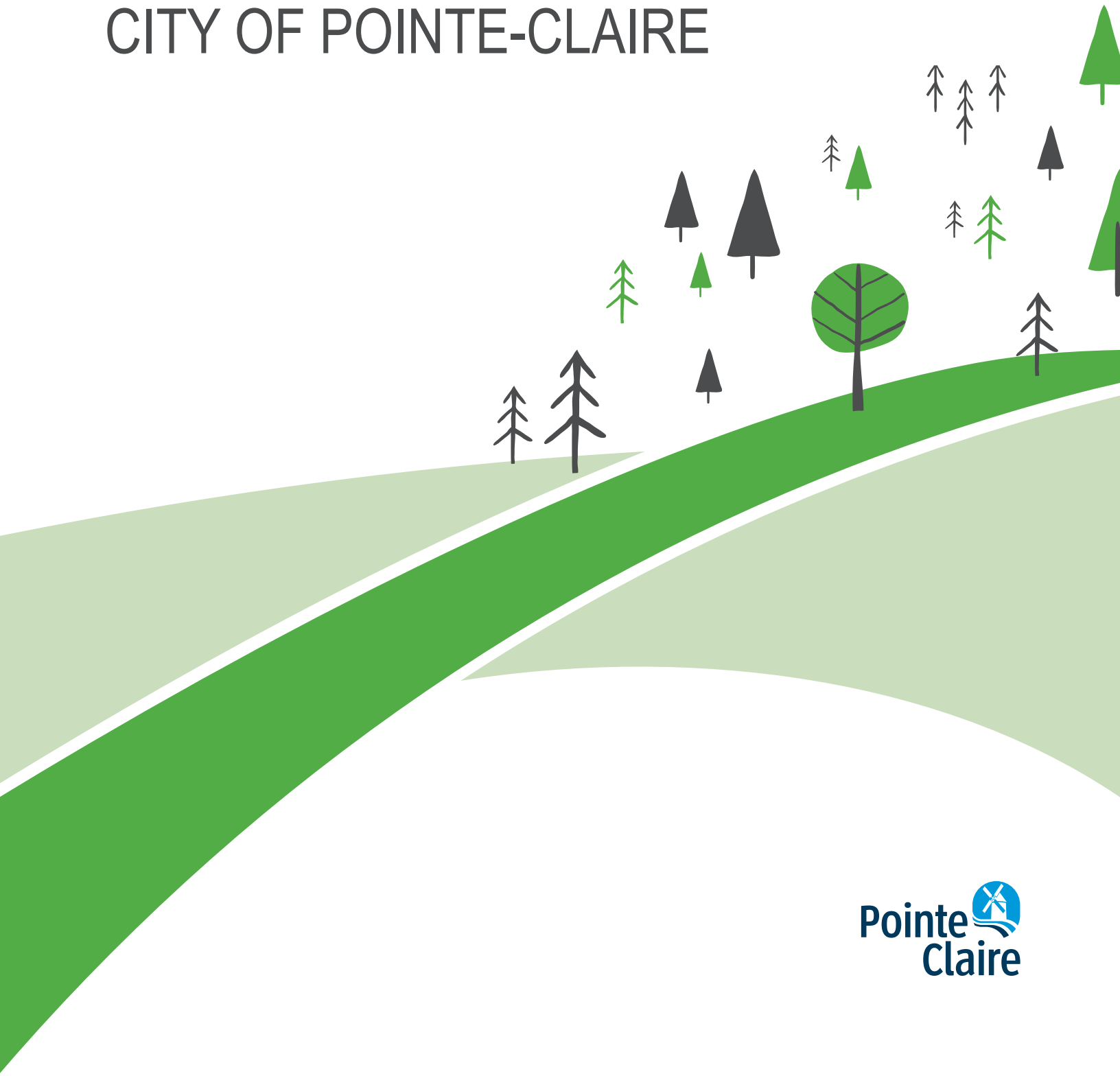
URBAN FORESTRY POLICY

CITY OF POINTE-CLAIRE



Pointe Claire

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. FOUNDATIONS

In 2017, the City of Pointe-Claire adopted a 2016–2020 sustainable development policy and its action plan with the objective of **constantly improving the quality of life for the benefit of current and future generations** (City of Pointe-Claire, 2016b). Several objectives of this policy directly affect tree resources because of its influence on several environmental components (water, air, soil) and on biodiversity.

Based, among others, on a series of measures to adapt to climate change, the environmental policy includes the development of an urban forestry policy as one of its objectives. This policy must contribute to an adequate response to the main issues associated with urbanization and climate change. In fact, trees and woodlands provide many services to the population that generate environmental, social and economic benefits.

Urban forestry is the sustained planning, planting, protection, maintenance, and care of trees, forests, green space and related resources in and around cities and communities for economic, environmental, social, and public health benefits for people (Deneke, 1993).

The arboreal heritage includes all the trees that are part of the garden and landscape of cities, as well as road and river networks (Bonnardot, 2004).

Given that 82% of the Canadian population lives in urbanized areas (Rosen, 2016), citizens are primarily in contact with trees in parks, public gardens and their back yards. Trees in an urban environment provide many benefits, increasing both the quality of the living environment and the physical and mental condition of individuals. While not a complete list, Table 1 lists many of the benefits of having trees in the city.

Knowledge of trees, as well as their preservation and enhancement, are necessary to maintain the quality of the living environment and urban landscape.

The urban forestry policy illustrates the City's intentions to renew, maintain and preserve its urban tree canopy. More specifically, it aims to reinforce the commitments already made by the City and to make citizens aware of the importance of trees and the actions to be taken.

TABLE 1 BENEFITS OF THE PRESENCE OF TREES IN THE CITY

Environmental benefits
• The quality of water and air is improved by capturing pollutants and suspended particles. • Carbon is captured and greenhouse gases are reduced. • Solar radiation is controlled. • Shade is created and the heat island effect is reduced. • The degree of glare and light reflection is reduced. • Erosion and runoff are controlled. • Water is retained and water permeability in soil is increased. • Noise intensity is reduced (vehicles, industries). • A habitat favourable to wildlife is created (biodiversity is preserved in an urban environment).
Aesthetic benefits
• Space is articulate and defined. • There is a variety of colours, shapes and textures in the landscape. • Architectural lines of buildings are softened.
Economic and social benefits
• Privacy is preserved. • Property values are increased. • Air conditioning costs are reduced in summer and heating costs reduced in winter. • Winds are blocked. • Traffic is controlled (the speed of cars is reduced). • A sense of belonging to the community or social fusion is created. • Jobs are created in the urban forestry sector. • Crime is reduced (such as domestic violence). • Graffiti is reduced. • Food for animals and people is produced (fruits, berries and nuts).
Benefits on physical and psychological health
• Blood pressure and stress are reduced, resulting in fewer negative reactions to stressful experiences and less depression. • Cardiovascular and respiratory diseases are reduced. • Disease recovery is faster. • Human sociability is increased. • There is a visual and mental break from monotony and uniformity of inert materials (concrete, asphalt, etc.).

Sources: Société internationale d'arboriculture Québec (1995); Abraham (2013); Donovan and collab. (2013); Tree Canada (s.d.)

2. VISION AND GUIDELINES

By adopting an urban forestry policy, the City of Pointe-Claire intends to provide its citizens and future generations with a healthy environment that respects the environment in a context of global change. The City recognizes the significant contribution of urban trees in maintaining a healthy living environment for its population. It manages and maintains its arboreal heritage efficiently by keeping information on its state of health up to date. By implementing numerous actions involving trees and their target environment, the City maintains and develops its forest cover, particularly in priority areas. Citizens and community stakeholders recognize the importance of trees and woodlands within the City, and actively participate in various tree conservation and enhancement activities.

To achieve this vision, the City of Pointe-Claire has defined three main guidelines:

- Preserving, restoring and developing arboreal heritage;
- Maintaining and developing the forest cover;
- Mobilizing and involving stakeholders.

These three guidelines were then broken down into objectives. An action plan resulting from the guidelines and their objectives has been developed and is included as an appendix to the policy.

3. PORTRAIT OF THE FOREST SYSTEM

3.1. CONTEXT

3.1.1 Territory

Located in Montréal's West Island, in the Greater Montréal area, Pointe-Claire covers an area of 18.9 km^2 and has a population of over 32,000 residents (Ministère des Affaires municipales et de l'Occupation du territoire [MAMOT], 2019).

According to the ecological classification system of Québec, the City of Pointe-Claire is located in the regional landscape unit of Montréal and the bioclimatic domain of the maple hickory. The climate in this region is moderate subhumid continental and the mildest in Québec. The average temperature is among the highest, and the growing season is one of the longest (Robitaille and Saucier, 1998). Marine deposits, composed mainly of clay, occupy more than half the area in the territory. The vegetation is very diverse and consists of several thermophilic species growing at the northern edge of their range, such as the bitternut hickory (*Carya cordiformis*), shagbark hickory (*Carya ovata*), hackberry (*Celtis genus*), black maple (*Acer nigrum*), swamp white oak (*Quercus bicolor*), rock elm (*Ulmus thomasii*), pitch pine (*Pinus rigida*) and many shrubs and herbaceous plants. Other more northern species are also present, such as the sugar maple (*Acer saccharum*), American white ash (Fraxinus americana), northern red oak (*Quercus rubra*), silver fir (*Abies spp*) and spruce (*Picea spp*).

Figures for the City of Pointe-Claire:

- **14 parks and 23 green spaces**
- **10% of the total area consists of green spaces**
- **More than 21,000 public trees on the rights-of-way of streets, parks and green spaces, over 40% of which are mature trees**
- **250 public trees over 1 m in diameter at the trunk**
- **Most common species: maple (30%) and ash (17%)**
- **23.5% of the area is covered by the forest canopy, according to an analysis conducted in 2007**

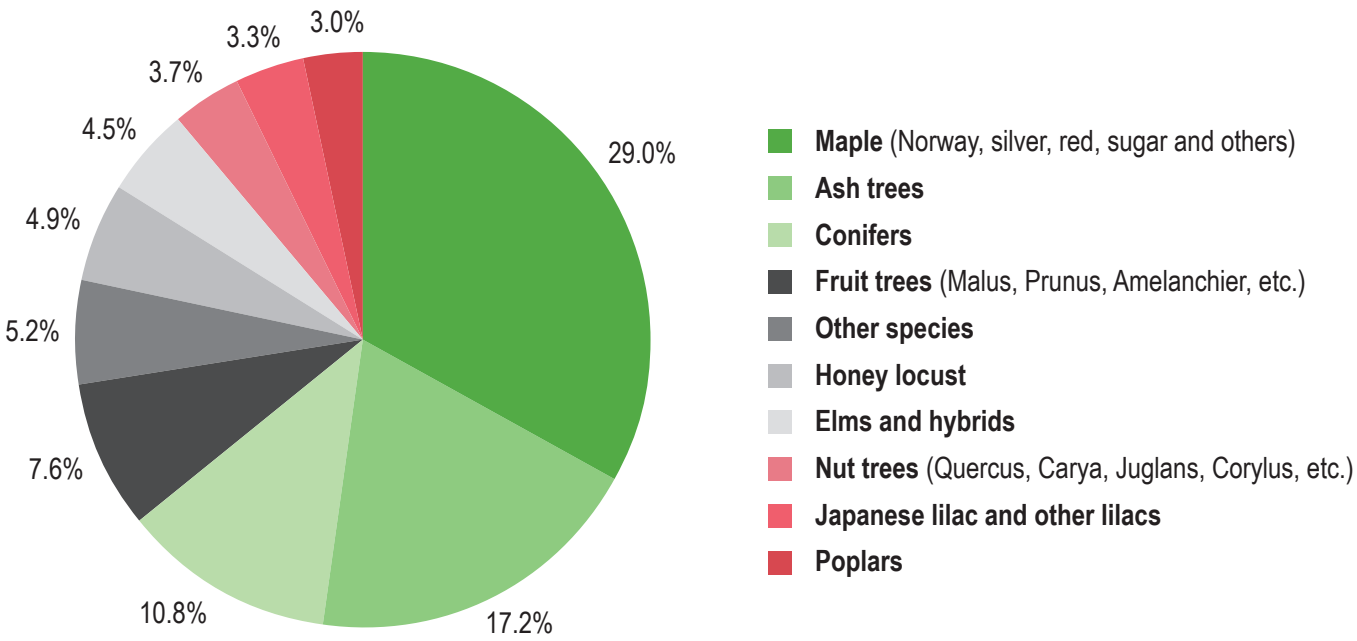


FIGURE 1 COMPOSITION OF THE TREE COVER IN THE CITY OF POINTE-CLAIRE

The inventory of public trees in the City of Pointe-Claire has made it possible to identify 215 species and varieties of trees present on its territory. In general, the tree cover (figure 1) is mostly broadleaved (89%) and dominated by maples (*Acer spp*) and ash trees (*Fraxinus spp*).

Once prized for its agriculture, Pointe-Claire quickly became a tourist attraction, both for its location and its unique character. The village core has in fact retained the representative elements of the era of the French colony. In this sense, it provides a rare insight into the first founding villages of Greater Montréal. These period houses are accompanied by a vast forest cover, composed mainly of mature deciduous trees, several of which are quite old.

3.1.2. Municipal management

The City of Pointe-Claire offers a high-quality environment and lifestyle, making it a prime destination for families and seniors, as well as for industrialists and business people. In addition to the attractions and services, the territory has several parks and green spaces that occupy 10% of its surface. The City also has important natural areas, including the Terra-Cotta Natural Park and the vegetated shores of Lake Saint-Louis.

The pride of the City of Pointe-Claire is also reflected in the municipal organization. The architectural and natural heritage has always been a key concern of the City, as is demonstrated by its proactive management of the territory. Many horticulturists, arborists and forestry engineers are employed by the City to ensure optimal management of its public tree heritage, parks and green spaces. Furthermore, actions are supported by an extensive regulation that deals with several aspects of managing trees (planting, felling, conservation, maintenance) and green spaces in general. Finally, the City organizes events every year, such as Earth Day celebrations, which include distributing trees to citizens, among other activities.

The arboreal heritage faces pressures: new neighbourhoods are developed, there are more large shopping centres and parking lots, a problem with heat islands has emerged, and the City is not immune to exotic invaders, such as the emerald ash borer, which has been attacking the island of Montréal. To counter these threats to quality of life and the environment, the City of Pointe-Claire is acting proactively by implementing planting programs, adopting a strategy to fight the emerald ash borer and a regulation aimed at protecting the forest cover, all with a view to sustainable development. The City places great importance on the conservation and densification of tree cover. The development of an urban forestry policy becomes essential for defining the areas of intervention to be prioritized and to implement a consistent action plan.

3.2. AREAS OF STUDY

3.2.1. Arboreal heritage

3.2.1.1. Status of knowledge of trees and their biodiversity

Trees

Data on the state of health, the size and location of trees, but also on the presence of various stress factors that may affect their integrity (pests, climate change, work, physical damage) are required to prepare a progress report on the arboreal heritage and develop adapted intervention plans.

In-depth knowledge of arboreal heritage helps to identify elements of interest, both for wildlife and vegetation, and to guide management and conservation measures. Data from several years ago are often not very useful (Bonnardot, 2004). Since 1998, the City of Pointe-Claire has maintained a computerized inventory of public trees located in street rights-of-way, parks and green spaces.

Biodiversity

Whether individually or as part of an ecosystem, trees are a valuable habitat that support biodiversity within the “urban ecosystem.” However, the forest ecological balance is fragile and complex. It is even more precarious if its surface is small, reducing resilience in the event of a disturbance (Bonnardot, 2004). Identifying and preserving habitats and environments intrinsically is therefore not enough to ensure their sustainability. They must be connected to each other by links or ecological corridors as part of the urban landscape. The easiest and most receptive landscape elements and environments to cross facilitate the movement of individuals from one habitat to another.

In Pointe-Claire, there are possibilities of links that are fairly receptive. One of these links is the banks of Lake Saint-Louis, along the entire southern tip of Pointe-Claire. In fact, the City is responsible for 3.6 km of shorelines and has planned revegetation activities over the next 15 years (City of Pointe-Claire, 2016a). This mosaic of environments connected to the St. Lawrence River contains habitats that are conducive to their use and the establishment of several species, while making their movements on the territory possible. Located further inland, the rail and highway corridors that cross the city from east to west are also methods of passage. Although it is one of the sources of fragmented landscapes, a linear transport infrastructure is never totally impermeable since permeability depends on the species considered, the footprint of the infrastructure, the intensity of use, the type and condition of fences, the presence of crossings, etc. (Trame verte et bleue et région Midi-Pyrénées, 2014).

However, the permeability of the environment not only benefits the species and areas of interest. Invasive alien species, pests and other "undesirables" also use these propagation avenues to colonize the environment and spread within the territories. Constant monitoring of their presence makes it possible to develop and implement control measures quickly after they are discovered. One of the most striking examples is that of the emerald ash borer (*Agrilus planipennis*). After wreaking havoc in the United States and Southern Ontario, this insect is spreading quickly in Québec, mainly in the metropolitan area (Communauté métropolitaine de Montréal [CMM], 2016). It was detected in 2013 on the territory of the City of Pointe-Claire, which adopted the Strategy to Fight the Emerald Ash Borer (City of Pointe-Claire, 2015b). The insect's attack on the tree almost inevitably leads to the tree's death, which causes costs and losses for the community. Scientists at the Canadian Forest Service (CFS) estimate that the cost of treating, removing and replacing trees affected by the emerald ash borer in Canadian municipalities may reach $2 billion over a 30-year period (Natural Resources Canada, 2018). In addition, a large-scale study conducted in the United States has already demonstrated the impact on people's health of losing ash trees in urban areas, revealing a significant increase in deaths from cardiovascular and respiratory diseases over the last six years following the discovery of the insect causing ash tree mortality in 15 U.S. states (Donovan et al., 2013, cited in Paquette, 2016).

The presence of pests is not the only challenge facing trees in an urban setting. In their study on forests in an urban setting, Nowak et al. (2010) report on the main sources of stress, which are:

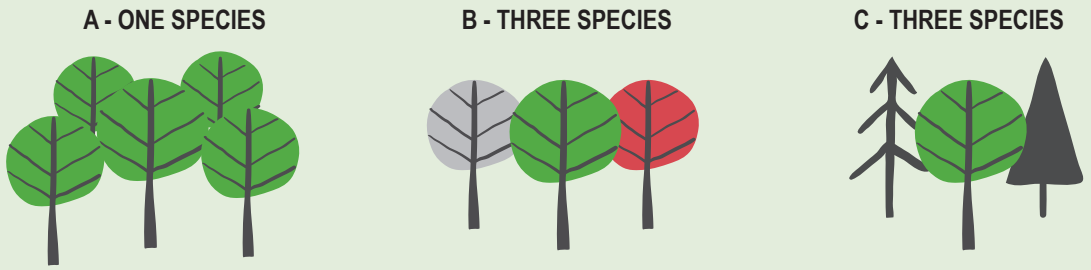
- pests and diseases;
- invasive plants;
- climate change;
- urban development;
- air pollution;
- natural disasters; and
- forest fires.

Whether on a local or global scale, the existence of these stress factors is real, and conservation issues are more important than ever for cities because the presence and health of trees is one of the keys to a healthy quality of life.

Increasing the amount and diversity of trees in the city helps to fight these stresses. In a study on reforestation in urban areas in Québec, several observations were made about the situation of trees in the city (Paquette, 2016):

- Despite the great apparent diversity, urban forests are dominated by only a few very abundant species.
- The species used are very similar.
- There is a huge number of cloned trees, which leads to a loss of genetic diversity.
- The dominant species are generally the same in all major cities in the Northeast, unlike natural ecological units.

In view of the various issues affecting trees in the city, the City of Pointe-Claire has been working for 10 years on establishing resilient trees. To achieve this, more than 50 tree species are planted every year to better respond to global changes.



Here are three tree communities: Community A is composed of a single species; communities B and C consist of three species each.

By increasing the number of species (community A to B or C), we increase species diversity (biodiversity in the common sense). However, the choice of species is important.

Community B is composed of three species that are similar in their biological characteristics (functional traits). For example, imagine a mix of silver maple, Norway maple and red ash.

Community C is also composed of three species. However, the characteristics of these species are very diverse. For example, imagine a mix of chicot from Canada, serviceberry and thuja.

As a result, despite the diversity of species in communities B and C, community C has greater functional diversity, providing more ecological services and greater resilience.

Source: Paquette (2016)

FIGURE 2 DIFFERENCE BETWEEN SPECIES DIVERSITY AND FUNCTIONAL DIVERSITY

Remarkable trees

Remarkable trees represent a component of the City's arboreal heritage that deserves to be known and enhanced. A remarkable tree can be defined as a specimen that has exceptional characteristics in relation to certain established criteria: its size, approximate age, aesthetics, rarity, historical and cultural value and location (Association forestière des deux rives, 2016). A remarkable tree should be recognized as a heritage landmark, just like a historic monument.

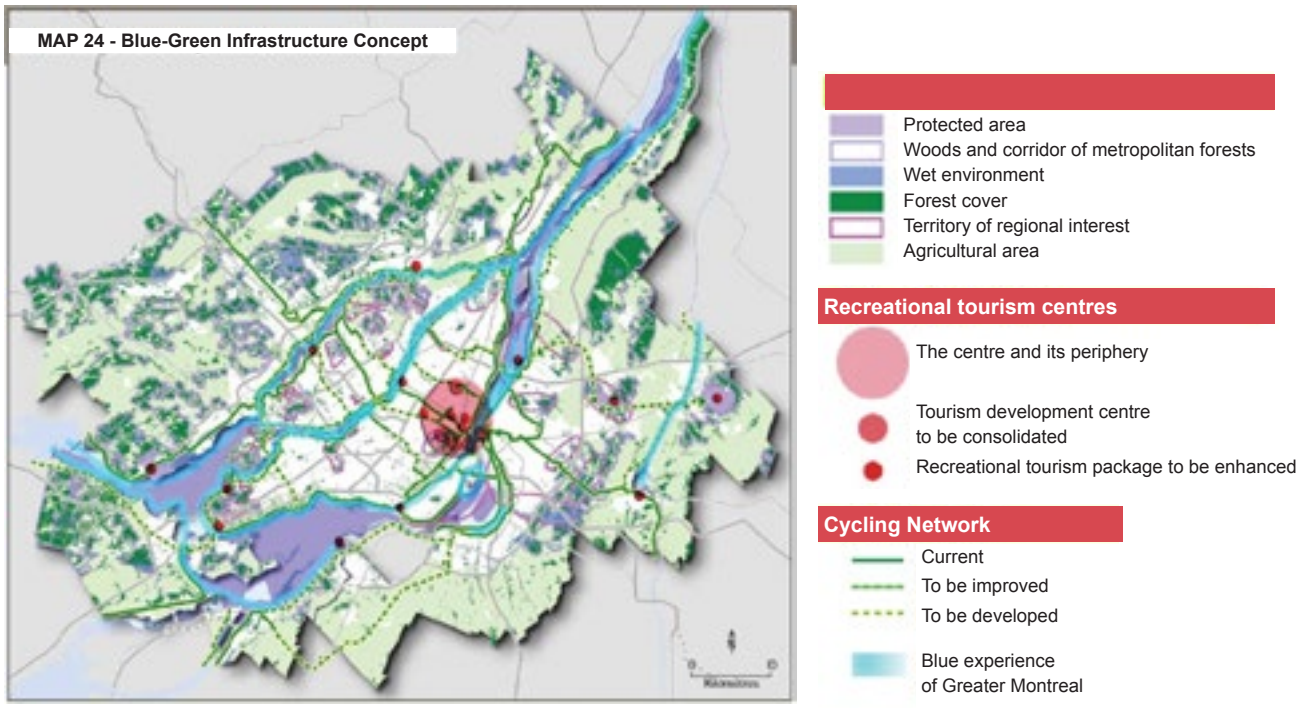
There is no official register of remarkable trees in Pointe-Claire. However, according to the public tree database, several individuals have particularly interesting dendrometric characteristics, which may justify their classification as remarkable trees. For example, more than 200 trees have a trunk diameter greater than 1 m, which is rather rare in urban areas.

Pointe-Claire has more than one hundred buildings, sites and sectors of heritage and archeological interest (City of Pointe-Claire, 2015a), many of which are homes to mature trees. In a study on the characterization of urban heritage carried out on City territory (Ville de Montréal, 2005), five sites were listed as "exceptional," namely Pointe-Claire Village, the Beaconsfield golf course, Bowling Green, Cedar Street and the Stewart Hall property. The recommendations made in this study include the preservation, protection and enhancement of vegetation cover and natural heritage, which contribute to the exceptional character of these heritage areas (Ville de Montréal, 2005).

Urban woodlands

The City lists 14 large parks and 23 green spaces, occupying 10% of the total area of the territory (City of Pointe-Claire, 2015a). Among these, the Terra-Cotta Natural Park is a renowned natural woodland located in the heart of the city. In order to support its biodiversity and promote the presence of several layers of vegetation to maintain the forest cover, conservation efforts and plantings are carried out.

The identification and characterization of all woodlands of interest is a first step in supporting their conservation. With a view to sustainable development of the territory, these spaces must endure. They must therefore be better known, and their area and function must be protected within their environment. In its strategic guidelines for protected areas, Québec's goal is to reach 12% of protected areas on its territory (Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques [MDDELCC], 2011). Several organizations, including municipalities, have aligned themselves with this objective by defining their own conservation strategies. This is true of the CMM, which has identified a series of environments of interest on its territory and has grouped them into an ecological set named the "blue-green infrastructure." It is committed to protecting 17% of the territory of Greater Montréal, distributed in the form of natural environments, landscapes and heritage buildings of interest (CMM, 2013).



Source: CMM (2012)

FIGURE 3 GREATER MONTRÉAL BLUE-GREEN INFRASTRUCTURE CONCEPT

Included in these environments are protected areas, woodlands and corridors of metropolitan forests. The CMM recognizes the importance of woodlands and forest corridors, which constitute one of the essential conditions for maintaining the biodiversity of the region. As such, in 2005, it set up the Programme d'acquisition et de conservation des espaces boisés (Fonds vert) [woodlands acquisition and conservation program (green fund)], whose main objective is to support local and regional initiatives for the acquisition and protection of wooded areas and forest corridors.

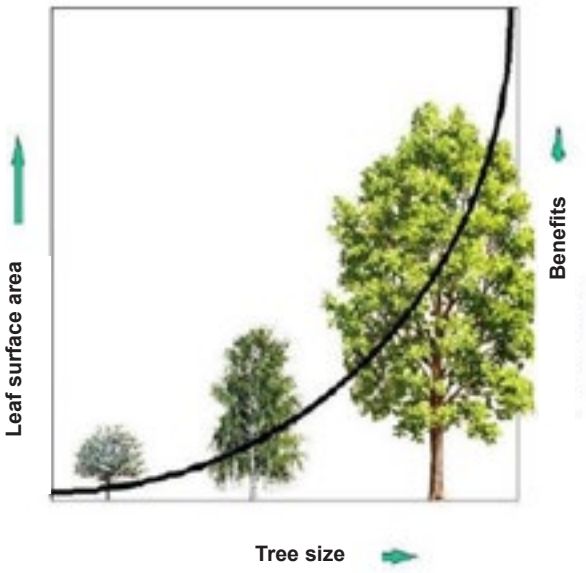
Objective 1: Improve knowledge on trees and their biodiversity

The implementation of an urban forestry policy must be supported by up-to-date knowledge of the tree population and its state of health so that interventions to protect, develop and enhance the arboreal heritage can be planned appropriately.

In natural woodlands, a general inventory of the composition of forest stands and potential wildlife habitats provides a picture of the biodiversity present and possible in all of these environments. In-depth knowledge of arboreal heritage and potential wildlife habitats helps to identify elements of interest, both for wildlife and vegetation, and to guide management and conservation measures. Lastly, maintaining an up-to-date inventory makes it possible to plan and target interventions appropriately.

Recommendations:

- Continue the annual update of the inventory of public trees.
- Perform a full update of the inventory every five years.
- Prepare an inventory of species with a precarious status.
- Locate and identify invasive exotic species and pests.
- Produce a quantitative and qualitative inventory of public natural woodlands (Terra-Cotta Natural Park, David-W.-Beck Park, Cedar Park Heights and the wooded area at the civic centre).
- Improve knowledge of wildlife in an urban setting.
- Create a register of remarkable trees.
- Identify and preserve ecological corridors.
- Identify and characterize natural environments of interest.



Source: Rosen (2016)

FIGURE 4 CORRELATION BETWEEN THE SIZE OF TREES AND THE EXTENT OF THEIR BENEFITS

3.2.1.2. Conservation and enhancement of trees

Keeping a tree healthy in an urban setting is a different challenge from doing this in a natural environment. The urban environment exposes trees to various air pollutants and injuries. It does not always provide the underground or aerial space necessary for their normal development (Paquette, 2016). However, a healthy and preserved tree will develop its size and standing, thereby optimizing its benefits (figure 4).

Pressures from the urban environment

According to the urbanization gradient, various environments that are more or less favourable to the development of trees are found in the urban environment. Table 2 presents the different growth environments of trees in urban areas (Greater Montréal) and the conditions and constraints that characterize them (Paquette, 2016). The estimated frequency data are taken from available city inventories.

	Types of locations and examples	Estimated frequency (%)	Special conditions (stress)	Acceptability constraints to the presence of trees
Street	Bench, sidewalk, ground surface, island	25	Most significant stress: available space and infrastructure (aerial and underground), salt (spray and soil), compaction, pollution, wind, insulation, extreme heat, mechanical stress and injury	Most significant constraints: public acceptance, leaves, fruits and flowers, inconvenience (aphids), municipal infrastructure, maintenance of public roads and movement of equipment, allergies and aesthetics
Flowerbeds	In front of residences in the municipal right-of-way, but off the sidewalk	40	Same as "Street" section, but significantly diminished.	Same as "Street" section, but significantly diminished.
Park	Large lots belonging to the government, for example	30	Pollution, wind, insulation, heat, mechanical stress and injury. Note that these stresses only play a minor role in this environment	Allergies, aesthetic, public security (groves and low foliage), exotic and invasive species. Note that these factors are less restrictive than in the "Street" or "Flowerbeds" sections
Woods	"Natural" forest in an urban environment	N/A	Low: similar to natural forests	Exotic and invasive species

Source: Paquette (2016)

TABLE 2 SUMMARY OF LARGE GROUPS OF PLANTING ENVIRONMENTS FOUND IN THE CITY – REGION OF MONTRÉAL

In their study on forests in an urban setting, Nowak et al. (2010) report on the main sources of stress:

- Pests and diseases
- Invasive plants
- Climate change
- Urban development
- Air pollution
- Natural disasters
- Forest fires

Whether on a local or global scale, the existence of these stress factors is real, and conservation issues are more important than ever for cities because the presence and health of trees is one of the keys to a healthy quality of life.

Objective 2: Preserve and enhance the arboreal heritage

The trees and the forest in an urban setting are subjected to several sources of stress that threaten their integrity and the state of their health, such as pests and diseases, invasive plants, urban development, air pollution and climate change. Increasing the amount and diversity of trees in the city helps to protect them from these sources of stress by increasing the resilience of the urban forest.

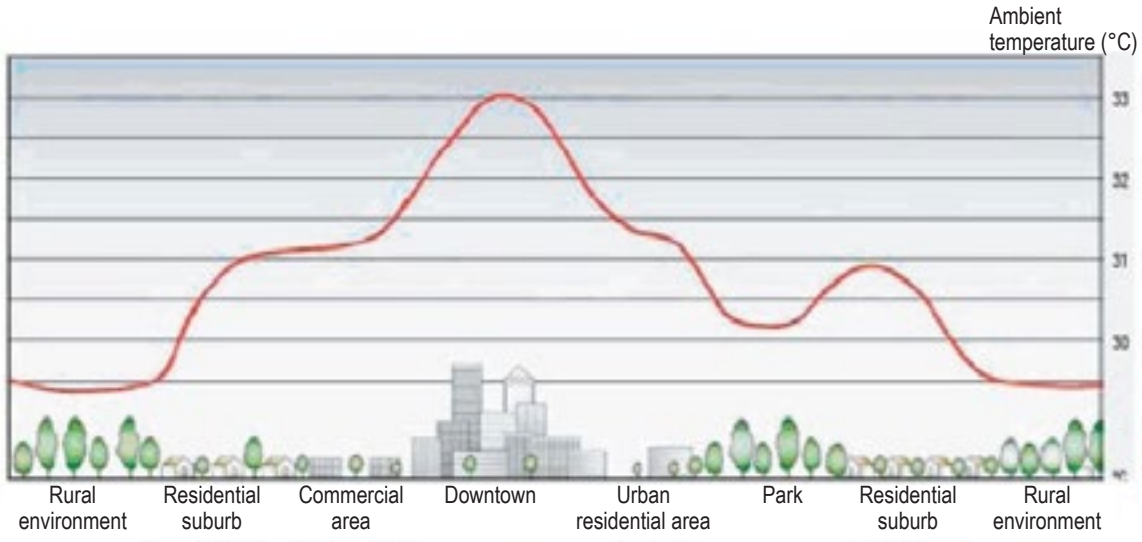
Recommendations:

- Plan maintenance interventions on the trees (cyclical maintenance, felling, protection).
- Prioritize indigenous species and those that are adapted to an urban environment and resistant to pests when choosing the species to be planted.
- Continue with integrated pest management.
- Continue to increase the number of trees and maintain their diversity in the city: species diversity and diversity in the biological, functional and genetic characteristics.

3.2.2. Forest cover

3.2.2.1 Heat islands and canopy index

The absence of forest cover is one of the reasons for the emergence and densification of heat islands in the city (figure 5).



Source: Butera (2008), cited by Payan (2011)

FIGURE 5 TEMPERATURE VARIATION BASED ON THE FOREST COVER AND BUILT ENVIRONMENT IN A CITY AND ITS PERIPHERY

In Québec, forest cover in cities has been in constant decline since the 1960s. It even threatens to disappear in some of the more developed sectors of the Greater Montréal area (Giguère, 2009). Since forest canopy plays an essential role in protecting against heat through the phenomenon of evapotranspiration and the shading of soils and materials, its disappearance will result in more heat in the urban environment. However, the presence of heat islands has a negative impact on humans and their living environment (Giguère, 2009). Adding greenery by planting in sectors with the least amount of forest cover decreases the size and intensity of islands of heat.

According to a study on the nature of heat islands conducted for the City of Pointe-Claire (Comité écologique du Grand Montréal [CÉGM], 2012), the heat problem on the territory is primarily produced by:

- industrial buildings;
- shopping centres;
- institutional buildings;
- municipal buildings; and
- parking lots and other paved surfaces.

Source: CÉGM (2012)

FIGURE 6 HEAT MAP OF THE CITY OF POINTE-CLAIRE

Most of these problematic environments are concentrated in the northern part of the city, more specifically in districts 6, 7 and 8 (figure 6).

The territory can also be analyzed from the angle of wooded areas, defined among others by the extent of its canopy or greater foliage of trees. Providing many ecological services, the canopy creates shade while absorbing dust and the many air pollutants (City of Pointe-Claire, 2015a).

To measure the canopy in the form of an index (used in most major North American cities), we calculate the shade on the ground provided by the crown of trees in relation to the territory (City of Montréal, 2017). Based on data from 2007, the canopy of the city occupies 433 ha, which gives it a canopy index of 23%.

However, Pointe-Claire's canopy is distributed very unevenly on the territory. Although the residential areas to the south of the city offer a forest cover ranging from 26% to 41%, the three sectors to the north have fewer trees and range from 9.5% to 14.1% (see figure 7). Within these three sectors, the canopy in the residential area is younger and less developed because few trees were preserved during the construction of residential developments. Also, despite intensive planting efforts at the fronts of industrial and commercial lots, there are large areas that are devoid of trees.

Maintaining the forest cover does, however, present a challenge because the emerald ash borer requires interventions and many fellings (City of Pointe-Claire, 2015b). The increased planting efforts, particularly that of large-scale trees, limits the reduction in the forest canopy and maintains it, but also increases it (see the simulation of the change in the canopy based on plantings and losses in Appendix 1).

Objective 3: Extend and harmonize the forest cover of the city

With a canopy distribution covering 23% of its territory, Pointe-Claire is among the richest municipalities in the urban area of Montréal. Although it is highly developed, Pointe-Claire's canopy is distributed very unevenly on the territory. Some sectors suffer from a lack of trees that can be corrected by the reforestation of suitable sites that are already available, among others.

Recommendations:

- Continue to increase planting efforts.
- Prioritize large-scale trees when choosing species to be planted.
- Increase the canopy index of the City of Pointe-Claire to 25% by 2042.
- Maintain a minimum of one tree in the right-of-way of the City in front of each residence in Pointe-Claire.
- Continue planting to systematically replace all felled trees.
- Maintain the increase in reforestation in the three districts in the northern part of the city: Seignory (district 6), Northview (district 7) and Oneida (district 8).

FIGURE 7 DISTRIBUTION OF THE CANOPY BY DISTRICT IN THE CITY OF POINTE-CLAIRE

3.2.2.2 By-laws

In addition to this policy, the City of Pointe-Claire can translate its urban forestry concerns into various planning by-laws. In fact, a series of regulatory provisions has already been developed for the management of trees on the territory. However, the new challenges identified, as well as societal awareness of the importance and role of trees in urban areas, make it necessary to improve and clarify certain provisions, and to facilitate their application to reach the new objectives that have been set.

When compared to other municipalities, the City of Pointe-Claire has some of the most comprehensive and extensive regulatory tools. More specifically, the City distinguishes itself through:

- its comprehensive provisions requiring that cut trees must be replaced, even on side yards or back yards; and
- detailed protection measures to be implemented during construction or excavation work.

In a context of urban development and climate change, it would be best to improve the by-laws in order to maintain and increase the canopy on the territory.

Objective 4: Update by-laws pertaining to trees

To be effective in urban forestry, the City must be able to rely on comprehensive and up-to-date by-laws that reflect the current state of knowledge in urban forestry and climate change. In addition, these by-laws must be easily accessible and searchable by all citizens.

Recommendation:

- Adopt new by-laws governing the planting of trees on residential, industrial and commercial.
- Continue to make these by-laws available online.

For residential uses:

- Review the list of prohibited tree species.
- Establish a minimum number of trees depending on the size of the lot, which includes at least one tree in the backyard.

For commercial and industrial uses:

- Improve existing standards that set the number of trees according to the area of free land for development (e.g., lane, parking lot etc.), taking into account the width of the frontage.

- In accordance with Section 19 of the *Municipal Powers Act*, adopt an environmental by-law concerning the planting of trees to limit heat islands. The by-law could provide for a certain time period to give businesses and industries time to comply with the new standards.

3.2.3. Stakeholders

3.2.3.1. Civic action

Given that a significant proportion of the territory's trees are located on private residential land, citizen participation in tree protection and urban forest development is essential. Citizens who are aware of their duties, as well as the consequences of some of their actions, can contribute to preserving and improving the forest landscape, particularly by protecting and planting trees. In the spirit of mobilizing citizens, the many benefits generated by trees in urban areas and their significant contribution to the quality of life of citizens are communicated effectively.

Conscious of the importance of citizen involvement in the conservation of forest cover and arboreal heritage, several municipalities have set up initiatives aimed at getting the population actively involved. Thus, many projects have emerged in the Greater Montréal area, such as the Canopy Action Plan, Alliance forêt urbaine (urban forest alliance), Blue-Green Infrastructure, etc. (CMM, 2012). For several years, the City of Pointe-Claire has been organizing various activities on the theme of trees and woodlands as part of Earth Day. Hundreds of trees are distributed every year to citizens for planting on their land. Activities are also organized for and by citizens.

Objective 5: Educate citizens about the importance of trees in the city

The City of Pointe-Claire has been conducting citizen awareness campaigns on the importance of urban trees for several years. These actions need to be maintained and communicated effectively to citizens through online tools.

Recommendations:

- Keep organizing annual citizen days dedicated to urban forest interventions (planting, cleaning, etc.).
- Illustrate the various regulatory standards in order to provide concrete and easily understandable examples that can be communicated to citizens through the website.
- Continue the annual distribution of trees.
- Produce up-to-date online information on the City's annual interventions in urban forestry.

3.2.3.2. Institutions, businesses and industries

Some industrial and commercial sectors of the City suffer from a significant lack of forest canopy because of the asphalt surfaces created by their development. These surfaces, which are directly exposed to solar radiation, are currently the main heat islands of the City.

Pointe-Claire has many establishments, businesses and industries, such as Fairview shopping centre, Complexe Pointe-Claire, Centre Terrarium, Plaza Pointe-Claire, Megacentre des Sources and Promenades Pointe-Claire, as well as three commercial arteries (Donegani Avenue, Du Bord-du-Lac – Lakeshore Road and Cartier Avenue). Businesses and industries predominantly occupy the northern sector of the city. Industrial and commercial owners have a significant potential for action to reduce heat islands, both through corrective measures and project planning.

Objective 6: Involve owners in protecting forest cover

Commercial and industrial properties occupy large areas within the city. They have a significant impact on the quality of the urban environment. In this context, owners need to be made aware of their impact on the environment and the positive actions they can take. Their commitment is of considerable importance to their public image.

Recommendation:

- Evaluate the forest potential of commercial and industrial areas.

BIBLIOGRAPHY

ABRAHAM, L. (2013). “When Trees Die, People Die”, *The Atlantic*, January 22. Online: https://www.theatlantic.com/health/archive/2013/01/when-trees-die-people-die/267322/

ARBRES CANADA (s.d.). *Les bienfaits des arbres*. Online: https://arbrescanada.ca/ressources/bienfaits-des-arbres/

ASSOCIATION FORESTIÈRE DES DEUX RIVES (AF2R) [2016]. *Les arbres remarquables*. Online: http://www.af2r.org/mise-en-valeur-et-conservation/les-arbres-remarquables-des-monuments-vivants (Consulted on February 15, 2017)

BONNARDOT (2004). “Inventaire, sauvegarde et mise en valeur des arbres remarquables”, in *La gestion des arbres*, p. 93-96. Online: http://www.arthur-elagage.fr/wa_files/la-gestion-des-arbres.pdf

COMITÉ ÉCOLOGIQUE DU GRAND MONTRÉAL (CÉGM) [2012]. *Caractérisation préliminaire de la problématique d’îlots de chaleur sur le territoire de la ville de Pointe-Claire*, report presented to the City of Pointe-Claire, December, 21 p.

COMMUNAUTÉ MÉTROPOLITAINE DE MONTRÉAL (CMM) [2012]. *Plan métropolitain d’aménagement*, Montréal, April, 221 p.

COMMUNAUTÉ MÉTROPOLITAINE DE MONTRÉAL (CMM) [2013]. *La trame verte et bleue du grand Montréal*, Montréal, February, 28 p.

COMMUNAUTÉ MÉTROPOLITAINE DE MONTRÉAL (CMM) [2016]. *Stratégie métropolitaine de lutte contre l’agrile du frêne 2014-2024*, report, Montréal, January, 97 p.

DENEKE, F. (1993). “Urban Forestry in North America: Towards a Global Ecosystem Perspective”, in G. BLOUIN AND R. COMEAU (under the direction of), *Proceedings of the 1st Canadian Urban Forest Conference*, May 30 to June 2, Winnipeg, p. 4-8.

DONOVAN et al. (2013). “The Relationship Between Trees and Human Health—Evidence From the Spread of the Emerald Ash Borer”, *American Journal of Preventive Medicine*, vol. 44, no. 2, February, p. 139-145. Online summary: http://www.sciencedirect.com/science/article/pii/S0749379712008045

GIGUÈRE, M. (2009). *Mesure de lutte aux îlots de chaleur urbains*, rapport réalisé par l’Institut national de santé publique, Direction des risques biologiques, environnementaux et occupationnels, July, 95 p.

MINISTÈRE DES AFFAIRES MUNICIPALES ET DE L’OCCUPATION DU TERRITOIRE (MAMOT) [2019]. *Répertoire des municipalités du Québec : Pointe-Claire.*
Online: https://www.mamot.gouv.qc.ca/recherche-avancee/fiche/municipalite/66097/

MINISTÈRE DU DÉVELOPPEMENT DURABLE, DE L’ENVIRONNEMENT ET DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES (MDDELCC) [2011]. *Orientations stratégiques du Québec en matière d’aires protégées : période 2011-2015*, report by the Gouvernement du Québec, 8 p.

NOWAK, D. J., S.M STEIN, P.B. RANDLER, E.J. GREENFIELD, S.J. COMAS, M.A. CARR and R. J. ALIG (2010). *Sustaining America's Urban Trees and Forests: A Forests on the Edge Report*, General Technical Report NRS-62, Newtown Square (PA), U.S. Department of Agriculture, Forest Service, Northern Research Station, June, 27 p.

PAQUETTE, A. (2016). *Repenser le reboisement : guide stratégique pour l'augmentation de la canopée et de la résilience de la forêt urbaine de la région métropolitaine de Montréal*, under the direction of Cornelia Garbe, Earth Day, and the Comité de reboisement de la CMM, Montréal, October, 29 p.

PAYAN, E. (2011). *Pour une véritable politique municipale en matière de foresterie urbaine à Saguenay*, report prepared for Les verts boisés du Fjord (LVBF), November 30, 38 p.

NATURAL RESOURCES CANADA (2018). Emerald ash borer.
Online:https://www.nrcan.gc.ca/forests/fire-insects-disturbances/top-insects/13377

ROBITAILLE, A. and J. P. SAUCIER (1998). *Paysages régionaux du Québec méridional*, Sainte-Foy, Les Publications du Québec, 213 p. Produced by Direction de la gestion des stocks forestiers et la Direction des relations publiques du ministère des Ressources naturelles du Québec.

ROSEN, M. (2016). *Foresterie urbaine : bénéfices, enjeux et défis*, presentation made as part of Colloques du Service canadien des forêts – Centre de foresterie des Laurentides, 2015-2016 season.

SOCIÉTÉ INTERNATIONALE D'ARBORICULTURE QUÉBEC (SIAQ) [1995]. *Guide d'évaluation des végétaux d'ornement*, Laval, SIAQ, 67 p.

TRAME VERTE ET BLEUE ET RÉGION MIDI-PYRÉNÉES (2014). *Schéma régional de cohérence écologique (SRCE) de Midi-Pyrénées*, report presented to the Préfet de la région Midi-Pyrénées as part of the Trame verte et bleue, France, December 2014, 443 p.

VILLE DE MONTRÉAL (2005). *Évaluation du patrimoine urbain : arrondissement de Pointe-Claire*, study conducted by the Service de la mise en valeur du territoire et du patrimoine, Direction du développement urbain de la Ville de Montréal.

VILLE DE MONTRÉAL (2013). *Plan d'action canopée 2012-2021*, working document prepared by Direction des grands parcs et du verdissement de la Ville de Montréal and Soverdi.

VILLE DE MONTRÉAL (2017). *Canopée et îlots de chaleur*.
Online: http://ville.montreal.qc.ca/portal/page?_pageid=7377,91101652&_dad=portal&_schema=PORTAL
(Consulted on February 17, 2017)

CITY OF POINTE-CLAIRE (2015a). *Planning Program*, Regulation PC-2768, effective March 1, 2011, Amendment PC-2768-1, December 17, 2015, 70 p.

CITY OF POINTE-CLAIRE (2015b). *Strategy to Fight the Emerald Ash Borer*, Pointe-Claire, September, 25 p.

CITY OF POINTE-CLAIRE (2016a). *Consultation workshop report*, workshops conducted December 19 and 20, 2016 as part of the development of the urban forestry policy, Pointe-Claire.

CITY OF POINTE-CLAIRE (2016b). *Environmental Policy*, report prepared for the City of Pointe-Claire, fall, 43 p.

APPENDIX 1

SIMULATION OF THE CHANGE IN THE CANOPY IN THE CITY OF POINTE-CLAIRE

METHODOLOGY, RESULTS AND LIMITATIONS

Methodology

This simulation aims to model the change in the urban canopy in the City of Pointe-Claire based on the planting and felling of ash trees due to the emerald ash borer. Several felling and planting scenarios are presented. Data from the 2007 analysis of the Pointe-Claire canopy were used for this modelling. This was the most recent data available at the time of the simulation.

For all scenarios, the felling estimates are below:

- 250 ash trees were felled in private areas annually.
- 325 ash trees were felled in public areas annually.

For all scenarios, the planting estimates are below:

- 250 trees were planted in private areas to replace felled ash trees. These trees had an average crown diameter of 1 m at planting.
- 575 trees were distributed annually to citizens on Earth Day for planting in private areas. These trees had an average crown diameter of 50 cm at planting.
- 800 trees were planted in public areas annually. These trees had an average crown diameter of 1 m at planting.

Crown growth is estimated at 20 cm per year for planted trees. No growth is expected for existing trees or for the existing urban canopy.

A total of 9,000 ash trees have been counted in the territory. The average crown diameter of these ash trees is estimated at 2.80 m, for an individual crown of 6.16 m^2.

The following three scenarios have been developed:

1. Pessimistic scenario: Felling of all ash trees, no preserved ash trees
2. Realistic pessimistic scenario: Preservation of 200 ash trees on private property and 800 ash trees on public property
3. Realistic optimistic scenario: Preservation of 200 ash trees on private property and 2,000 ash trees on public property

Summary of results

SCENARIO	ANNUAL PLANTING	CONSERVATION OF ASH TREES	YEAR IN WHICH A CANOPY INDEX OF 25% IS ATTAINED (SIMULATED PERCENTAGE FOR THE YEAR IN QUESTION)
Pessimistic	1,625	0	2042 (25.01)
Realistic pessimistic	1,625	6,800	2042 (25.04)
Realistic optimistic	1,625	8,000	2042 (25.08)

Interpretation

For all scenarios that take the felling of ash trees into account, the canopy will decrease in the years after the start of the simulation, before increasing. The number of ash trees felled has little effect on reaching the goal of a canopy index of 25% according to this simulation. The number of trees planted is more of a determining factor for when the canopy covers 25% of the Pointe-Claire territory.

Limitations

The simulation does not take into consideration the growth in the existing canopy, its change between 2007 and 2017, and trees planted between 2007 and 2016 inclusively. There is no reference to simulate the “natural” increase in the urban canopy. At maturity, the canopy stops growing and stabilizes.

Furthermore, the average surface of the canopy of ash trees might have been underestimated, which may lower the influence of ash trees on the canopy. The average crown diameter of these ash trees was estimated at 2.80 m, for an individual crown of 6.16 m^2.

DETAILED RESULTS

1. Pessimistic scenario: Felling of all ash trees, no preserved ash trees

	INCREASE IN CANOPY BY PLANTING		CANOPY LOSS BY FELLING ASH TREES		CHANGE IN THE CANOPY		
Year	Number of trees planted	Cumulative additional canopy area (m^2)	Number of ash trees felled	Cumulative canopy loss (m^2)	Cumulative canopy variation (m^2)	Total canopy area (m^2)	Canopy index (%)
2017	1,625	938	575	3,541	-2,603	4,328,731	22.94
2018	1,625	2,346	575	7,081	-4,735	4,326,599	22.93
2019	1,625	4,329	575	10,622	-6,293	4,325,041	22.92
2020	1,625	6,986	575	14,162	-7,176	4,324,158	22.92
2021	1,625	10,421	575	17,703	-7,282	4,324,052	22.92
2022	1,625	14,736	575	21,243	-6,507	4,324,827	22.92
2023	1,625	20,033	575	24,784	-4,751	4,326,583	22.93
2024	1,625	26,413	575	28,325	-1,912	4,329,422	22.94
2025	1,625	33,979	575	31,865	2,114	4,333,448	22.96
2026	1,625	42,834	575	35,406	7,428	4,338,762	22.99
2027	1,625	53,078	575	38,946	14,132	4,345,466	23.03
2028	1,625	64,815	575	42,487	22,328	4,353,662	23.07
2029	1,625	78,146	575	46,027	32,119	4,363,453	23.12
2030	1,625	93,174	575	49,568	43,606	4,374,940	23.18
2031	1,625	110,000	575	53,109	56,891	4,388,225	23.26
2032	1,625	128,727	375	55,418	73,309	4,404,643	23.34
2033	1,625	149,456	0	55,418	94,039	4,425,373	23.45
2034	1,625	172,291	0	55,418	116,873	4,448,207	23.57
2035	1,625	197,332	0	55,418	141,915	4,473,249	23.71
2036	1,625	224,683	0	55,418	169,265	4,500,599	23.85
2037	1,625	254,444	0	55,418	199,027	4,530,361	24.01
2038	1,625	286,719	0	55,418	231,302	4,562,636	24.18
2039	1,625	321,610	0	55,418	266,192	4,597,526	24.36
2040	1,625	359,218	0	55,418	303,800	4,635,134	24.56
2041	1,625	399,645	0	55,418	344,227	4,675,561	24.78
2042	1,625	442,994	0	55,418	387,576	4,718,910	25.01
2043	1,625	489,367	0	55,418	433,949	4,765,283	25.25
2044	1,625	538,866	0	55,418	483,448	4,814,782	25.52
2045	1,625	591,592	0	55,418	536,175	4,867,509	25.80
Total	47,125		9,000				

DETAILED RESULTS

2. Realistic pessimistic scenario: Preservation of 200 ash trees on private property and 800 ash trees on public property

	INCREASE IN CANOPY BY PLANTING		CANOPY LOSS BY FELLING ASH TREES		CHANGE IN THE CANOPY		
Year	Number of trees planted	Cumulative additional canopy area (m^2)	Number of ash trees felled	Cumulative canopy loss (m^2)	Cumulative canopy variation (m^2)	Total canopy area (m^2)	Canopy index (%)
2017	1,625	938	575	3,541	-2,603	4,328,731	22.94
2018	1,625	2,346	575	7,081	-4,735	4,326,599	22.93
2019	1,625	4,329	575	10,622	-6,293	4,325,041	22.92
2020	1,625	6,986	575	14,162	-7,176	4,324,158	22.92
2021	1,625	10,421	575	17,703	-7,282	4,324,052	22.92
2022	1,625	14,736	575	21,243	-6,507	4,324,827	22.92
2023	1,625	20,033	575	24,784	-4,751	4,326,583	22.93
2024	1,625	26,413	575	28,325	-1,912	4,329,422	22.94
2025	1,625	33,979	575	31,865	2,114	4,333,448	22.96
2026	1,625	42,834	575	35,406	7,428	4,338,762	22.99
2027	1,625	53,078	575	38,946	14,132	4,345,466	23.03
2028	1,625	64,815	575	42,487	22,328	4,353,662	23.07
2029	1,625	78,146	575	46,027	32,119	4,363,453	23.12
2030	1,625	93,174	525	49,260	43,914	4,375,248	23.19
2031	1,625	110,000	0	49,260	60,740	4,392,074	23.28
2032	1,625	128,727	0	49,260	79,467	4,410,801	23.37
2033	1,625	149,456	0	49,260	100,196	4,431,530	23.48
2034	1,625	172,291	0	49,260	123,031	4,454,365	23.61
2035	1,625	197,332	0	49,260	148,072	4,479,406	23.74
2036	1,625	224,683	0	49,260	175,423	4,506,757	23.88
2037	1,625	254,444	0	49,260	205,184	4,536,518	24.04
2038	1,625	286,719	0	49,260	237,459	4,568,793	24.21
2039	1,625	321,610	0	49,260	272,350	4,603,684	24.40
2040	1,625	359,218	0	49,260	309,957	4,641,291	24.60
2041	1,625	399,645	0	49,260	350,385	4,681,719	24.81
2042	1,625	442,994	0	49,260	393,734	4,725,068	25.04
2043	1,625	489,367	0	49,260	440,107	4,771,441	25.29
2044	1,625	538,866	0	49,260	489,605	4,820,939	25.55
2045	1,625	591,592	0	49,260	542,332	4,873,666	25.83
Total	47,125		8,000				

DETAILED RESULTS

3. Realistic optimistic scenario: Conservation of 200 ash trees on private property and 2,000 ash trees on public propert

	INCREASE IN CANOPY BY PLANTING		CANOPY LOSS BY FELLING ASH TREES		CHANGE IN THE CANOPY		
Year	Number of trees planted	Cumulative additional canopy area (m^2)	Number of ash trees felled	Cumulative canopy loss (m^2)	Cumulative canopy variation (m^2)	Total canopy area (m^2)	Canopy index (%)
2017	1,625	938	575	3,541	-2,603	4,328,731	22.94
2018	1,625	2,346	575	7,081	-4,735	4,326,599	22.93
2019	1,625	4,329	575	10,622	-6,293	4,325,041	22.92
2020	1,625	6,986	575	14,162	-7,176	4,324,158	22.92
2021	1,625	10,421	575	17,703	-7,282	4,324,052	22.92
2022	1,625	14,736	575	21,243	-6,507	4,324,827	22.92
2023	1,625	20,033	575	24,784	-4,751	4,326,583	22.93
2024	1,625	26,413	575	28,325	-1,912	4,329,422	22.94
2025	1,625	33,979	575	31,865	2,114	4,333,448	22.96
2026	1,625	42,834	575	35,406	7,428	4,338,762	22.99
2027	1,625	53,078	575	38,946	14,132	4,345,466	23.03
2028	1,625	64,815	475	41,871	22,944	4,354,278	23.08
2029	1,625	78,146	0	41,871	36,275	4,367,609	23.15
2030	1,625	93,174	0	41,871	51,303	4,382,637	23.23
2031	1,625	110,000	0	41,871	68,129	4,399,463	23.31
2032	1,625	128,727	0	41,871	86,856	4,418,190	23.41
2033	1,625	149,456	0	41,871	107,585	4,438,919	23.52
2034	1,625	172,291	0	41,871	130,420	4,461,754	23.64
2035	1,625	197,332	0	41,871	155,461	4,486,795	23.78
2036	1,625	224,683	0	41,871	182,812	4,514,146	23.92
2037	1,625	254,444	0	41,871	212,573	4,543,907	24.08
2038	1,625	286,719	0	41,871	244,848	4,576,182	24.25
2039	1,625	321,610	0	41,871	279,739	4,611,073	24.44
2040	1,625	359,218	0	41,871	317,346	4,648,680	24.64
2041	1,625	399,645	0	41,871	357,774	4,689,108	24.85
2042	1,625	442,994	0	41,871	401,123	4,732,457	25.08
2043	1,625	489,367	0	41,871	447,496	4,778,830	25.33
2044	1,625	538,866	0	41,871	496,994	4,828,328	25.59
2045	1,625	591,592	0	41,871	549,721	4,881,055	25.87
Total	47,125		6,800				

APPENDIX 2

PROPOSED ACTION PLAN

GUIDELINE 1:

PRESERVING, RESTORING AND DEVELOPING THE ARBOREAL HERITAGE

Objective 1 Improve knowledge on trees and their biodiversity

ACTIONS	SCHEDULE	IMPLEMENTATION		
		Department	Specificity	Indicator
Perform a full update of the phytosanitary and structural condition of public trees every five years	2020-21-22	Public Works	Take a full periodic inventory	Inventory of trees
Continue the annual update of the inventory of public trees	Ongoing	Public Works	Keep the inventory up-to-date	Inventory of trees
Optimize the use of existing databases and acquire new technologies	2022-23	Public Works	Acquire and use portable tools to update the database in real time	Number of tools acquired
Analyze and calculate the canopy coverage of the City of Pointe-Claire every five years	2022	Public Works	Periodically calculate the canopy coverage	Inventory of the canopy
Prepare an inventory of species at risk	2023	Public Works	Improve knowledge of biodiversity	Inventory of species
Support and encourage studies aimed at improving knowledge of wildlife	2018–2019	Public Works	Improve knowledge of the wildlife on the territory	Number of studies carried out
Identify and conserve ecological corridors	2025	Public Works	Document connectivity at various levels Study the different avenues for the conservation of ecological corridors	Drafting of a plan Proportion of ecological corridors conserved
Create an official register of remarkable trees (public and private)	2023	Public Works	List high-value trees in the area	Register of remarkable trees
Identify and characterize natural environments of interest, those acquired by the City and those bequeathed to the City	2020	Public Works	Obtain an adequate characterization of natural environments to be able to better protect them	Directory of natural environments of interest
Produce a quantitative and qualitative inventory of public natural wooded areas (Terra-Cotta, Beck and Cedar parks, and the wooded area at the civic centre)	2020	Public Works	Improve knowledge of public natural spaces	Inventory of public natural wooded areas
Continue training employees so they can identify and detect invasive exotic species (IAS) and pests, assess the phytosanitary and structural condition of trees and urban forestry issues, and provide extensive training to employees.	Ongoing	Public Works	Detect IAS and pests early Determine structural and phytosanitary problems Be at the forefront of best practices in urban forestry	Number of training sessions attended

Objective 2 Preserve and enhance arboreal heritage

ACTIONS	SCHEDULE	IMPLEMENTATION		
		Department	Specificity	Indicator
Plan tree interventions based on five-year inventory	2024	Public Works	Prepare a five-year intervention plan (cyclical maintenance, felling, protection) supported by up-to-date data on the trees	Five-year and annual intervention plan
Continue promoting species adapted to urban areas that are resistant to pests, while promoting native species	Ongoing	Public Works	Evaluate the specific conditions of each planting and recommend an adapted species, native whenever possible	Proportion of native trees and trees adapted to the urban environment and resistant to pests
Continue with integrated pest management	Ongoing	Public Works	Slow down the spread of insect pests	Plan to fight the emerald ash borer
Continue increasing the number of trees and maintain their diversity in the city	Ongoing	Public Works	Establish agreements with suppliers (diversity of species, adaptation to climate change, etc.)	Number of new species / varieties introduced

GUIDELINE 2:

MAINTAINING AND DEVELOPING FOREST COVER

Objective 3 Extend and harmonize the forest cover of the city

ACTIONS	SCHEDULE	IMPLEMENTATION		
		Department	Specificity	Indicator
Continue to increase planting efforts	Ongoing	Public Works	Quantify planting needs due to mortality on an annual basis	Number of trees planted annually
Continue to favour large-scale trees when choosing species to be planted	Ongoing	Public Works	Evaluate the best options and inform citizens	Proportion of large-scale trees planted annually
Maintain a minimum of one tree in the right-of-way of the City in front of each residence in the Pointe-Claire territory	Ongoing	Public Works	Plan and plant a tree in the right-of-way of the City for residences that are without	Proportion of residences with at least one tree in the City's right-of-way
Keep felling to a minimum on public territory	Ongoing	Public Works	Quantify annual fellings on public property	Number of trees planted annually Number of trees felled annually
Continue systematic replacement by planting a tree to replace all felled trees	Ongoing	Public Works	Quantify felling and planting on private land annually Quantify felling and planting on public land annually Ensure that all felled trees are replaced by planted trees	Proportion of trees felled and replaced
Calculate and update the canopy index every five years	2024	Public Works	Quantify the canopy index periodically	Update of the canopy index
Maintain the implementation of a planting program that promotes the reduction of heat islands	Ongoing	Public Works Planning	Establish the 25% canopy index target in 2042	Canopy index
Continue planting in areas with the lowest canopy indexes	Ongoing	Public Works	Assess the reforestation potential of districts 6, 7 and 8 Lay out and develop vacant land	Number of trees planted annually in these sectors

Objective 4 Update tree regulations

ACTIONS	SCHEDULE	IMPLEMENTATION		
		Department	Specificity	Indicator
Define the legal restrictions of municipal interventions with respect to acquired rights and land development	2018	Public Works Planning City Clerk's Office	Study existing by-laws on this matter Document what is done in other municipalities	Amendment of by-laws
Adopt new by-laws governing the planting of trees on residential, industrial and commercial properties	2019	Public Works Planning City Clerk's Office	Ensure a minimum uniform forest cover on the territory	New by-laws

GUIDELINE 3:

MOBILIZING AND INVOLVING STAKEHOLDERS

Objective 5 Educate citizens about the importance of trees in the city

ACTIONS	SCHEDULE	MISE EN ŒUVRE		
		Department	Specificity	Indicator
Keep organizing annual days dedicated to urban forest interventions	Ongoing	Communications Public Works	Target events	Number of annual activities
Develop a section on the website on the functions and benefits of trees, as well as on the regulatory provisions of the City	2020	Communications Planning Public Works	Produce simplified and illustrated documentation concerning municipal by-laws affecting trees	Production of the web page
Continue the annual distribution of trees	Ongoing	Public Works	Preserve and increase vegetation cover despite the presence of pests	Number of plants distributed
Highlight the remarkable trees on the territory of the City to citizens	2024	Communications Public Works	Develop a path of remarkable trees highlighted on the website, based on the register of remarkable trees	Production of the web page
Broadcast information on urban forestry through the City's various communication channels (newspaper, public places, website, etc.)	Ongoing	Communications Public Works	Regularly communicate information about urban trees and woodlands to develop and maintain the interest of citizens	Annual number of new information releases

Objective 6 Involve owners in protecting forest cover

ACTIONS	SCHEDULE	IMPLEMENTATION		
		Department	Specificity	Indicator
Evaluate the forest potential of developed commercial and industrial areas	2020	Public Works	Be aware of the potential in planting areas deficient in canopy	Number of square metres listed
Ensure constant communication with industries, businesses and institutions to promote the development of the forest canopy	2018	Communications Public Works	Produce documentation for industries, businesses and institutions	Production of documentation