

# In Support of Trees in the City

## A Message for Municipal Councillors, Urban Developers and NGOs

Prepared by  
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### Urban forest

For our purposes here, we define the urban forest to include all the trees in the city. While a tree is a large woody-stemmed plant (or one that can grow large), a forest is a tree-dominated ecosystem. That means that a forest includes all the other kinds of organisms (that is, plants, animals, microbes, etc.) that are associated with trees, plus the soil, air and water upon which the living community depends. We use the terms "urban forest" and "trees in the city" interchangeably.

### Why are trees in the city important?

Roughly 80% of Canadians now live in cities and towns. Regardless how much forest exists in the countryside near or far from urban areas, the fact remains that most Canadians live, work and play in the built-up area and therefore spend more time in close proximity to urban trees than they do to rural trees.

Another fact is that trees in the city deliver a host of valuable benefits and services to people across the very widest range of environmental, social, and economic dimensions. Overleaf you will find a list and description of more than twenty ways in which trees in the city are important to people. The list is far from complete - there are dozens more such values that we could not list and describe due to lack of space. Our definition of forest value is "any way in which people consider trees and forests important to them". Sometimes these are called forest benefits or forest services - we prefer the term "value" because it encapsulates the very widest range of concepts.



### Why have we prepared this document?

We believe that trees in the city do not get the attention they deserve. Considering the abundant values associated with the urban forest, too little effort goes into learning about them, expanding them, tending them, appreciating them, and generally being good stewards. Our aims with this short document are threefold - to remind policy people why urban forests are so important to city dwellers, to encourage further learning about urban-forest values, and to promote stronger attention to urban forests through increased stewardship activities.

### Who are we?



The Canadian Urban Forest Research Group is a loose affiliation of researchers, mostly at Canadian universities, who are dedicated to the cause of improving knowledge about urban forests as well as the condition of urban forests across Canada. Some of our recent research has focussed on eliciting from Canadian urban dwellers their value sets related to trees in the city. This document represents one of the many methods we are using to share our knowledge. See last page for information on how to contact us.

### Supportive Actions

If the urban forest is to flourish and be sustained as a complex ecosystem, coordinated attention to many activities and actions is required. Despite the fact that trees usually grow, eventually, on their own when we don't take deliberate action to suppress them, a healthy urban forest faces many challenges. Some of those challenges are:

- *Stock* - healthy, affordable stock of appropriate species is needed.
- *Planting spaces* - in spaces with abundant built infrastructure, appropriate soil space and quality as well as sufficient crown space are needed; spaces far from built infrastructure are ideal for regenerating trees.
- *Maintenance* - young trees are especially vulnerable to damage and often require protection; older trees often need pruning for good health, longevity, and safety.
- *Protection* - when building projects are planned for land where trees are growing, special efforts are needed to keep as many trees as possible and to give those retained sufficient room to continue growing.

# "We value trees in the city because they..."

## "... enhance the aesthetic beauty of the city"

The idea that trees are pretty may be self-evident to any urban dweller. Humans are wired to the green that surrounds them, and visions of green usually inspire calm and pleasant feelings. But city trees also provide a wider set of visual pleasures, from the different colours of the leaves to the size and texture of tree trunks that make them so imposing and attractive. Trees also have sounds, such as when leaves rustle in the wind or one walks on a carpeted floor of fallen leaves. Trees' colours, sizes and textures may also be associated with the surrounding architecture, such as buildings and housing, providing a green complement to the urban greyscape.



## "... help conserve fuel"

Trees in the city help to conserve fuel in many ways including slowing down traffic, and improving energy efficiency. Well-placed trees can also reduce the amount of fuel that evaporates into the atmosphere from vehicles. Consider outdoor parking lots, which can be considered miniature urban heat islands. Vehicles parked in sunlight heat up and emit hydro-carbons into the air from the gas in their tanks. Trees planted in the parking lots shade the vehicles and the pavement, thus reducing the hydro-carbon emissions and saving fuel.

## "... prolong the life of infrastructure"

Trees help reduce the amount of maintenance and repair required for city streets. This reduces costs against the city budget. The asphalt used to pave streets is made up of aggregate held together by asphalt cement. The asphalt cement is a petroleum product, which breaks down and evaporates in the sunlight, causing streets to crack and eventually crumble into potholes, which need to be repaired, or the whole street repaved, at great cost. The shade provided by trees can significantly improve the longevity of pavement and reduce repaving costs. For example, in Modesto, California, it was found that just a 20% shading of streets can save 60% of resurfacing costs over a 30-year period. This service provided by trees is a huge incentive for engineers and indeed all municipal managers to put the city trees on their agenda.



## "... reduce energy costs"

A significant amount of energy demand in a city is spent in cooling and heating. In warm places, an average of 5-10% of urban electricity demand is spent on cooling buildings, while in cold places the same can be said for heating buildings. Trees around buildings and houses can act as heat insulators and heat absorbers, shielding buildings from a high-temperature environment through shade, or keeping buildings from losing their heat in winter by increasing the humidity of the surrounding area and slowing down wind. Simulations in Canadian cities have shown that an increase in a neighbourhood's tree cover by about three trees per house reduces the heating energy of that house by up to 10%, and cooling energy can be reduced by up to 40%. The annual savings in heating and cooling costs can reach the hundreds of dollars every year depending on house size.



## "... enhance community safety"

Security and safety are serious concerns in a city, particularly in densely populated neighbourhoods in the urban core. Among the psychological causes of insecurity and unsafeness, we find mental fatigue and elevated levels of stress. Although earlier research suggested that dense and natural vegetated areas were perceived as insecure and threatening, these perceptions have been changing through the years with our understanding of how mental fatigue and stress are mitigated by green space and its most dominant feature, the trees. More recent research shows that, in reality, the greener an area, the safer it is perceived to be by urban citizens. This includes patterns such as more supervision of children in outdoor spaces, healthier patterns of children's play, and fewer property crimes. Residents living in greener surroundings report lower levels of fear, fewer incivilities, and less aggressive and violent behaviour.



## "... provide shade"

Shade is a ubiquitous value at the root of so many of the social, economic, and environmental benefits provided by trees in the city. Indeed, it is believed by many to be their most important function. Shade is a vital service in promoting people's health. Shade trees block harmful ultraviolet radiation that comes from the sun, which is a major cause of skin cancer. Shade trees, especially ones that are strategically situated where people are frequently outside like parks and sidewalks, can help to mitigate the risk of skin cancer. Children are especially vulnerable to skin cancer, and thus shade trees in playgrounds and school yards have the potential of significantly reducing their exposure and risk of skin cancer.

## "... provide business opportunities"

The services provided by trees in the city benefit a wide array of people beyond the residents. They also provide tangible financial benefits to business owners. Research has shown that consumers perceive business districts with trees as better places to shop. Moreover, consumers say they are willing to pay higher prices, travel further and longer, and shop longer and more frequently in areas with green streetscapes. This not only benefits business owners, but provides incentive for them to become more actively involved in the stewardship of urban trees.

## "... draw tourists"

Little research has been done linking urban forests and tourism. Recent work in Savannah, Georgia, concluded that the better the urban forest, the more attractive the city is for tourists. This seems a reasonable conclusion considering that most city residents would like more trees, and better urban-forest management, in their own cities. All other things being equal, it seems fair to say that tourists would prefer to visit a well-wooded city as opposed to one with few trees.

## "... provide diverse foods"

Trees have been a source of food for people throughout the ages. Most foodstuffs from trees now come from trees in rural areas: for example, sugar-maple forests, nut groves, and farm orchards. However, urban settings are also highly suitable for growing the full range of fruit and nut trees. Additionally, there may be opportunities to pick edible mushrooms that grow on the forest floor of treed parks and other naturalized areas. There is something very satisfying about being able to bypass the grocery store and pick one's own apples or cherries or walnuts or sweet chestnuts right in the backyard of the urban home!

## "... foster health and healing"

When we are healthy, the urban forest - pollen allergies aside - helps keep us that way, for example by purifying the air. And when we fall ill, or are convalescing from illness, trees can also play a pivotal role in enhancing healing. Imagine lying in a hospital bedroom and spending hours peering out the window - would buildings and parking lots be the preferable scene, or trees? Or imagine spending time out-doors during recovery from illness - would you prefer the busy, treeless commercial streetscape or the quiet treed park? Richard Louv, an American journalist, coined the term "nature deficit disorder" which posits that experiences in natural and naturalized spaces are good for the health of both body and mind. Trees are a key part of such spaces in cities.

## "... enhance recreation opportunities"

City residents frequently visit treed areas for recreation. Recreation in these areas can be passive or active, ranging from gentle activities such as cultural events, walking, picnics, or the safe climbing of tree branches, to active sports such as running or biking. Treed areas in cities can also lend themselves for full outdoor recreational activities such as camping. The many types of urban forest formats, ranging from treed streets to dense and naturalized forest remnants, can be used for diverse uses. The close proximity to the space and the quality of the trees or the greenspace in general will allow the recreational opportunity to be fully achieved.

## "... capture and store carbon"

Atmospheric carbon dioxide is one of the main drivers of climate change. Its concentration in the air is rising largely because of the burning of fossil fuels like oil, gas, and coal. Anything we can do to slow down emissions of carbon dioxide and increase the rate of its removal from the air will be good for the future of the earth. Trees in the city capture carbon dioxide from the air and store the carbon in their trunks, roots and branches. The more trees we have in the city, and the larger they grow, the more carbon dioxide will be taken out of the atmosphere.



## "... cool the city environment"

Trees collectively have the power to cool the temperature of an entire city. Because of the built environment, cities frequently experience higher temperatures than the surrounding countryside due to the urban heat-island effect. This can be harmful to people and the environment alike. Trees reduce ambient air temperatures in several ways, including altering wind speeds, shading surfaces, and blocking solar radiation. Trees also transpire huge amounts of water vapour into the air, which also cools the air temperature. Importantly, the more trees there are in the city, the greater the cooling effect will be. This is especially relevant given expected climatic change and the associated warmer temperatures.

## "... slow down stormwater flow"

Urban areas consist mainly of roads, sidewalks, rooftops, and parking lots. Most of these surfaces are impervious and prevent rainwater from being absorbed directly into the ground. As a result, stormwater and wastewater systems, as well as natural water bodies, are strained during heavy rains as runoff flows into them from impervious surfaces. Excessive runoff can lead to flooding, sewage spill-over, and aquatic pollution. City trees intercept some amounts of rainfall and retain it in their foliage for a period of time. This has the effect of slowing down the flow of rain that would otherwise hit impervious surfaces, thus reducing runoff. Trees provide a critical economic service in stormwater management.



## "... provide employment opportunities"

Trees in the city need our care. As they grow up into overhead wires, shed their leaves, grow new branches in undesirable directions, drop dead branches, or die, trees are cared for not only by municipal workers but also to private landscape contractors and other specialized tree caretakers. Salaries make up large proportions of the budget of tree-care organizations. While this represents a cost that sponsoring organizations try to reduce, it serves as revenue for businesses and livelihoods for individuals. The more trees there are in a city, the greater the amount of economic activity associated with their maintenance. These are smart societal investments because they represent expenditures on caring for vital urban green infrastructure.



## "... increase property values"

Trees in the city are a major component of a neighbourhood's aesthetic appeal and give residents a sense of place. In addition, trees also provide additional dollars to homeowners by increasing property values. One study in Portland, Oregon, found that a large tree on a residential property can add some \$9,000 to the sale price of a house. By having trees on residential properties, citizens are also helping others because adjacent homes and even entire neighbourhoods benefit. This economic function of trees is an important message to communicate to homeowners, since there is frequently much more available space to plant trees on private residential properties than in publicly-owned street sides.



## "... clean the air"

Air pollution is an issue for most cities. Research has shown that city trees can contribute significantly to improving air quality. While trees indirectly reduce pollution emissions in cities by cooling them and shading buildings, they also filter the air directly. Gaseous pollutants like ground-level ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), and carbon monoxide (CO) are removed from the atmosphere by trees by absorbing them into the leaves. Particulate matter is also removed from the air and stored temporarily on the plant surfaces until it washes off in the rain. It has been clearly shown that overall air quality is better with more trees in the city.

## "... improve water quality"

The City of New York has it right – better to pipe clean water into the city from a healthy forest hundreds of kilometres away than to treat dirty water from the river within the city's boundary. The more trees we have in the city, the cleaner our waterways will be. Trees help reduce runoff and stormwater flow, both of which can affect water quality in lakes and streams. Trees can even help reduce water pollution into the ocean. Consider Halifax, where there is only one sewer system for both sanitary and stormwater flows. The sewage treatment system is designed to spill water directly into the ocean, untreated, when storms bring so much rainfall that it would overwhelm the treatment plant. Given that trees can significantly help reduce stormwater flow, then in cities like Halifax the urban forest contributes to keeping the harbour water clean.

## "... conserve biodiversity"

Biodiversity, in the simplest terms, refers to the full diversity of life on earth and includes diversity of gene pools, species, communities and ecosystems. Trees themselves represent important elements of biodiversity, but they also serve as host and habitat for a wide range of other organisms such as fungi, lichens, insects, birds, mammals and other plants. The ability of trees to contribute to urban biodiversity increases enormously as one moves from single isolated trees to lines of trees along streets and lanes, and further to stands of trees in parks and other areas. Urban forests can contribute immensely to biodiversity conservation through inclusion of the full range of native tree species in their full spectrum of ages and community associations.

## "... promote learning opportunities"

Trees are the native vegetation in many parts of the world. Because they are relatively big when mature, they provide habitat for many other kinds of wild organisms, including fungi, insects, lichens, birds, mammals, other vascular plants, and others. If we want to learn more about nature on land (as opposed to the sea), an excellent place to start is by learning about the trees. There is no better place to learn about nature than to be in it. Getting away from the city and out into natural forests is exciting and worthwhile, but it is costly and may even not be possible for some people. The alternative is to study nature in the city. Thus, trees in the city can provide excellent opportunities to learn about the kinds of species and natural ecosystems we have in the countryside and the wilderness.

## "... impart a sense of place"

Feeling a sense of belonging in the city is important to its citizens. The vegetation of a locale can contribute strongly to this sense of place. The presence of trees transforms barren areas into pleasant, welcoming spaces that infuse the city environment with a positive sense of self. It has been shown that well-kept treed neighbourhoods serve to strengthen the ties among residents, generating a sense of place and care among neighbours. This in turn generates important civic values such as a greater sense of safety and adjustment, more use of neighbourhood common spaces, and fewer incivilities.

## "... contribute to sense of well-being"



In his book "The Nature Principle", Richard Louv speaks of nature-deficit disorder and how urban people ought to deal with it. The main argument is that the more people experience nature, the better they feel, emotionally, mentally, and physically. In most cities in Canada, trees dominate the natural ecosystems. Thus, in an urban environment, if we are to bring nature to the people, that means more trees, not just in total but also more trees in naturalized conditions. The healthier the urban forest, the healthier and happier the people!

## Downsides to Trees in the City

Of course there are reasons for not wanting certain kinds of trees in specific places, at specific times, in the city. For example, an old, weak tree with dead branches is likely a safety hazard. A large tree might be shading an area where someone wants to grow sun-loving plants. Some trees produce pollen that irritates asthma sufferers. Leaves and fruits may need to be cleaned up whenever and wherever they fall. Tree roots may cause the sidewalk concrete to buckle and break. Additional problems can also be identified.

In general, it is our view that the benefits of trees in the city greatly outweigh the downsides. Choosing wisely which trees to plant where and when, as well as engaging in sound maintenance and stewardship programs, can reduce the downsides to tolerable levels and greatly increase the benefits.



## Further Information

We strongly encourage readers to avail themselves of the abundance of good information about trees in the city and urban forests on the following websites:

- Tree Canada: [www.treecanada.ca](http://www.treecanada.ca)
- Canadian Urban Forest Network:  
[www.tcf-fca.ca/programs/urbanforestry/cufn](http://www.tcf-fca.ca/programs/urbanforestry/cufn)
- International Society of Arboriculture:  
[www.isa-arbor.com](http://www.isa-arbor.com)
- Society of Municipal Arborists:  
<http://www.urban-forestry.com/>
- USDA Forest Service – research stations:
  - Pacific Northwest: [www.fs.fed.us/pnw](http://www.fs.fed.us/pnw)
  - Northeastern: [www.fs.fed.us/ne](http://www.fs.fed.us/ne)

## Taking Responsibility, Taking Credit

For the urban forest to thrive, many people and organizations need to share in their stewardship. First and foremost are land owners - these can be governments (at all levels), businesses, individuals, organizations, and others. Landowners, for the most part, control how the tree canopy develops on their properties and also how built infrastructure is put in place and maintained. Secondly, municipal governments, business associations, neighbourhood groups, and schools can support citizen-oriented stewardship initiatives focussed both on learning more about trees in the city and on taking direct action to improve the urban forest. Many more stakeholders could be singled out for attention. We emphasize the need for all urban citizens and visitors to respect trees, doing no damage and appreciating them for all the ways they enhance our lives.

Let's not take our urban forests for granted. Let's learn more about them, enhance them, and celebrate them. Such celebration can showcase both the trees themselves - as the magnificent forms of life they are - as well as the individuals and groups who show outstanding leadership in their stewardship.



Canadian  
Urban  
Forest  
Research  
Group

We heartily welcome any and all inquiries and communications with people who would like to converse with us about trees in the city and urban forests. We have many methods by which you can contact us: mail, email, phone, or a personal visit. Here are our coordinates:

- On the web:  
[www.canadianurbanforest.ca](http://www.canadianurbanforest.ca)
- At Dalhousie University in Halifax:  
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