1923 and the last remnant of what was once a robust afforestation program, with no plan in place for assuring the continuity of seed storage and seed source tracking. In July 2018, the new provincial government stated it would review this decision.

One MNRF-funded tree planting program (50 Million Trees, delivered by Forests Ontario) and one tax incentive program for landowners with forested properties (the Managed Forest Tax Incentive Program) are all that remains of Ontario's once-robust suite of afforestation and forest stewardship programs for southern Ontario forests on private land.

The MNRF's disengagement has played out at the same time that incentives and costs of farming in southern Ontario have been changing. Increasingly, farm fields are rented out, and there are less farmer-occupied on-farm residences, which may decrease landowner interest in and reasons for retaining and tending on-farm woodlots (e.g., firewood). The MNRF's decisions to close its nurseries and end its woodland improvement and subsidized seedling programs also

The MNRF's decisions to close its nurseries and end its woodland improvement and subsidized seedling programs also roughly coincided with increases in total acreage, yield and farm value for crops such as corn, making farming more attractive at the same time that tree-planting became more expensive.

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As recently as the 1980s, the MNRF routinely sold over 20 million seedlings to landowners each year.⁷ Now, the provincially-funded 50 Million Tree Program struggles to find enough landowners to plant 3 million seedlings a year – but it's not for lack of land. An MNRF study from 2002 determined that there was an estimated 10,000 km² of non-farm land suitable for afforestation in southern Ontario.⁸ A 2007 MNRF study determined that there was almost 3,000 km² of private land that landowners would be willing to afforest if they didn't have to pay the planting costs. That figure increased to 3,800 km² if the landowners were also paid an additional incentive of \$25 per hectare per year.⁹

The biggest barrier to more successful afforestation is that private landowners today have little economic incentive to plant or keep forests on their land.

Forests are a public good, and individuals who provide and maintain that public good should be compensated for doing so.

2.3.1 How the government can increase afforestation and forest retention on private land

The biggest barrier to more successful afforestation is that private landowners today have little economic incentive to plant or keep forests on their land. This has been a known problem for years. In 2001, the MNRF conducted a review of seedling production in Ontario for afforestation that recommended that the ministry subsidize afforestation stock and planting operations, and develop a policy on private land forestry and afforestation.¹⁰ To date, the ministry has done neither. It should do both, and more.

Compensating farmers and other landowners for maintaining forests on their property is good public policy. Land is expensive in southern Ontario, and many landowners want to maximize financial gain from its value. There is in most cases little to no financial benefit to the landowner for planting trees, but there is an immense environmental and health benefit to all Ontarians. Forests filter our air and water (see Figure 7), mitigate rising air temperatures through shading and transpiration, sequester carbon, and provide habitat for countless species. Forests are a public good, and individuals who provide and maintain that public good should be compensated for doing so.

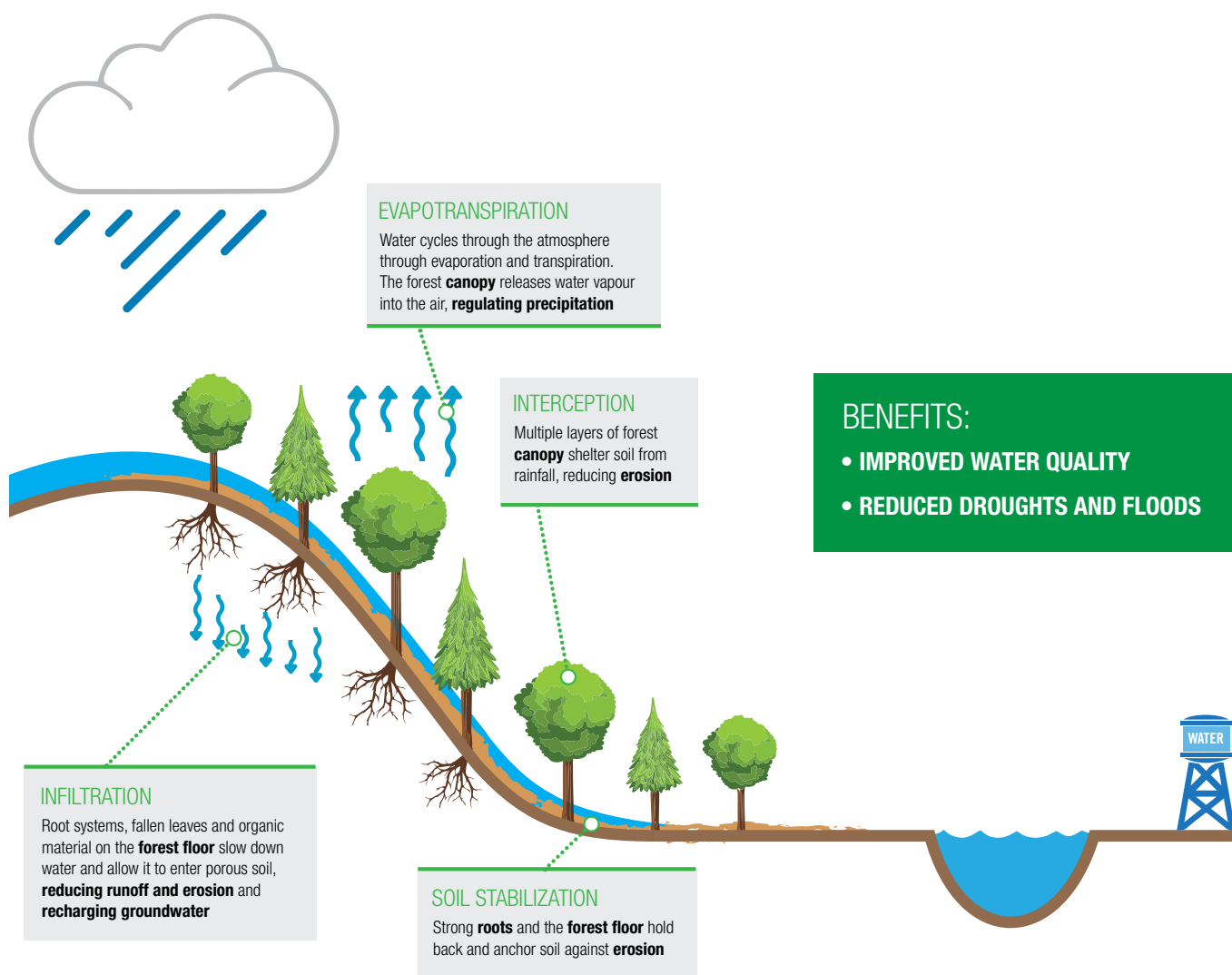


Figure 7. Trees and forests reduce erosion and runoff, and recharge groundwater.

Source: Adapted from the World Resources Institute.

Make afforestation less expensive for landowners

The 50 Million Trees Program, established in 2007 and funded by the MNRF, enables landowners with at least 2.5 acres of land who are willing to sign a 15-year contract to have their land afforested at a reduced cost – but that cost is still substantially higher than what the MNRF used to offer through now defunct programs. In 1986, afforesting 10 acres cost eligible landowners just \$340 (adjusted to 2018 dollars); today, it would cost almost four times as much.¹¹

Table 1. Current and past government-funded afforestation programs for private landowners. The table sets out the total cost to landowners of planting 4 ha/10 acres (8,000 trees), which is the minimum forest area required to qualify for the Managed Forest Tax Incentive Program. Costs adjusted to 2018 dollars; 2000 seedlings are planted per hectare (ha).

	Year	Government-funded program	Seedling cost (payable by landowner)	Planting cost (payable by landowner)	Total cost to plant 4 ha (8,000 trees)
SEEDLING PRICES (no restrictions on use, landowner plants)	1986	MNR Over-the-counter seedling sales (no restrictions – terminated in 1996)	\$0.04/seedling + \$20.50	\$0.5/seedling	\$4,340.50
	2018	Conservation Authority seedling sales (no restrictions)	\$0.5/seedling	\$0.5/seedling	\$8,000
FULL SERVICE AFFORESTATION PROGRAMS (planting provided or costs covered, restrictions apply)	1986	Full service planting: MNR Woodland Improvement Agreement Program (minimum 5 acres, signed agreement to keep land in forestry for 15 years, and to follow MNR work plan – terminated in 1996)	\$0.04/seedling + \$20.50	0 (fully covered by government)	\$340.50
	2018	Full service planting: 50 Million Tree Program (minimum 2.5 acres, signed agreement to keep land in forestry for 15 years)	\$0.15/seedling	0 (fully covered by government)	\$1,200

When the 50 Million Tree Program reaches its goal in 2025, participants will have planted 250 km². To restore forest cover to 30% in southern Ontario, the minimum amount needed for functioning ecological systems, we need to afforest 6,800 km².

Increasing the seedling and planting subsidies for landowners could have big impacts, and would spread the costs more equally between the landowners and all Ontarians, who benefit from the trees being planted.

If the government paid \$0.5/seedling in planting costs to afforest 3,000 km² of private land (the extent of land area the 2007 MNRF study reported available for afforestation if planting costs were covered by the government), the

total annual cost of a 25-year planting program would be \$12 million. According to the government's public accounts, the MNRF contributed approximately \$4.9 million to "Southern Ontario Private Land Afforestation and Urban Tree Planting Delivery Partners" in 2016-2017. For a little more than double that annual amount, 10 times the amount of land set to be planted through the current 50 Million Tree Program could be afforested in 25 years.

However, supporting a time-limited tree-planting program is just the beginning of what is necessary for successful afforestation. Protecting and enhancing forest cover on private land in southern Ontario will require ongoing provincial support of tree planting, seed collection, landowner liaison, seedling development and plantation maintenance programs. Putting trees in the ground is just the first step.

Improve and expand the Managed Forest Tax Incentive Program

The sole incentive program that the government currently offers for retaining and sustainably managing forest on private land is the voluntary Managed Forest Tax Incentive Program (MFTIP). MFTIP is a good program that helps protect forests on private land throughout Ontario by giving enrolled landowners a 75% property tax break on eligible forested lands that they manage responsibly and according to a plan approved by the MNRF. To participate in MFTIP, landowners must have at least four ha (about ten acres) of forest, submit reports every five years, and update their plan every ten years.

The government incents agricultural activity on private land with a tax reduction equal to what's offered by MFTIP. Landowners who opt to use their land for agricultural operations also receive a 75% property tax break through the Farm Property Tax Rate Program, plus they can presumably make money from crops or livestock. Also, municipalities can lower the tax rate for farm tax program participants even further, while the MFTIP rate is fixed.

The Ontario Biodiversity Council tracks enrollment in MFTIP as an indicator of the state of Ontario's biodiversity. Enrollment of participants and land area has fluctuated since the program's inception. While overall, participant enrollment has increased, total land area in the program has remained rather flat (see Figure 8).

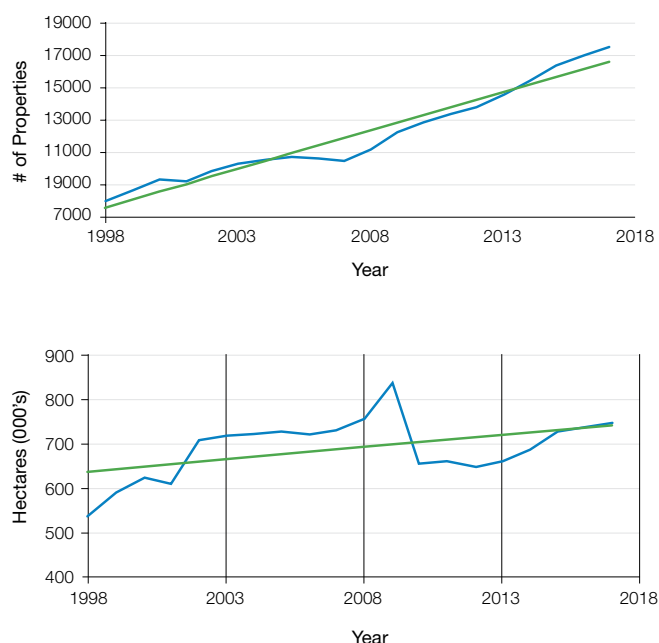


Figure 8. Participation levels in the Managed Forest Tax Incentive Program by number of hectares and number of individual properties enrolled. The large decrease between 2009 and 2010 is mostly the result of a few very large parcels of land in northern Ontario changing hands.

Source: MNRF.

MFTIP could help conserve more forest cover if the eligibility criteria were widened and landowners received a bigger tax break. Specifically, MFTIP's criteria should be changed to enable landowners who planted land through the 50 Million Tree Program to enroll. Through 50 Million Trees, landowners can plant plots of land as small as 2.5 acres, but the MFTIP program is restricted to landowners with forests greater than 10 acres. Landowners with less than 10 acres of trees (the most

Landowners with less than 10 acres of trees don't qualify for MFTIP, but if they used the land to plant a few acres with crops like grain corn, canola or soybeans, they could generate thousands of dollars in gross revenue every year.

common situation for participants in the 50 Million Tree Program) don't qualify for MFTIP, but if they used the land to plant a few acres with crops like grain corn, canola or soybeans, they could generate thousands of dollars in gross revenue every year on top of the farm property tax break.

As a result, there is no financial incentive for landowners with smaller plots of trees to keep those trees on the land beyond the program's required 15 years; and if the land changes hands at any time, the new landowner has no financial incentive to retain the plantation (the agreement is not tied to title).

Before a landowner can participate in a program like 50 Million Trees or MFTIP, they have to know about it.

Landowners who steward southern Ontario forests provide an immense benefit to the entire province. They deserve to be rewarded for the work they do. MFTIP participants should receive 100% tax relief for their forested land, the same tax relief given to landowners who are enrolled in the Conservation Land Tax Incentive Program (CLTIP) aimed at conserving natural features on private lands (see Chapter 1 of this volume on wetlands). In addition, the revival of an assistance program like the now-defunct Woodlands Improvement Program would help landowners carry out necessary tending and maintenance actions in their forests that keep them healthy and productive, but which landowners are not always capable of executing on their own due to lack of funds and/or knowledge (e.g., invasive species control, pre-commercial thinning of young plantations).

The provincial government used to bear the cost of property tax relief for landowners with farm or forested land, ensuring municipalities weren't deprived of essential tax revenue as a result of these programs. However, since 1998, municipalities have borne the total cost of such tax relief. This has been especially difficult for municipalities with small tax bases, and may even

give them a reason not to support forest conservation. Going forward, the province should again bear the cost of tax relief for the MFTIP and CLTIP programs. The forests enrolled in MFTIP are a public good that benefits all southern Ontario residents through air and water filtration, carbon storage, heat and erosion mitigation. Lifting the cost burden off municipalities could also encourage them to work towards growing their forest cover, rather than potentially associating forested land with lost tax revenue. Using the estimate of an average of \$1,186 per year of foregone taxes per property (assuming the government begins giving MFTIP participants 100% property tax relief), which is the cost reported in the MNRF's 2004 EBR review of the MFTIP program adjusted for inflation, the annual cost of MFTIP to the provincial government for the current area of enrolled land (approximately 750,000 ha) would be around \$12 million.

Attract more landowners to incentive programs and recognize them for their work

Many landowners are willing to participate in programs to care for and grow their forests because they want to benefit wildlife and nature, and the wider environment. But before a landowner can participate in a program like 50 Million Trees or MFTIP, they have to know about it.

Rural land is changing hands as aging farmers and rural landowners pass away or move closer to medical facilities. Their properties may be passed down to adult children who don't live full-time at the rural residence. These new farm and rural property owners should be a target audience for afforestation programs and MFTIP. The government needs to inform these new landowners that there are programs that will help them take care of their land, plant trees at a subsidized cost, and get tax breaks.

Changing the public-facing name of MFTIP to something more descriptive and enticing could help attract landowners.



The Ontario government also needs to better recognize landowners for participating in stewardship programs. Giving each landowner a sign that says “I planted 5,000 trees” or “My land stores carbon” or “Future Forest” is a simple way to recognize them for what they’re doing, and also to advertise to others. Even simply changing the public-facing name of MFTIP to something more descriptive and enticing such as “Forests for the Future” or “Ontario Land Stewards Rewards Program” could help attract landowners.

2.3.2 More support and incentives for landowners who steward forests

The ECO recommends that the province ensure that financial and technical supports for tree planting and forest stewardship on private land adequately incent landowner participation and lift the financial burden of tree planting and forest maintenance off the shoulders of landowners alone.

Specifically, the government should:

- subsidize the costs of seedlings and planting, and assist forest owners in carrying out sustainable forest management actions to the extent necessary to make it financially attractive to plant trees on their land (annual cost: approximately \$12 million to afforest 3,000 km² in 25 years),
- reduce the minimum size of forest required to enroll in the Managed Forest Tax Incentive Program to ensure all 50 Million Tree Program participants are eligible to enroll,
- increase the MFTIP property tax relief to provide 100% provincially-funded tax relief to all participants and bear the full cost of the tax relief (annual cost: approximately \$12 million for current land area enrolled), and
- strategically market MFTIP and the 50 Million Tree Program to landowners.

2.4 There is no forest without seed

With so many pressures on our existing forests, the need to plant and maintain new forests is greater than ever – but this will be impossible without the right seed.

Natural regeneration in a healthy forest requires the right combination of light, moisture and temperature, as well as wind and/or rodents and other animals to move, bury and scarify (scratch up) tree seeds and nuts. If these conditions combine at the right time in the right places, seeds germinate and seedlings break through the forest floor. It’s a slow and complex process.

Slow too is the march of seedlings that will advance on an abandoned field if there is a mature forest nearby to produce them. Those seedlings grow into small trees that make shade and habitat for animals to bring more seeds, and on it goes laboriously for years until a new forest finally takes shape.

However, many marginal farm fields, vacant lots and city parks don’t have seed sources nearby, and we don’t have the time to wait. If we want more forests in southern Ontario any time soon, we have to deliberately grow them. And to do that, we have to collect, store, catalogue, prepare and plant the right seeds, in the right places.

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Sugar maple keys (wings removed) and the seed of many other deciduous forest species can be stored for long periods of time. The coiled green seedling leaves can be seen when the seed is cut in half.

Photo credit: Melissa Spearing, Forest Gene Conservation Association, 2012. Used with permission.

2.4.1 The right seed in the right place: the key to forest resilience

The right seed comes from a similar climate, and has been collected from a sufficient number of genetically distinct individual trees to ensure a diverse and therefore resilient new forest. When anticipating altered future conditions under climate change, the right seed may also be seed that comes from the climate that the planting site will experience in the near to long-term future. Finding this seed is challenging. Trees don't produce seed every year; it's a cyclical occurrence, complicated by weather. Seed forecasting is a skill and art unto itself, as is the business of collecting viable seeds. Long-term storage is also necessary to hedge against years where there are poor or no seed crops for a species, or in times of crisis like widespread fire, drought, or deadly invasive insects.



Scouting red pine branches after a thinning operation in the Ganaraska Forest, looking for evidence of developing seeds (top). High-quality white pine seed processed at the Ontario Tree Seed Plant is ready for long-term storage (bottom).

Photo credit: Melissa Spearing, Forest Gene Conservation Association, 2017 (top), 2013 (bottom). Used with permission.

The forests on the Oak Ridges Moraine and throughout many parts of southern Ontario were established by planting over 100 million trees using seed processed at the OTSP.

From 1923 to 2018 the Ontario Tree Seed Plant (OTSP) was the center of tree seed expertise for the province. The forests on the Oak Ridges Moraine and throughout many parts of southern Ontario were established by planting over 100 million trees using seed processed at the OTSP (the land had been desertified by clearing for agriculture on sandy soils that proved incapable of growing crops).

The OTSP seed bank was also a safety net for southern Ontario forests, storing seed from native tree species to ensure we don't lose those species from our landscape as a result of fire, severe storms, or invasive insects and diseases – which are all becoming more frequent because of climate change. The network of seed collectors fostered by the OTSP held the hope of seeing ash trees (devastated by emerald ash borer), butternut trees (an endangered species), beech trees (felled by beech bark disease), and American elms (almost wiped out by Dutch elm disease) in our forests again. Without stores of Ontario ash, beech and elm seeds, Ontario risks losing these native trees altogether.



A seed collection tag indicates the species, seed source and quantity of bags delivered from the Bancroft-Minden Forest Company to the Ontario Tree Seed Plant in late August 2017 (top). Seeds from conifers (needled trees) are stored at -18 Celsius in sealed plastic containers (bottom), and can remain so for decades. Temperature and moisture content are closely monitored and viability is retested periodically with germination tests.

Photo credit: Melissa Spearing, Forest Gene Conservation Association, 2017 (top). Ontario Ministry of Natural Resources and Forestry, 2013 (bottom). Used with permission.

The province shut down its afforestation programs in the 1990s, and in the end, only the OTSP was left, along with a small staff with very specialized, hard-to-come-by knowledge of how to store and process seed for the long-term. In the fall of 2017, the MNRF made public its intention to shutter the plant to save the operating costs. In July 2018, the new Minister of Natural Resources and Forestry announced that the ministry would review that decision in consultation with stakeholders.

The OTSP was instrumental in starting the 50 Million Tree Program in 2007, and continued to enable essential tree seed cataloguing, and provide storage and processing for conservation authorities, conservation organizations, municipalities, private nurseries, and companies that manage Crown forests in central and eastern Ontario. Without these services, tree planting programs, forestry companies and nurseries would be forced to use whatever seed was readily available regardless of the consequences for genetic and species diversity, or purchase seeds of unknown, non-native origin from seed plants in the United States.



To verify seed viability, the Ontario Tree Seed Plant staff performed germination tests like this one on conifer seeds in a container of sterilized sand (left). Inside the OTSP's germination room (right), hundreds of tests are done each year. Individual seedlots are tested for germination percentage and vigour. Foresters and growers choose seedlots and calibrate their production systems based on these test results.

Photo credit: Melissa Spearing, Forest Gene Conservation Association, 2013 (left), 2008 (right). Used with permission.

Long-term seed storage and cataloguing is an essential service to safeguard the future of native southern Ontario tree species, and give us a fighting chance at lessening the effects of climate change on our forests. Some southern Ontario trees will be the best seed sources for reforesting northern Ontario Crown forests in the very near future, because the southern Ontario seed is adapted to the warmer climate that northern Ontario will experience before the end of the century. We can move southern Ontario seed to northern Ontario much faster than tree populations can move themselves.

Long-term seed storage and cataloguing is an essential service to safeguard the future of native southern Ontario tree species, and give us a fighting chance at lessening the effects of climate change on our forests.



2.4.2 Ensure continued support for the services provided by the Ontario Tree Seed Plant

In 2001, an MNRF review recommended “the establishment and funding of a central agency to co-ordinate the forecasting and confirmation of seed and stock demand, to co-ordinate appropriate seed collection and banking and to co-ordinate the stock production and distribution in southern Ontario.”¹² This never happened, but the OTSP in partnership with its clients and the Forest Gene Conservation Association filled this role as best they could.

The decision to close the OTSP was made without consultation with the planting program agencies and clients who rely on it to carry out their mandates. Stakeholders including Forests Ontario, the Forest Gene Conservation Association, two large private tree nurseries, and a representative from central Ontario forest licence holders have been working to ensure the continuation of the critical services the OTSP provided.

The ECO recommends that the MNRF guarantee funding for the essential services formerly provided by the Ontario Tree Seed Plant, including:

- **a system for recorded chain of custody for seed and seedlings (so the right seed is always planted in the right place and seeds can be stored for the long-term when necessary); and,**
- **expertise to co-ordinate and provide education, training and information about seed collection, handling, cataloguing, cleaning, processing and storage.**

These services are estimated by stakeholders to cost under \$1 million annually.

2.5 Nurturing Ontario’s urban forests

More than 85% of Ontarians live in urban areas where the trees they see every day are likely planted in backyards, on boulevards, in planter boxes, in parks and on school grounds. These trees (on both public and private property), along with natural woodlands and ravines, make up the urban forest – a vital part of sustainable communities. The urban forest provides many essential services, including:

- mitigating the heat-island effect (see Figure 9)
- reducing the amount of energy needed to heat and cool our homes and other buildings
- absorbing and filtering stormwater
- supporting biodiversity, from insects to birds to small mammals, and creating corridors for wildlife to move through urban areas
- improving air quality by filtering pollutants
- improving residents’ physical, mental and emotional health, and
- raising property values.

As our weather becomes hotter and drier and we experience more frequent and severe storms, the services provided by urban forests are becoming more important than ever.

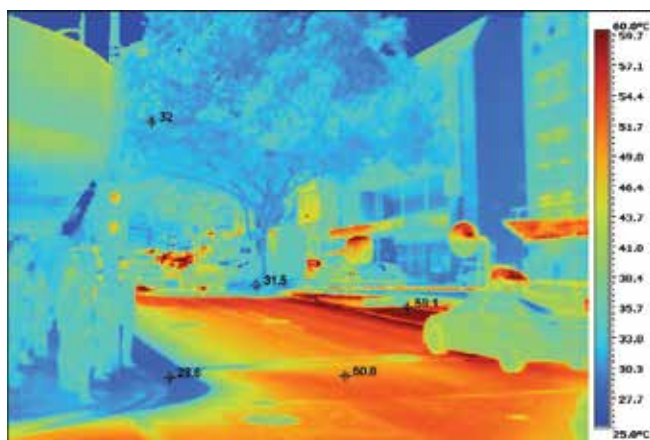


Figure 9. Thermal imaging at the streetscape level shows how trees can cool the air around them. In this example the large tree in the centre has a surface temperature nearly 20 degrees cooler than nearby concrete surfaces.

Source: City of Melbourne, Australia. Used with permission.

Municipalities require more support from the Ontario government to grow and manage healthy urban forests. They shoulder the full responsibility of maintaining urban forests, but often have limited funds and capacity to manage them effectively and to derive the most benefit for the least cost. Despite the myriad services that urban forests provide, they are strikingly undervalued as municipal assets, and chronically underfunded as a result.

2.5.1 The challenges of maintaining urban forests

Most people like trees and are disappointed when they lose them, but until disaster strikes, few people put much thought into the cost and work required to maintain urban trees in a healthy and safe condition. Urban forests become a more topical issue following high-profile natural events that damage and stress urban trees and cost municipalities millions of dollars. Events like ice and wind storms, the emergence of Dutch Elm disease in the 1970s, and the invasion of emerald ash borer that began in the early 2000s

underscore the fragility of seemingly permanent urban trees. For example, emerald ash borer, an invasive beetle that continues to wipe out ash trees (a common street tree) from southern Ontario's urban forests has cost municipalities millions of dollars, and is forcing many to develop long-overdue plans and strategies for managing their urban forests.

Urban trees face constant stresses because of their growing environment. Development and construction can damage or displace trees. Insufficient root space and compacted and/or nutrient-poor soils, as well as salt and air pollution from roadways and industry, can prevent trees from thriving.

But it is not just isolated natural disasters that threaten urban forests. Urban trees face constant stresses because of their growing environment. Development and construction can damage or displace trees. Insufficient root space and compacted and/or nutrient-poor soils, as well as salt and air pollution from roadways and industry, can prevent trees from thriving. Climate change effects, such as more frequent and severe wind and ice storms, hotter temperatures, and changing precipitation patterns can exacerbate these stresses. Some species of trees in our urban forests will not adapt well to the new temperature and precipitation patterns, and the ranges of invasive and other insect pests and tree diseases will expand to cover more of the province.



The lack of protection for this mature tree's root zone during the compaction and interference that results from construction caused its premature death.

Photo credit: Urban Forest Innovations Inc. Used with permission.



Roots of mature trees have been severed during construction.

Photo credit: Urban Forest Innovations Inc. Used with permission.



Urban trees suffer the chronic stresses of lack of root space and constant soil compaction.

Photo credit: Janet McKay, LEAF. Used with permission.

The cost to maintain a tree in an urban environment is much higher than in a rural or woodland environment. In manicured urban areas, the safety of pedestrians and property needs to be considered, and unlike woodlands, there are no new saplings nearby to naturally regenerate and take a tree's place if it dies. In a town or city, a newly planted tree is a significant investment of effort and money that may not pay off unless the tree grows to maturity. A new tree needs regular watering until it has successfully established (often for one to three years after planting). As it grows it will require regular pruning, both to maintain a safe

and strong structure, as well as to avoid conflicting with sight lines and power lines. A tree offers the most benefits once it has reached maturity: larger trees store more carbon, filter more air and water, offer more habitat, and create more shade (see Figure 10).

In a town or city, a newly planted tree is a significant investment of effort and money that may not pay off unless the tree grows to maturity.

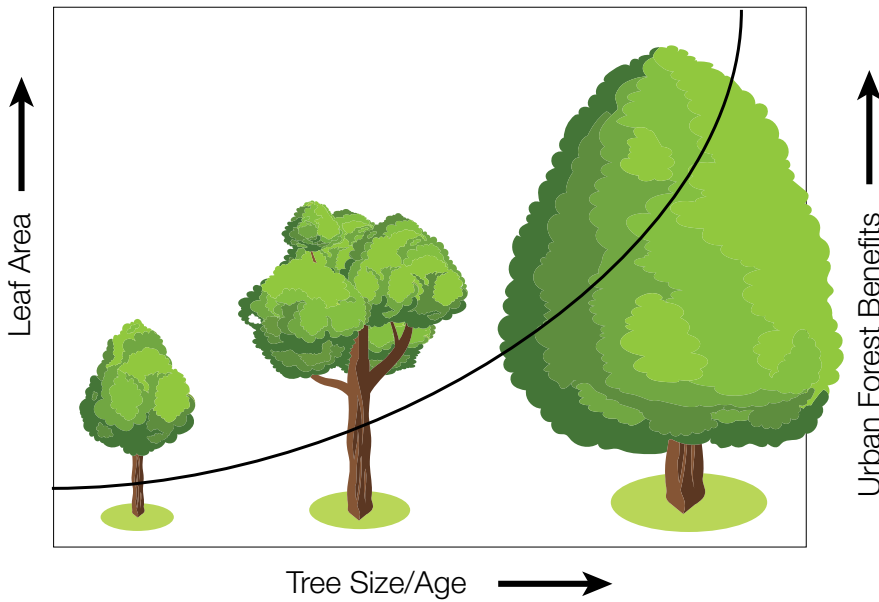


Figure 10. Bigger, older trees offer the most benefits due to their greater leaf areas.

Source: W.A. Kenney and Urban Forest Innovations Inc.

Given the stresses that urban trees are constantly under, urban forest managers need to regularly monitor them for signs of insects or disease and treat for those stresses when needed. While nurturing mature, stressed trees back to health can be costly, the

cost-benefit ratio is usually lower than removing and replacing them with new young trees, which would need to grow for years before they begin providing comparable ecosystem services (see Figure 11).

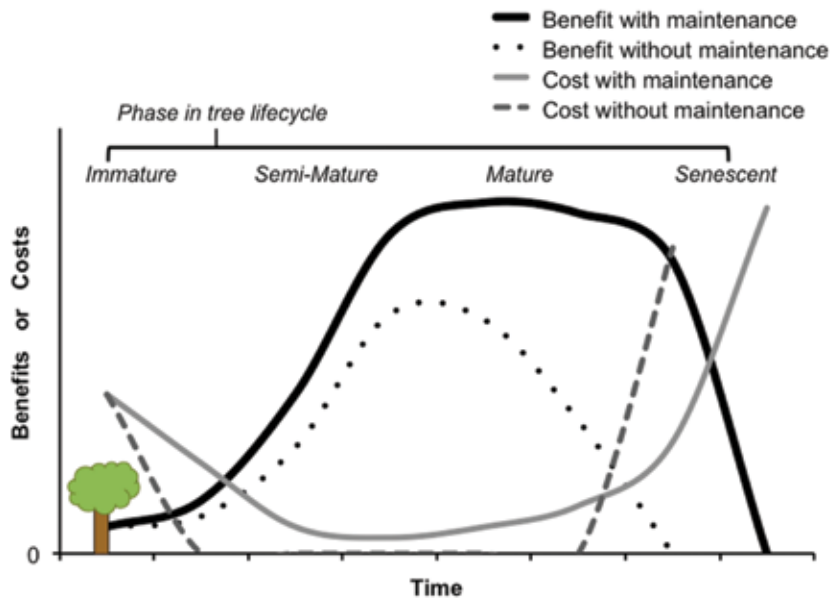


Figure 11. Costs and benefits of an individual urban tree. Theoretical costs and benefits over the lifetime of an individual tree, with (solid lines) and without (dashed lines) adequate maintenance. Ecosystem services (benefits) are maximized when a tree is mature and decline rapidly when the tree begins to die, while costs are highest when the tree is young and at the very end of its lifespan, and bottom out during stable maturity.

Source: Hauer et al. The Cost of Not Maintaining the Urban Forest. International Society of Arboriculture. Copyright © International Society of Arboriculture. Used with permission.

Municipalities bear sole responsibility for managing urban forests.

2.5.2 Urban forests need provincial support

Municipalities bear sole responsibility for managing urban forests. Many municipalities (especially those with small tax bases), struggle to meet the challenges of growing and maintaining a healthy urban forest, and may also lack political will among elected officials. Where expertise, motivation or funds are lacking, local environmental groups or volunteer urban forest committees sometimes pick up the slack – for example by organizing residents to plant, water and maintain trees in their own neighbourhoods, and even advising municipal council on management. The provincial government, however, has never taken an active role in urban forest management, and no provincial ministry has taken on the important task of working with municipalities to help urban forests thrive.

The provincial government has never taken an active role in urban forest management.

In addition to the day-to-day challenges of managing urban forests, major threats from invasive species and extreme weather – both of which are projected to become more frequent and severe – are forcing municipalities to put aside important long-term urban forest planning and maintenance initiatives in order to focus their funds and staff time on dealing with the immediate effects of these disasters. For example, the City of Guelph has budgeted \$6-8 million over 10 years, and York Region has budgeted \$10 million over 10 years to manage the effects of emerald ash borer. The ice storm in 2013 cost the City of Toronto's urban forestry department approximately \$50 million.

While the province provides some financial relief to municipalities that suffer extraordinary costs because of sudden and unexpected natural disasters, the cost of managing the effects of natural disturbances falls almost entirely on municipalities. Yet, urban forests provide a broader public good. The ecosystem services urban forests provide (carbon storage, air pollution filtration, stormwater retention, keeping buildings cooler, enhancing biodiversity) are key tools to mitigate climate change and safeguard human health. While some of these services primarily benefit the municipality's residents, others – like carbon storage – benefit the entire province. It behooves the province to support urban forests and the ecosystem services they provide for all residents of Ontario. Otherwise, we risk losing them.

Tree by-laws can fall short of intended protection

Since 2006, Ontario's Municipal Act has enabled municipalities to pass by-laws that protect trees on private and public property from removal or damage, but such by-laws are not mandatory, and they vary in restrictiveness and efficacy. Often, the fines for removing trees without a permit are not enough of a deterrent, and may be seen as the cost of doing business. Municipalities may also struggle to keep up with inspections and issuing orders.

Heritage tree designation can galvanize political will to protect valuable urban trees

Province-wide, Ontario has just 52 heritage trees protected under the Ontario Heritage Act and protected by municipal by-laws, meaning they cannot be injured or destroyed without written approval from the municipality.

In contrast, the City of Portland, Oregon, population 236,000, has nearly 300 designated “heritage trees” that are protected from injury or destruction by the city code. They can be located and learned about through an interactive map on the city’s website (portlandoregon.gov) as well as a Heritage Tree Guidebook, which includes colour photos of many of the most impressive heritage trees.

The Bronte White Oak is an example of one of Ontario’s Heritage Trees protected under the Ontario Heritage Act and protected by a municipal by-law. One of only a handful of pre-settlement white oaks left in the Municipality of Oakville, the Bronte White Oak dates back to the 1730s and is valued for its natural heritage by the community, which raised over \$343,000 to divert the expansion of Bronte Road around the tree instead of destroying it.

For trees to be protected in this way, the municipality must designate them as part of a heritage property

under the Ontario Heritage Act. The Minister of Tourism, Culture and Sport can designate a heritage property by order, and any resident of Ontario may petition the minister to do so (this has not been used for trees thus far).

Residents in north-west Toronto successfully lobbied the city to save a red oak believed to be over 300 years old. Its roots threaten the structural integrity of a home built meters from its trunk, and the homeowner was threatening to remove it to sell the property. The tree was a marker on the Toronto Carrying Place Trail, a major trading route for First Nations. This property is not currently designated under the Ontario Heritage Act, but is subject to the City of Toronto’s private tree protection by-law. In order to prevent the tree from being harmed, Toronto City Council voted to negotiate a purchase price for the property on which the oak stands at the end of July 2018.

Municipalities can pass by-laws to protect trees without including them in designated properties under the Ontario Heritage Act by defining “heritage tree” according to their own criteria for the purposes of a tree protection by-law. For example, the City of Toronto has a private tree protection by-law that enables the city to refuse to issue a permit to cut down a tree that is protected as a heritage tree under the Ontario Heritage Act, or that should, in its opinion, be protected as a heritage tree – which theoretically could enable public opinion to affect permit approvals.



Thanks to fundraising efforts by the local community, a major arterial road in Oakville was diverted around the root system of this centuries-old white oak, which is a designated heritage tree under the Ontario Heritage Act.

Photo credit: Christopher Dias. Used with permission.



2.5.3 How to grow and improve our urban forests

There are a few key actions the province could take that would greatly improve municipalities' abilities to effectively manage and enhance their urban forests, including:

- ensure infrastructure funding is available for urban forests,
- incent private land tree planting, and
- facilitate collaboration and knowledge-sharing.

These are elaborated further below.

Ensure infrastructure funding is available for urban forests

The Ontario government recently made new tools available to municipalities to help manage urban forests. The Municipal Act now directs municipalities to develop policies on protecting and enhancing tree canopy and natural vegetation (section comes into force on March 1, 2019). Greater canopy cover equals greater ecosystem services (see Figure 12), and many municipalities have a canopy cover target. Urban forest managers report that the new Municipal Act requirement for a tree canopy protection and enhancement policy is improving municipalities' abilities to develop urban forest management strategies and

plans to help reach those targets. These strategies and plans are precursors to sustainable urban forests, but many Ontario municipalities have not developed them. Now, municipal councils must commit to funding their development and implementation.

The new Municipal Act requirement for a tree canopy protection and enhancement policy is improving municipalities' abilities to develop urban forest management strategies.

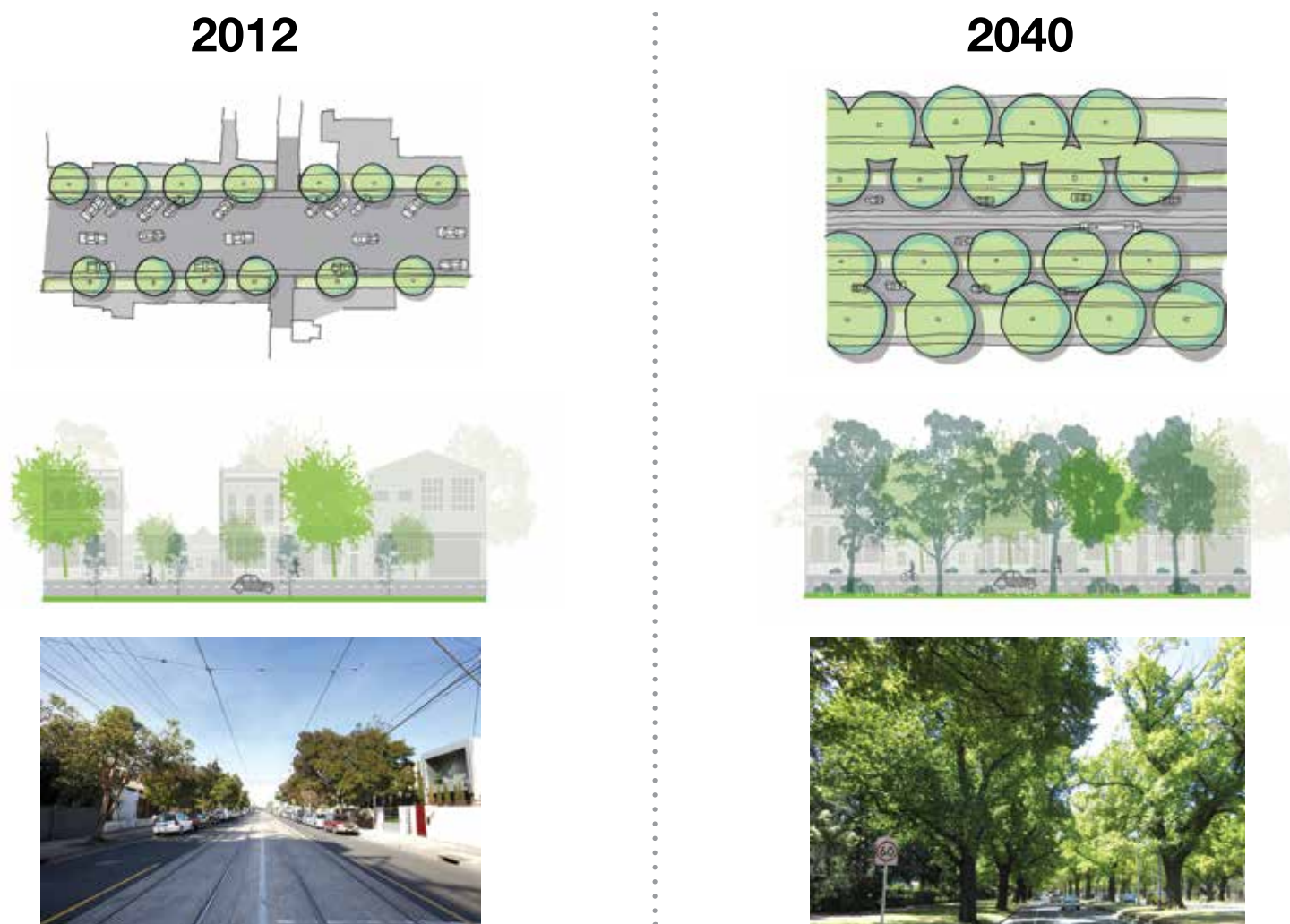


Figure 12. The more tree canopy coverage the better. Graphical representations and corresponding photos represent 20% (left) and 40% (right) canopy cover on city streets. Canopy cover refers to the area of ground covered by the branches and leaves of a tree, and the higher the percentage, the more ecosystem services the urban forest can provide. Many municipalities aim to increase their urban forest canopy over time.

Source: The City of Melbourne, Australia. Used with permission.

The Ontario government also recently passed a new regulation governing municipal asset management (O. Reg. 588/17), which could help urban forest managers secure long-term funding for urban forest management. The new asset management regulation recognizes urban forests as part of “green infrastructure,” and all green infrastructure assets as “municipal infrastructure assets.” This means that municipally-owned urban trees must be included in long-term municipal asset management strategies and plans.

Urban trees must be included in long-term municipal asset management strategies and plans.

Now that the government has recognized urban forests and other green infrastructure in legislation, the Ministry of Infrastructure should make the financial support it gives municipalities for infrastructure improvements



through programs such as the Ontario Community Infrastructure Fund available for green infrastructure improvements and projects, including those involving urban forests.

Plant trees on private property

Growing urban forests will require more trees to be planted on private property, because the vast majority of urban land is private. Often the best opportunities to plant trees are found on private land – both because of suitability (more root space, shelter, etc.), and because planting trees beside peoples’ homes ensures that residents directly benefit from their ecological services. Therefore, programs to incent residents to plant and maintain trees on their own properties are essential.

One non-profit organization has partnered with a number of municipalities to help residents plant appropriate trees on their properties at an affordable price. LEAF (Local Enhancement and Appreciation of Forests) plants native trees in residents’ backyards at subsidized prices by partnering with municipalities such as Toronto, Mississauga, and Oakville, as well as corporate sponsors. LEAF’s staff of certified arborists carefully select each tree to ensure it is healthy and appropriate for the planting site, has good structure, and is planted correctly to give the tree the best possible chance of surviving and thriving.

Think outside the box: grow a forest at a closed jail?

Tree planting on private land is crucial for increasing forest cover, but there are also opportunities to restore unused publicly owned lands. Infrastructure Ontario has surplus lands across southern Ontario, including properties of hundreds of acres such as shuttered psychiatric and correctional facilities.¹³ The grounds of closed schools, healthcare facilities, and other smaller public properties could also be considered for their potential to grow trees. Planting small areas of public land can make a difference to restoration efforts, especially in watersheds where forest cover is under 30%.

Community Hubs make use of surplus public property and facilities in communities throughout Ontario to provide public health, social, cultural and recreational services in one place. The Ontario government has supported Community Hubs for a number of years. As part of an action plan to develop

more hubs across the province, Infrastructure Ontario launched the Surplus Property Transition Initiative, which helps organizations and community groups transition publicly owned surplus properties “to meet community needs.” As part of the initiative, Infrastructure Ontario provides funding to help organizations acquire properties at below market value “to support community re-use.”

Restoration and greening are also worthy uses of surplus public property, especially in areas with little forest cover. The initiatives undertaken as part of the Community Hubs action plan could also enable a program to help conservation organizations, conservation authorities and municipalities work together and with the province to identify and procure spaces to plant trees and forests. If natural spaces and parks were also incorporated into Community Hubs they could provide ecosystem services to their communities in addition to health, social and cultural services.

In larger, highly developed municipalities like those in the Greater Toronto Area, legacy issues continue to cause time- and capacity-consuming problems.

Share knowledge to learn from the mistakes of the past

In larger, highly developed municipalities like those in the Greater Toronto Area, legacy issues continue to cause time- and capacity-consuming problems. Decisions made or not made during past development have resulted in conditions that make it difficult for the urban forest to thrive in the long term, including:

- too little soil
- poor soil quality
- invasive or inappropriate^b tree species
- low diversity of tree species, which leaves the urban forest vulnerable to outbreaks of specialist pests and diseases like emerald ash borer
- poor tree form due to a lack of early pruning or poor nursery stock quality or availability, and
- competition for space with other urban infrastructure (e.g., pipes, transportation corridors).

The upside to recognizing these legacy issues is that many lessons have been learned and can be shared with municipalities that are just now developing and urbanizing, and therefore have the chance to avoid making these same mistakes. For example, developing municipalities' urban forests will be much better off in the future if the municipalities work to:

- provide adequate soil quality and quantity in new developments

b. Many trees planted in urban areas are genetic clones of one individual, leaving the urban forest as a whole more vulnerable to stressors because of the lack of genetic variation that fosters resistance and resilience.

- retain trees and remnant woodlands as much as possible during development
- select diverse, biologically and genetically appropriate trees for planting
- ensure urban forest practitioners are involved at the design stage of developments to consult on long-term maintenance needs and costs, and
- develop and implement urban forest management plans that include maintaining a tree inventory, pruning, watering and monitoring to ensure trees establish and thrive, and actions to engage the community and stakeholders in looking after the urban forest.



Urban design and planning that leaves mature trees where they are and plans for the needs of trees in terms of root space and compaction results in a healthier, more livable urban environment – for example, shaded parking lots.

Photo credit: Georgia Silvera Seamans, localecology.org. Used with permission.

Melbourne residents write love letters to their urban trees

Soaring temperatures and crippling drought have become the new norm in Melbourne, Australia, resulting in accelerating mortality of a huge number of the city's trees, just when Melbourne residents most need the cooling benefits of trees. The city's urban forest managers are implementing a comprehensive plan to ensure there is a healthy urban tree canopy in place to protect the city's residents from the searing effects of these new-normal temperatures in order to keep Melbourne livable under climate change. One aspect of this plan is an extensive outreach and engagement strategy to keep residents informed and involved in planning and caring for their urban forest.

For starters, the city put an immense amount of information on its street and park trees online, helping foster residents' interest in and connection to its urban forest. Users can learn about the species and life expectancy of every city-owned tree by clicking on its location on an online map. They can also learn about the progress the city is making toward increasing Melbourne's canopy cover, and how climate change will drastically alter the urban forest of the future.

When a user clicks on a tree to learn its species and life expectancy, they are also offered the option of emailing the urban forestry department about the tree's condition. Urban forestry staff envisioned this tool as a way to enable the public to report broken branches or other issues with trees that needed attention, but they have also unexpectedly received over 4,000 letters to individual trees, ranging from messages of love to apologies for bad behavior to artistic tributes. Sometimes, the trees even write back!

"Dear London, I am saddened to see that your life expectancy is only around five years. I am also saddened to see that you have been labelled as a 'Plane Tree' - I do not think you are plane at all, in fact I think the way you wear your bark is quite alluring."

The city simply offered Melbourne residents information and a chance to reach out with any concerns about their public trees, but what they learned is how much people care about their urban forest – a powerful piece of information for securing sustained resources for its maintenance.



The City of Melbourne's online, interactive map of city-owned trees.

Source: City of Melbourne, Australia.

2.5.4 Create an Ontario Urban Forest Centre

Many urban forest practitioners believe Ontario's urban forests would benefit from a central co-ordinating body dedicated to sharing knowledge and tools such as plan templates, best management practices and studies; propelling and funding research and pilot projects; and providing forums for practitioners to collaborate on solutions to shared problems. Nationally, Tree Canada's Canadian Urban Forest Network is trying to provide some of these services (e.g., it hosts a national urban forest conference), but it does not have formalized, ongoing support from any level of government.

In the United States, the U.S. Forest Service Urban & Community Forestry Program serves over 8,000 communities country-wide.

In the United States, the U.S. Forest Service Urban & Community Forestry Program serves over 8,000 communities country-wide, providing funds, sharing knowledge and best practices, deploying "Urban Forest Strike Teams" to help communities recover from natural disasters, and undertaking and sharing the results of applied research.

A dedicated Ontario urban forest centre could similarly provide services and programs to address the challenges discussed above, such as:

- a province-wide private land tree-planting program
- a website with resources for municipal managers and practitioners
- forums for knowledge-sharing and tackling province-wide problems

- bulk buying schemes for good quality nursery stock (this kind of guaranteed, high-volume purchasing could incent Ontario nurseries to grow high quality native stock from source-identified seed, and cut down on the amount of non-native specimens they currently imported from nurseries in the U.S.), and
- grants for dealing with invasive species, drought, storms and other natural disturbances.

An urban forest centre could centralize and co-ordinate efforts to grow and improve urban forests throughout Ontario, and would be the first of its kind in Canada.

An urban forest centre could centralize and co-ordinate efforts to grow and improve urban forests throughout Ontario, and would be the first of its kind in Canada, serving as a template or perhaps a precursor for a national urban forest centre.

The urban forest can't be managed the same way as a woodland or large commercial forest, nor is the knowledge required to manage other municipal assets, such as a sewer system or road network, entirely transferable to managing an urban forest. The expertise needed to plan and steward urban forests that are productive, cost-efficient, long-lived and resilient is specific to the task, and for those municipalities that don't have and can't afford to purchase that expertise, an urban forest centre could be a lifeline.

How much would this cost? The Invasive Species Centre fulfills a similar function for the many public and private landowners struggling with invasive species management across the province. The MNRF contributed a little over \$1 million in 2016-2017 to the Invasive Species Centre, which is also supported by the federal government. Depending on the scope of mandate, a similar annual funding commitment could at least get something up and running.



The ECO recommends that the government work with partners to fund the establishment of an Ontario urban forest centre, a non-profit organization dedicated to protecting and enhancing urban forests throughout the province by working with municipalities and other partners.

2.6 Conclusion and recommendations

Time is running out for the forests of southern Ontario and for the species that depend on them. There is little time to adapt to the challenges society will face as a result of climate change. The ecosystem services provided by intact forests and urban trees cannot be replaced by man-made infrastructure. The provincial government has an opportunity to work with municipalities, conservation authorities, landowners and the agricultural sector to stop the loss of forest cover in southern Ontario, plant new forests where they are most needed, and help urban forests to grow and thrive. Conserving forests must become a top priority in land use planning, and creating the conditions for healthy urban trees must become a top priority in urban planning. Policy that is strongly protective of forests and plantable land, better incentives and supports for landowners to plant and maintain forests on their properties, and central co-ordination and support for municipalities to improve the condition of urban trees and forests should be top priorities for the provincial government in order to help Ontario adapt to climate change.

To better protect forests in southern Ontario, **the ECO recommends the province require a goal of net forest cover gain for every upper-tier southern Ontario municipality.**

To achieve this, the province should:

- **require all southern Ontario municipalities to evaluate woodlands in their jurisdictions for significance, and designate significant woodlands in their official plans**
- **amend the PPS to achieve a better balance between the protection of significant woodlands and agricultural uses, and**
- **require all southern Ontario municipalities to implement forest conservation by-laws, and prohibit diameter-limit cutting within forest conservation by-law frameworks.**

To create the optimal conditions for more forests to be created:

The ECO recommends that the province ensure financial and technical supports for tree planting and forest stewardship on private land, adequately incent landowner participation, and lift the financial burden of tree planting and forest maintenance off the shoulders of landowners alone.

Specifically, the government should:

- **subsidize the costs of seedlings and planting, and assist forest owners in carrying out sustainable forest management actions to the extent necessary to make it financially attractive to plant trees on their land**
- **reduce the minimum size of forest required to enroll in the Managed Forest Tax Incentive Program to ensure all 50 Million Tree Program participants are eligible to enroll**
- **increase the MFTIP property tax relief to provide 100% provincially-funded tax relief to all participants and bear the full cost of the tax relief, and**
- **strategically market MFTIP and the 50 Million Trees Program to landowners.**

To ensure a perpetual supply of source-identified, biologically appropriate seedlings for reforestation and afforestation under climate change:

The ECO recommends that the MNRF guarantee funding for the essential services formerly provided by the Ontario Tree Seed Plant, including:

- **a system for recorded chain of custody for seed and seedlings (so the right seed is always planted in the right place and seeds can be stored for the long-term when necessary); and,**
- **expertise to co-ordinate and provide education, training and information about seed collection, handling, cataloguing, cleaning, processing and storage.**

To support municipalities in creating the optimal conditions for urban trees and forests to expand and thrive:

The ECO recommends that the government work with partners to fund the establishment of an Ontario urban forest centre, a non-profit organization dedicated to protecting and enhancing urban forests throughout the province by working with municipalities and other partners.



Endnotes

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