VILLE DE MONTRÉAL

BIODIVERSITY REPORT | 2013

LAB

Local Action for Biodiversity

AN ICLEI – IUCN PROGRAMME

ENHANCING URBAN NATURE THROUGH A GLOBAL NETWORK OF LOCAL GOVERNMENTS

Montréal

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LAB
Local Action for Biodiversity
AN ICLEI – IUCN PROGRAMME

Local Action for Biodiversity (LAB) is a unique global biodiversity program run by The ICLEI Cities Biodiversity Center, in partnership with the International Union for Conservation of Nature (IUCN). LAB employs an approach which is action oriented and customized for local and regional authorities around the world. The LAB Program is aimed at improving and enhancing ecosystem management at the local level, and is recognized globally as the leading results-driven local government biodiversity initiative.

Established in 2006 as a pilot program with 21 pioneering local governments from across the globe, the LAB Program has expanded to include numerous local governments and additional focus areas, including communication, education and public awareness (CEPA) and climate change, aimed at tackling the complex challenges facing local biodiversity management. The LAB Program's results-based record and contributing to local biodiversity planning and management akes LAB a key component of the CBD's Global Partnership on Local and Sub-national Action for Biodiversity, which is dedicated to ensuring the achievement of the CBD objectives through joint local action.

The LAB Program is undertaken in a five step, non-linear process coordinated by the ICLEI Cities Biodiversity Center, providing technical support and guidance to participants throughout the five steps of the LAB Program. The Program is an accessible and enabling platform for committed, leading local governments from around the world, and provides numerous opportunities for profiling, promoting the importance of urban biodiversity and the role of local governments in its management. The LAB Program also provides numerous opportunities for networking and lesson sharing on the successes and challenges of urban biodiversity management with participant cities from all over the world, through regular workshops, webinars, conferences and other relevant knowledge sharing platforms.

For more information, please visit www.cbc.iclei.org/lab.

MAYOR'S MESSAGE

Montréal is home to remarkable biodiversity, which offers a wealth of discoveries in the natural habitats everywhere on the archipelago, in the bodies of water that surround it or even in our own backyards. This biodiversity is key to healthy functioning ecosystems, which produce goods and services critical to our quality of life, and increase our resiliency to future changes.

Produced by the *Ville de Montréal* and a coalition of partners, this report on Montréal's biodiversity represents an important step in understanding biodiversity and ways of managing it. It inventories the sites concerned and highlights the many and varied initiatives introduced by the Montréal community and how they complement the *Ville de Montréal*'s actions.

This report confirms the enormous value of Montréal's natural heritage. I am proud of the positive steps taken over the past several decades to safeguard it, in particular under the Policy on the Protection and Enhancement of Natural Habitats, but even reaching much further back to the 19th century and the creation of Mont-Royal Park.

In 2010, Montréal joined the Local Action for Biodiversity (LAB) program run by ICLEI (Local Governments for Sustainability), confirming the importance the city places on biodiversity. The LAB program is aimed at developing and implementing a biodiversity strategy. It does this by promoting awareness and communication between individuals, decision makers and the community about urban biodiversity issues and the need for local action. The compilation of this report and the signing of the Durban Commitment in 2011 represent two significant milestones.

The *Ville de Montréal* recognizes the considerable challenges that maintaining biodiversity poses and intends to continue its work in this regard in partnership with all Montrealers. We can and must be proactive in promoting biodiversity, for our collective well-being depends on it.

Michael Applebaum
Mayor of Montréal

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FOREWORD

Montréal is proud to have been the host city to the Secretariat of the United Nations' Convention on Biological Diversity (CBD) since 1996. Recognizing the importance of local actions to support biodiversity, the CBD Secretariat developed an initiative to encourage local authorities to become involved in protecting biodiversity. ICLEI's Local Action for Biodiversity project is one of several supported by the Secretariat to promote greater local participation in implementing the UN Convention.

As part of this project, the Ville de Montréal (hereinafter referred to as "the City") has embarked on a process of reflection to develop a strategy and an action plan that will rally all stakeholders to protect and enhance biodiversity in the city. A committee composed of various community representatives was closely involved in this process. They come from different city divisions (Direction des grands parcs et du verdissement, Division du développement durable, Service de l'eau, the Montréal Space for Life, Direction de l'urbanisme et du développement économique), the Conseil régional de l'environnement de Montréal, the Institut de recherche en biologie végétale of the Université de Montréal (IRBV), the Community Health unit of the Agence de santé et de services sociaux de Montréal (Health and Social Services Agency), the Communauté métropolitaine de Montréal (CMM), the Conférence régionale des élus de Montréal (CRÉ), the Quebec Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs (MDDEFP) and Environment Canada's Biosphere.

Before drafting a strategy and an action plan, it was necessary to gather all available information to produce a portrait of the current state of biodiversity in the Montréal agglomeration and compile it in a publicly available reference document. In accordance with the ICLEI guidelines and those approved by the committee, this report focuses on the following topics:

- the biological diversity present in the Montréal metropolitan area, the ecosystem services it provides and the threats it faces;
- the management procedures employed by the City, as well as the key resulting findings and challenges;
- the opportunities for contact with biodiversity, information and participation available to the public;
- the local initiatives undertaken by community stakeholders, and international initiatives;
- a number of examples of inspiring projects;
- and lastly, some points to ponder for future discussions.

The findings that emerge from this report will serve as the main basis for discussions aimed at drafting the biodiversity strategy and action plan – this project's ultimate objective – in line with the City's commitment to produce a strategy featuring a biodiversity component, as outlined in the Montréal Community Sustainable Development Plan. The report will also educate Montrealers and at the same time share with international readers a portrait of Montréal's rich biodiversity, the community's strengths in this area, and the challenges that are still to be overcome.

Courtesy of Antonio Rizi

SUMMARY

Biodiversity is the diversity of life on Earth, of which we are a part and on which we depend for our survival. In a context where the importance of nature to quality of urban life is increasingly acknowledged, the need to protect biodiversity is now part and parcel of community concerns.

Montréal has patches of terrestrial and aquatic habitats that support a rich diversity of animal and plant species, including many that are at risk. Several of these natural habitats are part of the island's network of large parks and ecoterritories, or are interconnected with the surrounding bodies of water. In addition to supporting Montréal's biodiversity, natural habitats supply valuable "ecosystem services," ranging from purifying the air and absorbing stormwater to contributing to the physical and mental health of city-dwellers by providing green spaces for sports and leisure activities.

The built-up sectors that make up most of the territory of Greater Montréal are also interspersed with a variety of green spaces and street trees; these elements that are complementary to the natural habitats likewise provide environmental and social benefits for local neighbourhoods.

Montréal's biodiversity, however, is threatened by many factors – the most important of these at present are habitat loss and fragmentation, as well as invasive species. The City, together with various groups and organizations, has undertaken a series of initiatives over the years to protect the island's natural land and water heritage; these have led to significant and encouraging achievements. Nevertheless, some hurdles remain and the possible solutions listed in this report will feed into the biodiversity strategy and action plan for Montréal that is currently being drafted.

Montréal's geographical location as part of an archipelago in a richly biodiverse area, combined with the island's natural and geological features, are at the root of Montrealers' strong sense of connection with their environment. The biodiversity strategy and action plan aim to foster partnerships with committed community stakeholders and offer opportunities for residents to become involved, in order for Montréal to become as green as possible and do its best to protect its biodiversity, for everyone's benefit.

Courtesy of Antonio Rizi

Courtesy of Antonio Rizi

AN INTRODUCTION TO THE CITY OF MONTRÉAL

Situated at the confluence of the St. Lawrence and Ottawa rivers, the city is located on Montréal Island, the largest island in the Hochelaga Archipelago[1].

Dynamic and heterogeneous, Montréal is the largest city in Quebec, one of ten provinces in Canada. Nearly 1.65 million people live in the city's different boroughs, some 1.9 million in the metropolitan area and close to 3.7 million in the entire metropolitan region (Communauté métropolitaine de Montréal - CMM) (see Map 1). Montréal is the largest French-speaking city in North America. It is also home to many other cultural communities, which contribute to its cosmopolitan flavour.

Thanks to its southerly location, Montréal's climate is milder than elsewhere in the province. In fact, southern Quebec is the most heavily populated part of the province and marks the northern range limits for many species, making it a highly biodiverse environment[2], despite the serious impact of human activities.

An island inhabited for millennia

Thousands of years ago, aboriginal people from Asia became the first human inhabitants of North America. In Montréal, the oldest trace of Native occupation is found in Old Montreal and dates back some four thousand years[3].

In 1535, the explorer Jacques Cartier visited the Iroquoian village of Hochelaga on Montréal Island. The point of land where Jeanne Mance and Paul de Chomedey, sieur de Maisonneuve, founded Montréal in 1642 had been frequented for millennia and was long the site of an annual fur-trading fair. Today, thousands of First Nations and Inuit people live in or visit Montréal. In addition, the Iroquois communities of Kahnawake and Kahnesatake are located in the Montréal metropolitan area[4].

Nature, landscapes and urbanization

The Lachine Rapids, a natural barrier to navigation, were one of the reasons why Montréal was founded here in the 17th century[5]. Montrealers are united by a collective sense of identity related to the fact of living on an island and near large bodies of water

The Lachine Rapids, an exceptional historic and natural site in the southwest part of the island.

– sources of biodiversity – like the St. Lawrence and Des Prairies rivers, Lake Saint-Louis, and the Lake of Two Mountains.

The history of Montréal is also tied to its harbour, which helped the city grow and prosper. Today the Port of Montréal is a major player on the eastern seaboard. The stretch of shoreline that over the years became the Old Port of Montréal now provides residents with a long window on the St. Lawrence.

Other than the large waterways, two other noticeable features greet visitors arriving in Montréal: the downtown business district and Mount Royal, a prominent city landmark. Formed millions of years ago, Mount Royal is a subterranean rock mass that was later exposed by erosion. It is one of a series of hills known as the Monteregian Hills, which form an east-west trending arc in the St. Lawrence River valley. The name "Montréal" derives from "mont Royal", the name Jacques Cartier gave this hill in the heart of the city[6].

Mount Royal and the business district dominate the view.

The renowned landscape architect Frederick Law Olmsted designed Mont-Royal Park in the late 19th century; he intended the area to be used by all of the city's residents and also to highlight the landscape experience centred around the mountain's woods and rocky outcroppings[7].

Over the last few centuries, the original natural environment was dramatically altered as land was cleared for agriculture, and then urban development. Valuable historical documents, such as Holmes' herbarium[8], also chronicled the changes, like those affecting plant communities. Some of the plants in the herbarium, specimens of which were collected in Montréal in the early 19th century, appear to have vanished from the island and are on the MDDEP list of species at risk[9].

During the 20th century, urbanization led to new land-use designations for farmland. Nowadays, barely 2,000 ha, or 4% of the Montréal agglomeration, is designated a permanent agricultural zone, a large part of which is located in the western end of the island and on Île Bizard (parts of it, however, are occupied for non-agricultural use, such as parks and golf courses). In comparison, more than half the land mass of the Communauté métropolitaine de Montréal (CMM) is in a permanent agricultural zone[10]. It is interesting to note that the St. Lawrence Valley's highly fertile agricultural land is associated with the end of the last ice age, when the ice sheets melted to form the vast Champlain Sea, covering all of what would later be Montréal and depositing silty sediments suitable for farming[11].

Montréal today is a mix of residential neighbourhoods, commercial streets, industrial areas, cultural and heritage properties, and more. Residents are served by a vast public transit system and infrastructures including 560 km of bike paths, designed to encourage active transportation.

Although the Montréal metropolitan area is highly urbanized, as is the case with most other large cities, it sees itself as a green city. Its arboreal heritage comprises 1.2 million public trees, of which more than 230,000 are street trees dotted across all the boroughs. The total urban canopy covers 19% of the city area and 20% of the metropolitan area[12].

Montrealers also have access to a network of 24 large parks (see Map 2), more than 1,270 local parks, and countless community and collective gardens, where they can enjoy a wide variety of outdoor activities.

In Montréal, life revolves around the four seasons, each with its own distinctive scenery, atmosphere and charms!

View of the city of Montréal from the Kondiaronk lookout, Mont-Royal Park

AN INTRODUCTION TO THE CITY OF MONTRÉAL

Challenges and opportunities

Cities continue to attract people looking for work, a stimulating living environment and bright prospects for their family. As heat islands, poor air quality and other urban problems emerge and persist, improving Montrealers' quality of life has become a pivotal issue.

Although many obstacles exist in terms of protecting biodiversity in urban areas, cities also create opportunities[13]. Montréal benefits from the presence of a broad range of civil society organizations, such as academic and research institutions, trade and business, non-profit organizations and many others, and together they represent an unparalleled force for action and reflection. The city is also home to several international organizations, including the Secretariat of the CBD. But Montréal is first and foremost a place where the actions, be they daily or occasional, of thousands of residents have an enormous impact on all aspects of city life, especially as regards nature conservation.

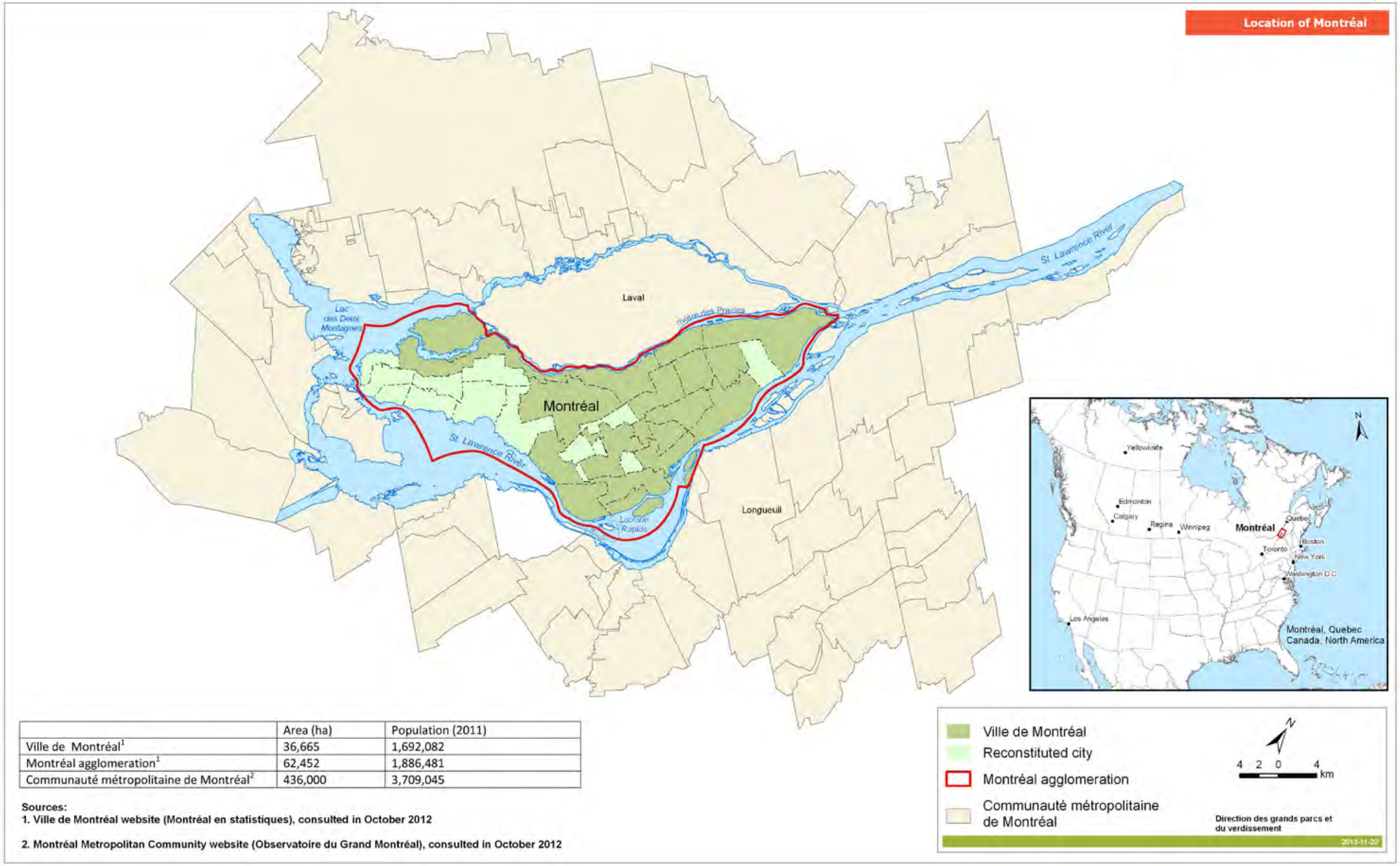
Pierre Dansereau, professor emeritus and a renowned scientist who began his career at the Montréal Botanical Garden alongside Brother Marie-Victorin, points to the human capacity to reverse course in favour of sustainable resource management. "Our failures are the failures of the imagination,"[14] he says. To help protect our natural environment for a better quality of life here in Montréal and elsewhere, let us draw inspiration from this eminent ecologist's eternal optimism. He passed away in the fall of 2011, one week before his 100th birthday.

Notes

1. Commission de toponymie du Québec website, section "Archipel d'Hochelaga" (consulted in January 2012): http://www.toponymie.gouv.qc.ca/ct/ToposWeb/fiche.aspx?no_seq=146061
2. Boucher, I., Fontaine, (2010), p.20.
3. Centre d'histoire de Montréal website (consulted in November 2011): http://ville.montreal.qc.ca/portal/page?_pageid=2497,3090431&_dad=portal&_schema=PORTAL and le Centre d'histoire de Montréal, 2011. *Le Montréal des Premières Nations : guide de découverte du patrimoine et des cultures des Premières Nations de la région de Montréal*, 35 pages.
4. Ibid.
5. McCord Museum website, Montréal (consulted in 2012): http://www.musee-mccord.qc.ca/scripts/explore.php?Lang=2&tableid=11&tablename=theme&elementid=62__true&contentlong
6. Commission de toponymie du Québec website, section "Montréal" (consulted in January 2012): http://www.toponymie.gouv.qc.ca/ct/ToposWeb/fiche.aspx?no_seq=42164) and Natural Resources Canada website, section "Île-de-Montréal" (consulted in January 2012): http://www.rncan.gc.ca/sciences-terre/limite-geographique/nom-geographique/origine-noms-geographiques/5774).
7. For more information on this topic, please see the work by Charles Beveridge, *Mount Royal in the Works of Frederick Law Olmsted*, available online: http://ville.montreal.qc.ca/pls/portal/docs/PAGE/BUREAU_MTROYAL_FR/MEDIA/DOCUMENTS/OLMSTED-VISION-MONT%20ROYAL-AVRIL%202009-VERSION%20FRAN%C7AISE-FINAL.PDF
8. For more information on Holmes' herbarium, go to the McGill University website (consulted in March 2012): http://www.mcgill.ca/herbarium/
9. Waterway, M.J., *The McGill University Herbarium, The development of Québec's eminent Herbarium, Collection Forum*, Vol. 3, Nos.1 and 2, 1987: 21-22. Centre de données sur le patrimoine naturel du Québec. January 2012. *Database report for the Montréal agglomeration.* Ministère du Développement durable, l'Environnement et des Parcs (MDDEP).
10. Communauté métropolitaine de Montréal (2011), p.146.
11. Natural Resources Canada website (consulted in October 2012): http://www.rncan.gc.ca/sciences-terre/produits-services/produits-cartographie/geoscape/montreal/5949
12. The canopy index is the ratio between the summation of the surface area of the tree tops or groups of trees projected on the ground (canopy) and the total surface area of the city/agglomeration. The index was calculated based on aerial photographs taken in June 2007.
13. For more information on this subject, see the *Cities and Biodiversity Outlook* (2012) report produced by the CBD Secretariat, which represents the first analysis by the UN of how urban land expansion will impact biodiversity and ecosystem services.
14. Quote taken from the Université du Québec à Montréal website (http://www.uqam.ca/distinctions/honorifiques/dansereau_hom.htm), as well as from the NFB documentary portrait of Pierre Dansereau entitled An Ecology of Hope (http://www.nfb.ca/film/An_Ecology_of_Hope/).Bisquast ricis, nondam actus, crum, quam probse ocae mil conihil ut querviv ivaturet vertiam ac ta L. cotique rcerenti, nonsule rfeconsupiem di, senintis; nonsulo cremus inteberra intem sceroru nunihil icultorum perei permisq uampre, civendam inc intiuspio essa idius, vilintes auciam terium quam adduciem o tenductum con di, nihiliu rarbem se, nonsus factus; et partiam silibef acchum et; hocaven ductum,

AN INTRODUCTION TO THE CITY OF MONTRÉAL

Map 1



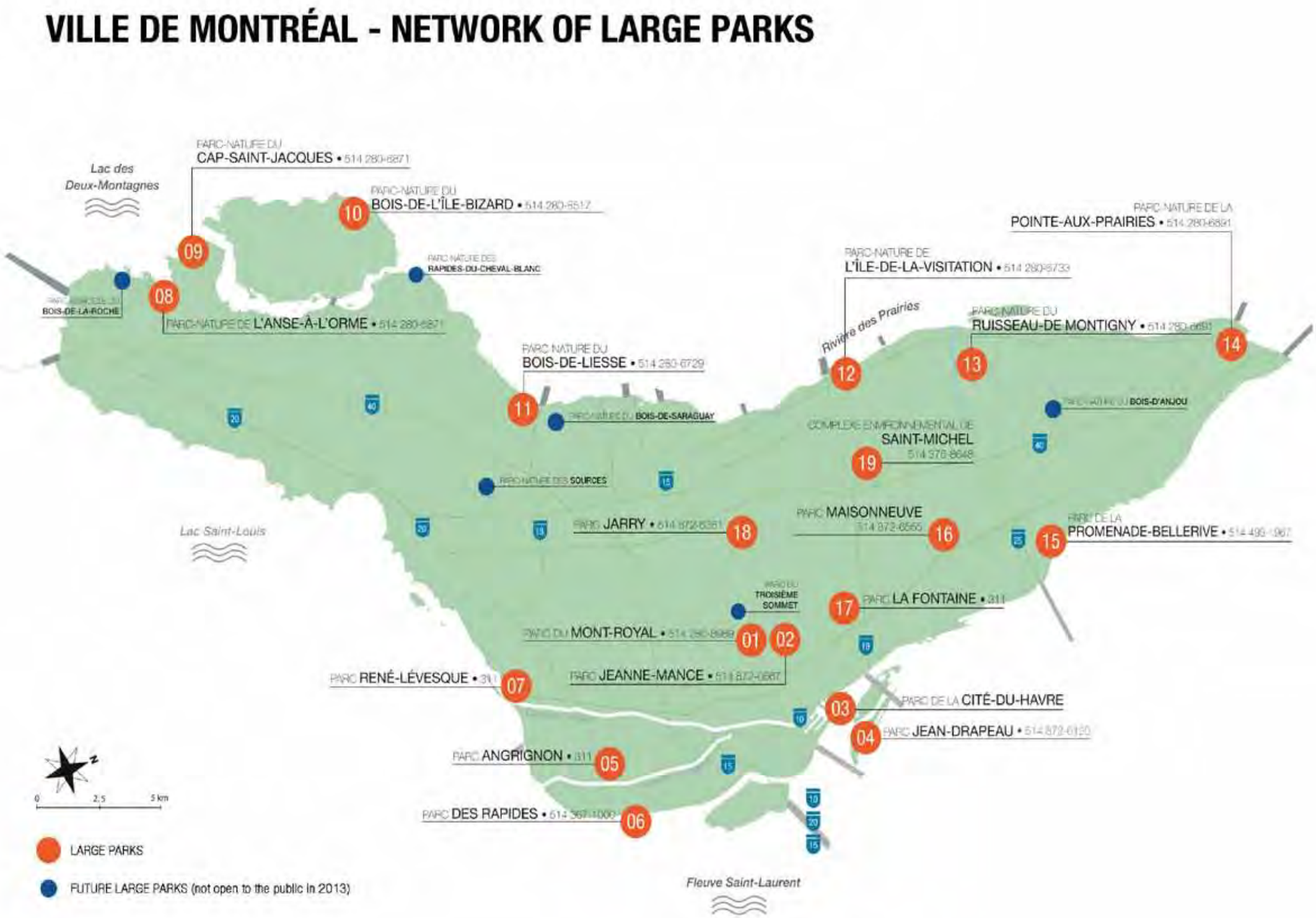
	Area (ha)	Population (2011)
Ville de Montréal[1]	36,665	1,692,082
Montréal agglomeration[1]	62,452	1,886,481
Communauté métropolitaine de Montréal[2]	436,000	3,709,045

Sources:
1. Ville de Montréal website (Montréal en statistiques), consulted in October 2012

2. Montréal Metropolitan Community website (Observatoire du Grand Montréal), consulted in October 2012

AN INTRODUCTION TO THE CITY OF MONTRÉAL

Map 2



Urban biodiversity

A Canada goose with its gosling

Biological diversity (or biodiversity) is the variability among living organisms on Earth, including diversity within species (plants, animals, bacteria, etc.), between species and of ecosystems[1].

This particularly broad scientific concept seems far removed from our daily lives. Yet, human beings are an integral part of this diversity of life and constantly interact with the environment, even in an urban context.

The guide on biodiversity and urbanization produced by the Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT) provides a definition for urban biodiversity: the variety of living organisms, including genetic variations, as well as the countless habitats in and around human settlements[2]. The diversity of urban ecosystems is characterized by the influence and presence of humans[3].

This human influence is reflected in the urban landscape and in its impact on natural habitats. Although urban development may lead to the habitat deterioration, fragmentation and loss, some habitats can be protected and even restored through specific interventions.

Human influence can also involve actions liable to affect the composition of biodiversity, such as the introduction of exotic plant species for horticultural purposes, which, over time, are absorbed into the urban vegetation. According to Latour, a large part of Montréal's flora consists of plants imported by European settlers and later through commercial trade. Many species became well established here, since they were already directly related to the settlers' experiences in their homelands[4]. Over time, a considerable number of non-native animals, introduced unintentionally or for domestic, research or other purposes, have made Montréal their home. Sometimes, certain exotic species become invasive and cause significant harm (this will be discussed in section 1.3, which addresses threats to biodiversity).

> The United Nations' Convention on Biological Diversity (1992) defines biodiversity as the **"variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems."**

Montréal Island consists of habitat patches that include natural spaces like wooded areas, undeveloped land, wetlands and streams, all of which support rich biodiversity. Many are located in nature parks, and give city dwellers direct contact with nature, considering their relatively close proximity and ecological importance.

Montréal also has many landscaped green spaces, like neighbourhood parks and schoolyards, which contain large grassy areas, gardens and tree-filled grounds.

Admiring the view from a lookout in the Bois-de-l'île-Bizard Nature Park

Gathering of citizens in a Montréal park

But the city consists above all of residential zones, commercial streets, parking lots, roads, etc. In fact, these paved-over and built-up areas cover most of the city. Even so, the urban landscape is dotted with countless street trees and other vegetation, and it is not unusual to see greenery forcing its way through the smallest crack. For most residents, this is the only nature they will encounter on a daily basis. While these green areas are not necessarily of high ecological value, they play an important role in environmental, social and educational terms; this will be further discussed in the next section on the benefits of nature in the city.

A brief overview of Montréal's land use history

After European settlers arrived, many villages were built along the shores of the St. Lawrence River and its tributaries. The island's development generally came at the expense of natural habitats, nature being viewed as a constraint hindering urban growth[5]. Mature trees were felled, wetlands were filled in, and streams were channelled underground. Creating and maintaining open fields for livestock and crops, however, encouraged the establishment of new animal and plant species.

According to the CMM, wooded areas, although scattered and isolated, cover 19% of the metropolitan area[6]. As for wetlands, data from Ducks Unlimited Canada show that they cover 4.7% of the total metropolitan area, and that 80% of them are negatively affected by human activity[7].

Based on the MDDEP ecological reference framework, the Montréal metropolitan area sits in the St. Lawrence Lowlands[8] in southern Quebec. As mentioned in the introduction, southern Quebec is the most densely populated region of the province, but it is also very rich in biodiversity.

Natural habitats in the Montréal agglomeration

The natural habitats found within the agglomeration comprise 9.7% of the geographic area, with woodlands representing the largest share, followed far behind by undeveloped land and wetlands. Brownfields, spaces previously used for industrial purposes and now abandoned (and often contaminated), and croplands are not considered here as natural habitats in themselves, but as places of interest: they are visited by many species and, in the case of brownfields, have the potential to be restored.

Most of the natural habitats are located around the periphery of the island (including Île-Bizard in the west end), with a few exceptions such as Mount Royal, the heart and lungs in the midst of the city (see Map 3).

The shoreline habitats, located along the banks of the large water bodies surrounding Montréal Island's natural floodplain, are highly diverse, ranging from swamps to aquatic plants[9]. These unique ecosystems in an urban environment are often essential for the feeding and reproductive needs of aquatic and semi-aquatic fauna.

Let us not forget the presence of Montréal's nearly 70 inland waterways. Many stream sections have been channelled underground, while some open stretches that were originally meandering have been straightened in the process of urban development. Countless waterways in nature parks have nevertheless been preserved, for instance stretches of the Rivière à l'Orme and the De Montigny and Bertrand streams.

Bertrand Stream in the Bois-de-Liesse Nature Park.

To date, 5.5% of Montréal's metropolitan land area (see Map 4) is being protected; add in the large bodies of water, and it totals 17% of the metropolitan area. The protected aquatic habitats in the St. Lawrence and Des Prairies rivers and the Lake of Two Mountains are under federal or provincial jurisdiction or both, as applicable.

A number of protected areas are located in ecoterritories (see Map 3), which are defined under Montréal's Policy on the Protection and Enhancement of Natural Habitats as geographical areas of over 15 ha in which the natural spaces have been given priority protection and enhancement[10].

Flora and fauna in natural habitats

Based on available data, Montréal is home to native and naturalized species that include more than 1,060 vascular plant, 270 butterfly, 120 bird and 80 fish species, as well as 13 amphibian and 8 reptile species. This list is not exhaustive, but the numbers provide a good indication of Montréal's remarkable biodiversity, much of it found in the city's large parks and, to a lesser extent, in local parks. The following are examples of the flora and fauna observed in Mont-Royal Park and the nature parks.

The woods in Mont-Royal Park are dominated by stands of red oak, sugar maple and white ash. Century-old woodlands, located primarily on the north and south slopes, provide feeding and nesting areas for many birds. The park attracts birds of prey, like Cooper's hawks and great horned owls, and is home to the May-apple, a plant species rarely found in Quebec.

The May-apple is a species at risk in Quebec.

Blue-spotted salamanders, observed mainly in Mont-Royal Park, spend most of their time underground and eat a variety of invertebrates.

The Bois-de-Saraguay Nature Park consists essentially of sugar and silver maple stands. The mix of wetlands and drier areas creates a fascinating forest landscape that is quite distinct in Montréal. This pocket of rich biodiversity is home to more than 260 plant species of which 20 are at risk, over 86 bird species, 10 amphibian and reptile species, and 15 or so mammal species. Large tracts of swamp forests offer refuge and food for the wood duck, an unusual native species that

Path in the Bois-de Saraguay Nature Park.

Wood ducks seek out ponds, shallow lakes and woodland streams, and nest in cavities in trees.

nests in trees. This nature park is also of significant heritage interest, given its buildings and remnants of gardens and stone walls.

The Bois-de-l'île-Bizard Nature Park contains one black maple stand and two cedar groves, tree species not usually found in or around Montréal. The nature park is of great interest for observing birds of all kinds, in particular aquatic birds, owing to the dense network of wetlands within the park. Amphibians and reptiles are also well represented, given the suitable wetland habitat. At Pointe Théoret (located at the western edge of Île Bizard, but actually part of Cap-Saint-Jacques Nature Park), the shoreline habitats have remained undisturbed and feature a diversity of aquatic plant communities. This area also contains swamp forests dominated by silver maple stands.

A ray of sunlight filters through a cedar grove in the Bois-de-l'île-Bizard Nature Park.

Painted turtles can be recognized by their smooth shell and colourful stripes.

The main attraction of the Anse-à-l'Orme Nature Park, a mixture of woods, wetlands and wild land, is the Rivière à l'Orme, Montréal Island's only inland river; it is home to water speedwell, an exceptionally rare plant in Quebec. Several fish species, including northern pike, brook stickleback, johnny darter, and central mudminnow, inhabit the river. The river's outflow is used by waterfowl, beaver, river otter, muskrat and the map turtle, a species at risk.

The water speedwell is at risk in Quebec: it can only be found in a few sites in the province among which the rivière à l'Orme.

Canadian beavers use branches, tree trunks, mud and stones to build dams, which affect water levels[11].

An oasis of greenery in a highly developed industrial zone, the Pointe-aux-Prairies Nature Park contains quality white-tailed deer habitat, including woods, undeveloped land and wetlands. The latter also provide shelter for waterfowl, amphibians and reptiles. Quebec's Ministère des Ressources naturelles (MRN) has designated the area known as Bois-de-la-Réparation as an exceptional forest ecosystem (EFE). It is dominated by a century-old sugar bush.

Pileated woodpeckers may be observed year-round in some large parks.

White-tailed deer are most active at dawn, dusk and nightfall[12].

Having provided a brief overview of the flora and fauna in our large parks, we encourage readers to visit the City's Large Parks website for more information on the plant and animal life there[13].

We still know very little about other aspects of biodiversity, such as genetic diversity. The interest expressed by many Montréal researchers regarding biological diversity in urban environments will certainly help add to our knowledge in the years to come (see section 4.1 for more on this topic).

Species at risk

Montréal is also home to some species considered to be at risk by the Quebec government: more than 60, in fact, according to current knowledge[14]. They are located primarily in the city's large parks, but also elsewhere in the various land and aquatic habitats and along shorelines.

Yellow water-crowfoot forms scattered colonies and flourishes in wetlands.

1.1 DESCRIPTION OF BIODIVERSITY IN MONTRÉAL

The nature parks and Mont-Royal Park contain a number of at-risk plant species, including May-apple, water speedwell, cork elm, yellow water-crowfoot, American bladdernut, soft agrimony, black maple and white trillium. As for animal species at risk, map turtles, least bitterns, chimney swifts and milk snakes have been found in the nature parks. Fish species at risk like lake sturgeon and American shad inhabit waters near various nature parks.

Brown snakes hibernate underground, in crevices and rock piles[15].

Other areas of Montréal provide habitats suitable for the brown snake, a wildlife species at risk that lives in open environments near ditches and streams. Open spaces and undeveloped land often host a surprising range of biodiversity. For instance, rarely seen in Montréal but not considered at risk, the bobolink is a species of interest that prefers vast meadows and fields.

Bobolinks frequent hayfields and fallow land dominated by tall grasses; they nest and feed on the ground[16].

All around the natural habitats … a city that's full of life!

Green spaces

Large urban and neighbourhood parks, large institutional properties, green alleys, gardens in private yards, and all kinds of small green spaces — all sites that support flora and fauna, perhaps less diverse than in the natural habitats, but contributing significantly to Montrealers' quality of life.

Montréal's parks, privately owned land and other green spaces are often expanses of grass dotted with trees, sometimes a small pond, and landscaped perennial gardens. Other plant species often find their way into various habitats through seed dispersal. Depending on their locations and characteristics, these "semi-natural" spaces tend to attract insects, small mammals and birds, the latter utilizing such sites to rest or for migratory stopovers. Even small landscaped ponds in urban parks become biodiversity havens in the city, especially for insects and other small organisms.

The urban space also includes vacant lots that, like brownfields, once cleaned up and restored could become sites of interest over time.

The contribution of urban agriculture

In addition to farmland in the West Island, Montréal boasts innumerable conventional vegetable gardens, as well as innovative projects stemming from individual, business or community initiatives. The Greater Montréal area has 104 community gardens created over the last 35 years. Many collective gardens have cropped up recently as part of residential projects, in schoolyards, on roofs, terraces and balconies, producing new landscapes for biodiversity to flourish. The enthusiasm for urban agriculture in Montréal is genuine, and offers considerable environmental, economic, social and health benefits. The variety of plants grown in vegetable gardens helps to enhance biodiversity and provide suitable habitats, particularly for pollinating insects.

Out for a stroll in Angrignon Park

Built environments

Urban residents live and spend most of their time in built-up areas (residential neighbourhoods, commercial streets, etc.) that also have green spaces close by. While nature is not conspicuously lacking, it often goes unnoticed given the frantic pace of modern life. The urban environment could encourage greater contact with the natural environment and awareness of environmental issues, nonetheless, including the importance of the services nature provides for city-dwellers; this topic is explored in the next section.

It would be good to take a moment to observe the world around us. Plants like common plantain and wartweed frequently grow by the roadside or sprout between concrete sidewalk slabs; yellow-evening primrose and white clover are commonly found in vacant lots. Vines on building walls, fences, or even lamp posts are a common sight. As part of our daily "décor," these plants are eloquent proof of the city's vitality.

The street trees commonly found in Montréal's neighbourhoods include three maple species (Norway maple, silver maple and red maple), two ash species (northern red ash and white ash), two linden species (basswood and little leaf linden), honey-locust, Siberian or Chinese elm, and common hackberry. The presence of native species that are more resistant to street conditions, such as hackberry, is an asset. Some of the species listed, however, like Norway maple and Chinese elm, are now considered invasive. Maple and ash species in fact form a large part of the urban forest's landscape.

In recent years, the municipal nursery has focused its efforts on diversifying the street trees it grows and supplies to the boroughs, not only to encourage greater biodiversity but also to increase the trees' resilience to disease and insect pests.

Monarchs sometimes visit private yards and urban vegetable gardens, especially those that have milkweed and nectar-bearing plants.

Climbing vines, extremely common in built environments, cover walls and fences with their foliage.

The ground, trees and shrubs are regular haunts for house sparrows, European starlings, common grackles, American robins and northern cardinals. As many as twenty bird species are found in the city's built areas, including some surprises, like the peregrine falcon. Usually nesting on steep cliffs, this species at risk occasionally chooses to build its nest on man-made structures, like bridges and the ledges of tall buildings. Peregrine falcons have been residing for years in the Université de Montréal tower and on the 32nd floor of the Stock Exchange building.

Some small mammals, like grey squirrels and groundhogs, have also become proficient city-dwellers. And swarms of insects teem unseen beneath the concrete and asphalt!

In conclusion, it is important to point out that urbanization, which shapes the physical environment primarily for human needs (thus one single species), creates homogeneous landscapes[17]. By and large, few plant and animal species are able to adapt to urban living conditions, compared with the conditions in their natural habitats. Some, however, have found a way to adjust and thrive: dandelions and rock doves, for instance, have spread and established themselves quite successfully in countless cities around the world.[18] Generally speaking, urban sprawl severely affects biodiversity, and native biodiversity in particular. We will take a closer look at this in section 1.3, which addresses threats to biodiversity.

Northern cardinals are easily recognized because of the male's bright red plumage; they show a preference for the edges of woods, parks, gardens and bird feeders around homes.

We are not always aware to what extent human societies depend on healthy ecosystems, even in cities! Recognizing the value of the services provided by nature helps us to better understand the delicate balance between development and conservation, which is crucial to maintaining the countless benefits, both physical and psychological, that people derive from ecosystems.

Ecosystem services

In 2005, the Millennium Ecosystem Assessment distinguished four categories of ecosystem services provided by nature from which human populations benefit, directly or indirectly (this list still serves as a global reference on the subject)[19]:

- regulating services, such as climate regulation, run-off regulation, air purification and protection against natural disasters;
- provisioning services, including the supply of goods like food, drinking water, wood, medicinal plants and fuel;
- cultural services, including landscape aesthetics, and educational and recreational opportunities associated with nature;
- supporting services, which, unlike the other services, provide no direct commodities to human populations. They are, nonetheless, necessary for the production of ecosystems (such as soil formation, plant growth processes, etc.) and form the basis for the services of the other three categories.

There are many types of ecosystem services nowadays. In Quebec, the Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP) is developing and expanding a list of ecosystem services that includes some fifty services. It introduces a new category, the concept of "ontogenic" (pertaining to the development of the individual organism) services, that is, the development of the immune system and psychosocial health[20].

Adapted from: *Canadian federal, provincial and territorial governments (2010). Canadian Biodiversity: Ecosystem Status and Trends 2010, Canadian Councils of Resource Ministers. Ottawa, Ont., p.74.*

1.2 THE BENEFITS OF URBAN NATURE

Improving Montrealers' quality of life

The services rendered by nature in Montréal are very real. First and foremost is the most indispensable one: our supply of drinking water. It is drawn from the St. Lawrence River and the other large bodies of water surrounding Montréal Island, and then treated and delivered to Montrealers' homes.

Trees, a major component of the city's green heritage, are extremely important to its residents: they improve air quality by producing oxygen, absorbing carbon dioxide and removing heavy metals present in the environment. According to Tree Canada, one healthy tree can reduce airborne dust by as much as 7,000 particles per litre of air[21]. What would smoggy days in Montréal be like without trees?

Trees also provide shade and cool the ambient air by transpiring water vapour; as a result, they contribute greatly to countering the effects of Montréal's heat islands, which can have an adverse impact on human health, especially for more vulnerable persons (e.g. fainting, heatstroke, exacerbating symptoms of chronic and pre-existing illnesses, etc.)[22]. During heat waves, Montrealers flock to parks to enjoy the pleasant coolness provided by the vegetation. A thermal image map clearly shows the temperature difference between various densely built areas of the city and Mont-Royal Park or the Bois-de-l'île-Bizard Nature Park, with its forested areas and marshes[23].

Studies have demonstrated links between contact with nature and reduced mental fatigue, as well as improved concentration, mood and psychological health[24]. Lower stress and anxiety levels and a more positive sense of general well-being have also been noted[25]. Moreover, studies tend to show that views of nature help patients heal faster and even strengthen immune systems[26].

Parks and green spaces provide an escape for city-dwellers. For some, they are an oasis of calm and tranquillity; for others, they are meeting and gathering places.

A tree-lined residential street

Mont-Royal Park

Montréal parks, especially the city's large parks, offer plenty of opportunities to enjoy outdoor sports that promote a healthy lifestyle, like walking, cycling, snowshoeing, cross-country skiing and skating. They also provide a wide range of scenic settings and contact with nature. The Bertrand Stream meanders through the Bois-de-Liesse Nature Park, which boasts the Bois-Francs, a forest of century-old hardwood trees. La Fontaine Park, one of Montréal's oldest parks, is home to tall trees, two ponds, and areas to play and relax. At the southern tip of the island, Des Rapides Park offers a stunning view of the Lachine Rapids and great bird watching during the migratory season.

This opportunity to experience contact with nature so close to home, work or school is greatly appreciated by city residents. Nearly 5 million people visit Mont-Royal Park every year (including nearby Jeanne Mance Park). According to a survey, user satisfaction is very high, with nature being the factor mentioned most often by respondents[27]. Neighbourhood parks are used very frequently, mainly by residents living within walking distance

Cross-country skiing in the Bois-de-Liesse Nature Park

Urban nature pays off!

Generally speaking, increasing access to nature in the city has an impact on the drawing power either of the city as a whole or of specific neighbourhoods for future residents, and for companies and organizations seeking a headquarters location, as well as for tourists and occasional visitors. Natural spaces can contribute directly to Montréal's economy, for example through recreational tourism and outdoor activities, but also more broadly by making the city more inviting for different clienteles.

According to a literature review by the Ville de Montréal in 2010, proximity to a park setting increases property values by 5% to 20% for adjacent properties (depending on the park and neighbourhood characteristics), while values decline for properties located farther away from the park.

Vegetation cover promotes the absorption of rainwater runoff, thereby reducing the burden on the sewer system. Large trees provide shade and cool the air, helping cut air-conditioning costs for

nearby buildings. Trees also block the wind in winter, lowering heating costs. In addition, improved air quality and heat island mitigation strategies have positive impacts on public health, thus reducing demand on an overburdened health system.

According to The Economics of Ecosystems & Biodiversity study report, maintaining functioning ecosystem services may be more profitable than implementing alternative techniques[28], while protecting and enhancing urban nature can be economically rational.

Urban nature: cause for concern

People have been asking for more green spaces in the city for many years, but not everyone is keen on the idea. Plants like poison ivy and ragweed and animals like skunks and raccoons can be a nuisance. These are valid concerns and it is important to reflect together on how we can live in harmony with nature, safely and enjoyably. Following certain guidelines is often enough to make sure all users have a positive experience, whether in the neighbourhood or in a park. To get the most out of a visit to one of the large parks, residents are encouraged to read the park regulations in effect[29].

Tolerating urban nature also requires a certain openness. For instance, adventive plants, commonly known as "weeds" because they grow where they are not wanted, are simply hardy species that have adapted to a wide range of growing conditions. There are, by the way, effective methods to reduce the spread of weeds[30]. These plants do have their advantages: their root systems enrich the soil, and a few even provide nutrients. In addition, greater biological diversity in a garden is more attractive to butterflies and to insects that feed on smaller plant pests. Some insects and mammals also play a highly beneficial role in pollination and seed dispersal. Nature is a vast and extremely complex system in which all elements are inter-related – each is important in its own right.

Active transportation: a healthy and eco-friendly choice!

Services for everyone

Even though parks are located throughout the city, some sectors lack green spaces or large trees; this poses a challenge for the city as it seeks to ensure that all residents benefit from ecosystem services[31].

Far from Montréal, major ecosystems like oceans and immense forests provide vital ecosystem services to support life on Earth. Outside influences, such as smog or a toxic spill occurring on a large body of water, may also have negative effects on our environment. Ecological reality knows no administrative boundaries. Global awareness about environmental protection, which has been evolving since the second half of the 20th century and growing rapidly in the last decade, stems from the recognition that everyone must co-operate and be involved in preserving our environment.

Alarming global rate of species loss

The scientific community agrees on the fact that the current rate of species extinction is much higher than the natural rate[32]. Some ecosystems and communities are deteriorating or vanishing. Species that endure tend to suffer losses, in both genetic diversity and in individual numbers. Moreover, population groups are increasingly isolated from each other. Domesticated and cultivated species have also sustained dramatic losses in genetic diversity[33].

There are currently nearly 20,000 threatened species on the IUCN (International Union for Conservation of Nature) Red List of Threatened Species[34]. At the moment, Quebec has legally declared 78 plant species endangered or vulnerable, and 314 vascular and 191 non-vascular plants likely to be designated threatened or vulnerable[35]. As for animal species, the province has 38 threatened or vulnerable species, as well as 115 species likely to be designated threatened or vulnerable[36].

Available data show that some forty plants and some twenty animal species are at risk in the Montréal area.

Unique to southern Quebec, the biologically rich habitat of maple stands provides an environment conducive to the growth of the white trillium, a species at risk[37].

Key threats to global biodiversity

The Secretariat of the CBD has identified five threats to global biodiversity[38]:

- The conversion of natural ecosystems to agricultural operations can lead to the loss, degradation or fragmentation of habitats.
- Many species considered useful are now in decline due to over-exploitation or over-consumption beyond their renewable capacity.
- Pollution, in particular the accumulation of nitrogen and phosphorus from excessive use of fertilizers that is released into waterways, causes accelerated eutrophication of aquatic ecosystems and stimulates rapid algal growth (potentially toxic to humans).
- Some alien species, when introduced to areas outside their native range, can become invasive and constitute an ecological threat by competing with native species for food and living space.
- Many predict that climate change will become of increasing concern in the next few decades; already, changes can be observed in flowering periods, migration and species distribution, which has an impact on the food chain and affects the balance of various ecosystems.

The destruction of natural habitats as a result of land use changes remains the leading cause of global biodiversity loss.

Two key threats in Montréal

Habitat fragmentation and loss

Habitat patches, comprising wooded areas, undeveloped land, wetlands and streams, can host a wide variety of species, which depend on one or more of these habitats. Some species need more than one habitat to meet all their needs: birds of prey, for instance, nest in forests but require open areas like fallow land and meadows to hunt.

The shape and size of a natural habitat are also important factors to ensure the necessary conditions are maintained for the survival of species within an ecosystem.

Urbanization can affect the conditions that support biodiversity. When land cover decreases or some types of habitats disappear from a patch (like undeveloped land), there is a risk of biodiversity loss. Generalist species are able to adapt to a wider range of conditions and food resources, and so are more widespread in cities than specialist species, whose narrow niche means they tend to use urban spaces as rest spots or migratory stops, and not as nesting sites.

Fragmentation affects biodiversity by shrinking core zones, threatening their ecological integrity; as a result, the nucleus of the zone where animals nest and raise their young becomes increasingly restricted. The periphery, acting as a buffer between the urban environment and the core zone, undergoes a series of changes in terms of temperature, wind and light, and this creates different conditions. Although it may support a certain level of biodiversity, the periphery can be threatened by invasive species. For example, species of buckthorn, extremely aggressive plants, have densely colonized the edges of Montréal's natural habitats.

In addition, fragmentation within a natural landscape, as a result of new paths, for instance, can have varying implications: the paths will not restrict the movement of birds but, depending on such factors as their number, location and width, they may make it difficult for mammals, reptiles and amphibians (herpetofauna) to cross them. An "edge effect" can be created on either side of the paths; the quality of the zone, now that it is broken up, is no longer the same.

Major highways cut across the ecoterritory in the East Island greenbelt.

The great majority of Montréal's surface is paved over and built up; nevertheless, some attractive habitat patches capable of supporting rich biodiversity do exist. There are some larger natural habitats, but they are often fragmented by roads and other development. Many small patches of natural habitats are geographically isolated; the presence of semi-natural corridors, such as landscaped green spaces, help maintain connectivity between the more intact ecosystems.

Invasive species

An invasive alien species is a non-native plant or animal that, once introduced in a location other than its native range, propagates rapidly and often harms native species. Invasive species may be intentionally introduced by humans for domestication, cultivation or other purposes, or accidentally, either blown in by the wind or transported by ship, train, truck, etc., to then spread and establish themselves.

Japanese knotweed is capable of reproducing from tiny stem or root fragments that can lie dormant in the soil for many years.

Invasive alien plants produce a significant change in terms of ecosystem composition, structure or processes. Once established, they can crowd out some native plants and disrupt the habitat's ecology, thereby also affecting the fauna that depends on them for food or reproduction. Of the many invasive alien plants present in Montréal, a dozen of

them threaten the biodiversity and ecological integrity of its large parks. They include Norway maple, European buckthorn, Chinese elm, wild chervil, Japanese knotweed, and common water reed[39].

As for animal species, there is one in particular that is making the news lately: the emerald ash borer. Originally from Asia, the insect has already caused extensive damage in the United States and in Ontario. The emerald ash borer was first observed in Montréal in 2011, near the port facilities in the borough of Mercier–Hochelaga-Maisonneuve. With the ash population making up a significant part of Montréal's urban forest and also elsewhere in the greater metropolitan area, the arrival of the emerald ash borer is of huge concern. City authorities, however, are doing everything possible to contain the infestation (more on this in the next chapter).

Emerald ash borers attack all ash species and have no known native natural enemies.

The state of biodiversity in Montréal: a partial assessment

Even though the overall health of the city's biodiversity is difficult to evaluate given the lack of data, some elements of an assessment have been identified to help define key issues and suggest solutions to promote biological diversity.

Montréal has a wonderful diversity of habitats suitable for a variety of plant and animal species, some of which are at risk. In addition to the large bodies of water, there are several good-sized inland habitats (see Map 3). Made up mostly of habitat patches of high interest, these large natural areas create a critical network to support and preserve rich biodiversity. This richness, however, remains fragile. In a vibrant urban environment such as Montréal, there are significant needs related to urban development, and encroachment into natural areas may have far-reaching consequences for the island's biodiversity. Reconciling urbanization and habitat conservation remains a major challenge. Improving connectivity is also becoming an increasingly topical issue, at both the local and regional levels; the aim would be to increase habitat area and the links between isolated habitats in southern Quebec.

The second key issue relating to Montréal's biodiversity is that of invasive plant and animal species, which constitute a threat to the integrity of natural ecosystems and to the survival of many native species.

A few other problems must be considered, in particular:

- chronic shortages in water inflow to some of the wetland ecosystems;
- the long-term impact on the ecosystems of the city's nature parks and Mont-Royal Park as a result of visitors straying off the marked paths and picking or digging out plants;
- urban runoff, which carries a wide variety of contaminants, polluting the soil and streams.

The next chapter, on governance and management, will address the City's efforts to promote biodiversity.

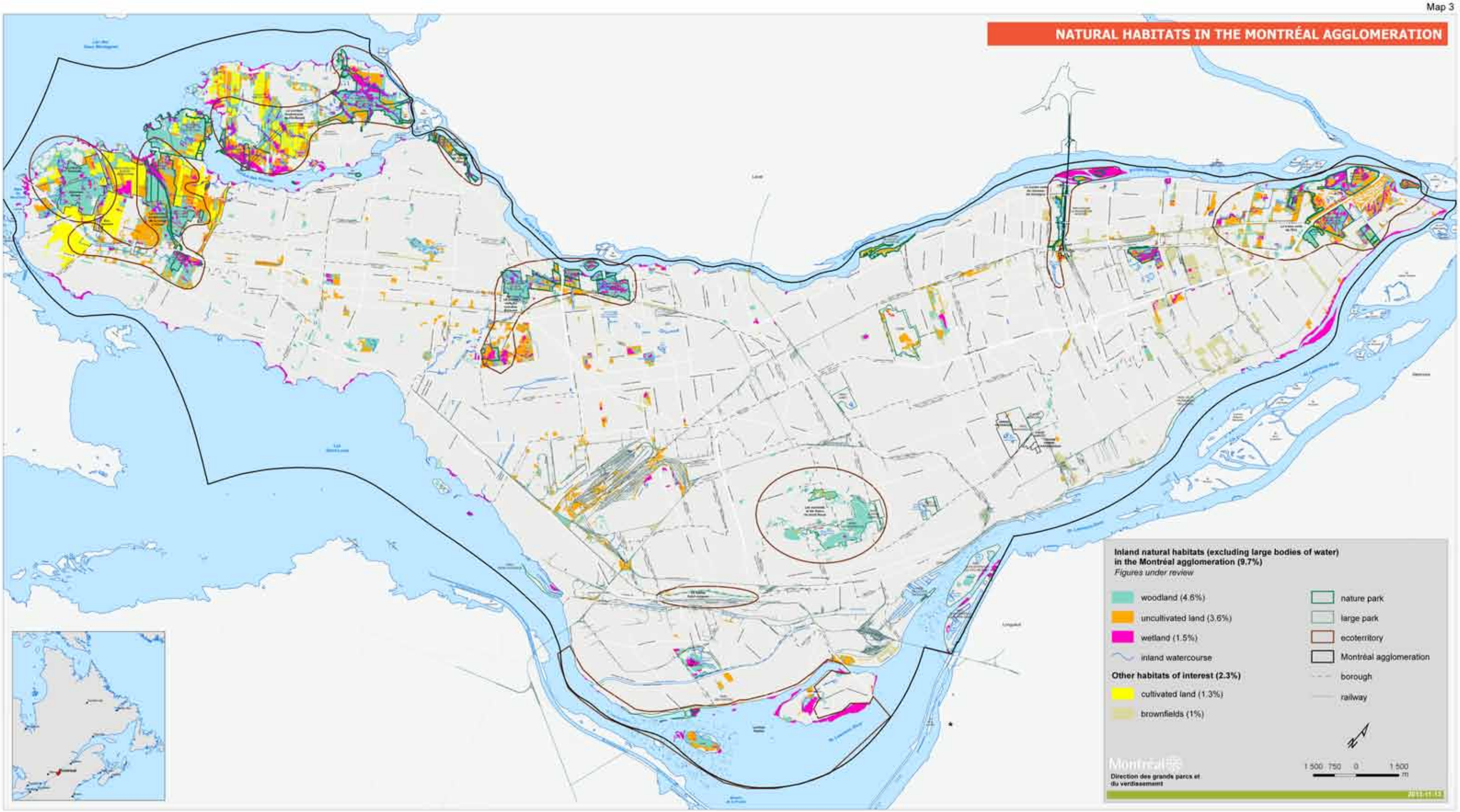
Montréal's aquatic habitats are home to a variety of species, including black-crowned night-herons, star attractions at the Île-de-la-Visitation Nature Park.

Notes

1. Adapted from definitions taken from the following references: Secretariat of the CBD website (consulted in March 2012), Millennium Ecosystem Assessment (2005) and Primack (2002).
2. Müller, N. (2010b) in Boucher, I., Fontaine, N. (2010), p.13.
3. Kinzig and Grove (2001) and Savard et al. (2000) in Boucher, I., Fontaine, N. (2010), p.13.
4. Latour (2009), p.17.
5. Boucher, I., Fontaine, N. (2010), p.25.
6. Communauté métropolitaine de Montréal, (2011). Metropolitan Land Use and Development Plan, p.146.
7. Beaulieu, J., G. Daigle, F. Gervais, S. Murray and C. Villeneuve (2010).
8. MDDEP website (consulted in November 2011): http://www.mddep.gouv.qc.ca/biodiversite/cadre-ecologique/index.htm
9. Gratton L. (1993), p.25.
10. The ecoterritories are subject to special measures, which will be discussed in the next chapter.
11. Prescott, J., Richard, P. (2004), p.123.
12. Prescott, J., Richard, P. (2004), p.248.
13. See the Large Parks section on the Ville de Montréal website: www.ville.montreal. qc.ca/grandsparcs
14. Data from the Ville de Montréal (2012) and the Centre de données sur le patrimoine naturel du Québec, January 2012. Database report for the Montréal agglomeration. Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP) and Ministère des Ressources naturelles et de la faune (MRNF), Quebec.
15. Desroches, J.-F., Rodrigue, D. (2004), p.220.
16. Paquin, J. (2003), p.439.
17. McKinney (2006), in Boucher, I., Fontaine, N. (2010), p.17.
18. Savard et al. (2000), in Boucher and Fontaine, p.17.
19. Millenium Ecosystem Assessment (2005), p.19 and Secretariat of the UN Convention on Biological Diversity (2010), p.23.
20. For more information, visit the MDDEP website (consulted in March 2012): http:// www.mddep.gouv.qc.ca/biodiversite/capsules/index.htm
21. Tree Canada website (consulted in October 2011): http://treecanada.ca/en/resources/publications/
22. Giguère (2009), p. 9.
23. Guay, F. and Baudouin, Y. (2005).
24. Kaplan (1995), Rohde and Kendle (1994), Ulrich et al. (1991), Kaplan and Kaplan (1989) in Maller et al. (2008), p.56.
25. Leather et al. (1998), Lewis (1996), Rohde and Kendle (1994) and Kaplan (1992) in Maller et al. (2008), p.56.
26. Parsons et al. (1998) and Ulrich et al. (1991), in Maller et al. (2008), p.56.
27. Impact recherche (2007).
28. TEEB – The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers (2010), pp. 67 and 143 : http://www.teebweb.org/
29. See the Large Parks section on the City of Montréal website: www.ville.montreal.qc.ca/grandsparcs
30. See details on the Montreal Botanical Garden website (consulted in January 2012): http://espacepourlavie.ca/en/tips-controlling-dandelions-plantains-and-other-undesirables
31. See Chapter 2 for the measures implemented by the City.
32. Primack, (2002), p.159.
33. Ibid.
34. For more information, go to the International Union for Conservation of Nature website (consulted in March 2012): http://www.iucnredlist.org/documents/summarystatistics/2011_2_RL_Stats_Table1.pdf
35. Visit the MDDEP website (consulted in December 2012): http://www.mddep.gouv.qc.ca/biodiversite/atlas-en.htm/
36. Visit the MRN website (consulted in December 2012): http://www.mddefp.gouv.qc.ca/biodiversite/atlas-en.htm
37. MDDEP website (consulted in March 2012): http://www.mddep.gouv.qc.ca/biodiversite/especes/trille/index.htm
38. For more information, see the CBD Secretariat website (consulted in March 2012): http://www.cbd.int/2010/biodiversity/#tab=1
39. The following is a complete list of the invasive exotic plants that threaten the large parks' biodiversity: Manitoba maple, Norway maple, alder buckthorn, European buckthorn, Siberian or Chinese elm, garlic mustard or hedge garlic, wild chervil, swallow-wort, goutweed, Japanese knotweed, giant knotweed and common water reed.

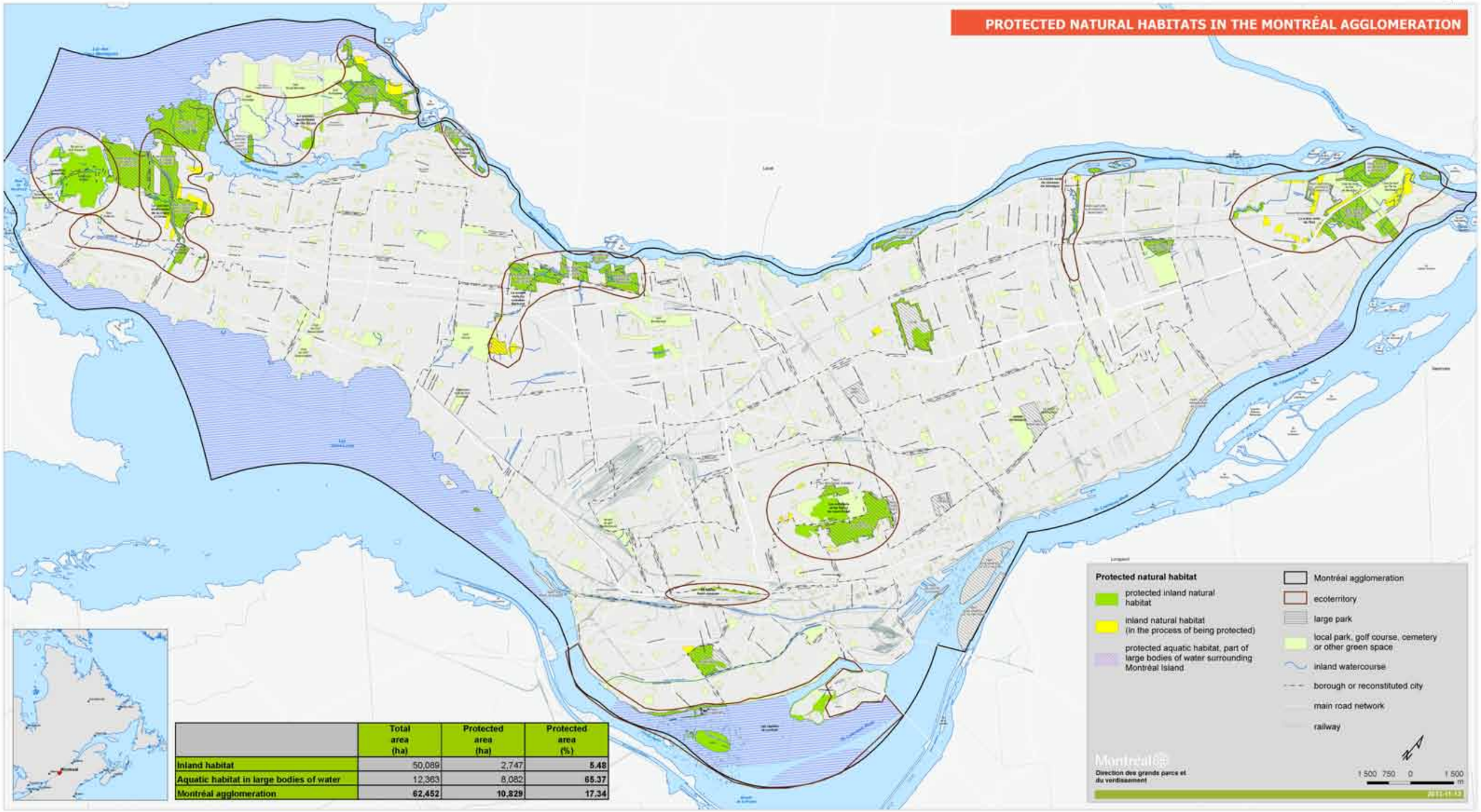
Map 3

NATURAL HABITATS IN THE MONTRÉAL AGGLOMERATION



Map 4

PROTECTED NATURAL HABITATS IN THE MONTRÉAL AGGLOMERATION



	Total area (ha)	Protected area (ha)	Protected area (%)
Inland habitat	50,089	2,747	5.48
Aquatic habitat in large bodies of water	12,363	8,082	65.37
Montréal agglomeration	62,452	10,829	17.34

Addressing the issue of biodiversity at the municipal level

Biodiversity is an increasingly important issue for society at large, not just the scientific community. Cities have not escaped this trend. Why so much talk about biodiversity? Because of all the threats to life on Earth. As discussed in Chapter 1, the different aspects of biodiversity (ecosystems, species and genetics) are all suffering on a global scale. This is worrying for humans, because we are part of and depend on the web of life.

On the municipal scene in Montréal, biodiversity-related considerations have all been taken into account in drafting and implementing such overarching tools as the Land Use Planning and Development Plan and the Master Plan, and other more specific tools like the water body monitoring program, the ecosystem management program, the By-law concerning pesticide use, the Policy on the Protection and Enhancement of Natural Habitats, the Tree Policy and community and corporate sustainable development plans. These plans are all outlined in the following section, which looks at planning and legislation.

The list is not complete, however, because many other policies, strategies, plans and programs contain measures aimed at enhancing biodiversity.

For instance, the 2012-2021 Canopy Action Plan proposes that an additional 300,000 trees be planted on both public and private property, in keeping with the goal of increasing the canopy in the Montréal Community Sustainable Development Plan.

In addition, Montréal has a 2012-2015 plan aimed at slowing the rate of emerald ash borer infestation on the island, so as to reduce the impact of these insect pests. The Heritage Policy contains a section devoted to natural heritage. As well, the Montréal 2011-2020 water strategy stipulates that stormwater should be collected and allowed to soak into the soil and natural habitats whenever possible. It also calls for reverse storm sewer connections to be corrected, to limit the amount of untreated water discharged into water courses, and for improvements to the quality of wastewater discharged into the St. Lawrence River by the wastewater treatment plant.

Biodiversity is also central to the mission of the Montréal Space for Life, through the conservation, research, education and outreach efforts of the Montréal Biodôme, Insectarium, Botanical Garden and Planetarium. We will come back to this point in Chapter 3, where we will discuss information sharing and public participation.

Montréal's boroughs, which are responsible for local parks and local services (including local environmental issues), also do important work in terms of biodiversity. The boroughs and reconstituted cities can adopt specific by-laws for their territories relating to such issues as greening initiatives. The central city may organize consultation or training sessions from time to time for borough officials to meet specific needs, such as the enforcement of the By-law concerning pesticide use or the emerald ash borer program.

Area with little canopy coverage

Area with good canopy coverage

Several boroughs have included managing stormwater and protecting or enhancing biodiversity in their plans, including the Saint-Léonard and Saint-Laurent boroughs (on the Hubert Reeves Eco-Campus).

It should also be noted that, since 2011, background papers, the internal documents drafted to help elected officials make informed decisions on various matters, have included a "sustainable development" heading. This means that projects' impact on biodiversity, for instance, can be identified and taken into account.

Although Montréal does already consider biodiversity protection in various areas, a number of challenges remain. This report, designed to offer an overview of the situation, is intended to provide input for the reflection process needed to identify the issues and possible solutions in this regard.

Raptors are considered species of interest in Montréal, like this great horned owl. These birds can be spotted in many of the city's large parks.

A few historical milestones

1874: An article is added to the City of Montréal Charter guaranteeing protection for Mont-Royal Park (first legislation in Quebec designed to protect a natural habitat)[1]

1875: The Commission des parcs et traverses is created (later renamed the Service des parcs et traverses, then the Service des parcs in 1910, and today the Direction des grands parcs et du verdissement)

1876: Montréal's first major park (Mont-Royal Park) is inaugurated, soon followed by St. Helen's Island Park and La Fontaine Park

1980s and 1990s: The regional park network (nature parks) is created; the first regional park (Île-de-la-Visitation Nature Park) is inaugurated in 1983

1981: Bois-de-Saraguay is declared a "natural district" by the Quebec government

1996: The ecosystem management program is introduced in the city's major parks

2004: The Policy on the Protection and Enhancement of Natural Habitats is adopted and ecoterritories are included in the Master Plan

2004: The By-law concerning pesticide use is adopted

2005: Mount Royal is declared a "historic and natural district" by the Quebec government

2005: The Tree Policy is adopted

2007: Montréal's First Strategic Plan for Sustainable Development is adopted; a second plan is adopted in 2010

2011: The Durban Commitment, reiterating the importance of biodiversity for Montréal, is signed (Appendix D)

2012: The Montréal emerald ash borer action plan is adopted

Federal and provincial tools in the area of biodiversity[2]

Over the years, the federal and provincial governments have prepared various tools as a way of promoting biodiversity in their administrative and legislative processes. The box below lists a number of examples.

At the regional level: the Metropolitan Land Use and Development Plan[3]

The Metropolitan Land Use and Development Plan (PMAD) is the land use planning document that applies to the entire Montréal metropolitan community (CMM). The PMAD, in effect since March 2012, proposes that metropolitan wooded areas, forest corridors and wetlands be protected and enhanced. Following a consultation process, the goal in terms of the amount of the territory of Greater Montréal to be protected was increased from 12% to 17%, in keeping with the international objectives in the CBD 2011-2020 Strategic Plan for Biodiversity. The PMAD includes measures for protecting riverbanks, shorelines, floodplains, landscapes and built heritage. To enhance all of these elements, the PMAD recommends a metropolitan recreational and tourism network, structured around a green and blue belt.

In accordance with the Quebec Act respecting land use planning and development, the Land Use Planning and Development Plan and the Montréal Master Plan will have to be revised to take account of the orientations contained in the PMAD.

Programs, policies and other tools guiding biodiversity initiatives in Montréal

This section lists various examples of biodiversity protection tools adopted by the City. They are described briefly in the next section (2.3).

Federal and provincial administrative and legislative tools relating directly or indirectly to biodiversity (not a complete list)

- *Environment Quality Act* **(Quebec, 1972)**
- *Parks Act* **(Quebec, 1977)**
- *Act respecting the conservation and development of wildlife* **(Quebec, 1983)**
- *Canada Wildlife Act* **(Canada, 1985)**
- *Act respecting threatened or vulnerable species* **(Quebec, 1989)**
- *Federal Policy on Wetland Conservation* **(Canada, 1991)**
- *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* **(Canada, 1992)**
- *Migratory Birds Convention Act, 1994* **(Canada, 1994)**
- *Canadian Biodiversity Strategy* **(Canada, 1996)**
- *Convention on biological diversity: Québec's Implementation Strategy* **(Quebec, 1996)**
- *Canadian Environmental Protection Act* **(Canada, 1999)**
- *Canada National Parks Act* **(Canada, 2000)**
- *Stratégie sur les aires protégées (strategy on protected areas)* **(Quebec, 2000)**
- *Natural heritage conservation act* **(Quebec, 2002)**
- *Québec Water Policy* **(Quebec, 2002)**
- *Species at Risk Act* **(Canada, 2002)**
- *An Invasive Alien Species Strategy for Canada* **(Canada, 2004)**
- *Stratégie et plan d'action sur la diversité biologique 2004-2007 (biodiversity strategy and action plan)* **(Quebec, 2004)**
- *Protection policy for lakeshores, riverbanks, littoral zones and floodplains* **(Quebec, 2005)**
- *Sustainable development act* **(Quebec, 2006)**
- *Biodiversity Outcomes Framework* **(Canada, 2006)**

2.2 PLANNING AND LEGISLATION

Land Use Planning and Development Plan and Master Plan

Montréal's Land Use Planning and Development Plan and Master Plan are planning documents that together set out guidelines for the spatial and physical organization of the city, while presenting an overall vision of land use development for its territory.

When revising them to align them with the PMAD, the City of Montréal prepared a draft discussion document, a Montréal Development Plan entitled Montréal for Tomorrow. The plan, adopted in May 2012, was submitted for public input in 2012, to encourage broad commitment to the development vision it proposed. Greening the city and biodiversity were some of the themes on which public comments were solicited.

As part of the creation of the green and blue belt proposed in the PMAD, the City is to identify future components of the belt on the territory of the agglomeration, so as to prepare development strategies to be reflected in the Land Use Planning and Development Plan.

Water body monitoring program[4]

Monitoring the city's water bodies is a key part of Montréal's overall wastewater treatment program. Thousands of chemical, physical and bacteriological analyses are conducted every year so as to track the changing water quality and identify priorities.

Monitoring activities started in the 1970s. The goal was first of all to draw up a baseline portrait of water quality. An approach was then developed to measure the success of efforts to improve water quality. The result was four specific characterization and monitoring programs:

- COURDO, to evaluate general water quality of adjacent watercourses
- QUALO, to evaluate local water quality along the shores of the island
- RUISSO, to evaluate water quality of inland streams and bodies of water
- PLUVIO, to evaluate water quality in the storm sewer system

The ecosystem management program was implemented in the large parks network, like here, at the Île-de-la-Visitation Nature Park.

Ecosystem management program[5]

The ecosystem management program, implemented in the large parks network since 1996, is intended to maintain access to natural habitats, with respect for their ecological integrity.

It is a two-part program:

- planning, including biophysical inventories, ecological assessments and the development of synthesis tools to simplify the consultation and analysis of the data collected.
- management, including a monitoring program that provides a portrait of the ecosystems and makes it possible to quickly identify any change in the natural habitat, along with interventions in the different ecosystems.

By-law concerning pesticide use[6]

This by-law was adopted in 2004 to respond to concerns about the pesticide risks for environmental quality and human health. Their use is now banned outside buildings. Some products, considered minimally toxic, are still allowed (biopesticides, mineral oils and low-impact pesticides as defined in the by-law).

A family "green" break

Banned products may still be used in certain exceptional cases, subject to permit approval. They cannot be used in sensitive zones such as daycare centres, schools, playgrounds or hospitals. Some Space for Life activities, production greenhouses and golf courses and bowling greens are covered by special exemptions.

The boroughs are responsible for applying the by-law.

Policy on the Protection and Enhancement of Natural Habitats[7]

The Policy on the Protection and Enhancement of Natural Habitats was adopted in 2004, intended to increase the area protected, safeguard natural habitats, maximize biodiversity and integrate ecosystems and natural landscapes into built-up areas. The goal of the Policy is to protect 6% of lands in the agglomeration (including wetlands, watercourses and inland bodies of water), where there are major issues involved in reconciling development and conservation. It calls for concertation among all stakeholders. The target sectors are existing parks, shorelines and ecoterritories.

Ecoterritories are vast diversified spaces, including natural habitats of more than 15 ha where protection is considered a priority. Ten "ecoterritories" were identified in the Policy (see Map 3) and have been recognized in the City's current Master Plan. Conservation projects undertaken in accordance with the Policy are based on the ecological network model, which includes (A) core zones, pockets of biodiversity; (B) protective buffer zones; and (C) an ecological corridor allowing species to disperse and migrate between core zones.

Ecological network

2.2 PLANNING AND LEGISLATION

Tree Policy[8]

This policy, adopted in 2005, places trees at the heart of the Montréal cityscape and encourages all stakeholders (municipal employees, citizens, institutional and association partners, major land owners, etc.) to contribute to preserving and developing Montréal's arboreal heritage.

The Policy lists 11 specific actions to reach the following four objectives:

- Develop and provide the tools necessary for defining a long term vision;
- Establish rules and practices relating to the protection, management and appropriate maintenance of the urban forest, while supporting applied research in the field;
- Increase the number of trees planted, in keeping with the principle of planting the right tree in the right place;
- Step up information, publication and awareness initiatives with a view to involving all stakeholders.

2010-2015 Sustainable Development Plans[9]

The 2010-2015 Community Sustainable Development Plan for Montréal calls on the city, local administrations and partner organizations to rally around broad orientations, objectives and actions. One of these orientations refers directly to biodiversity, i.e. "Improve protection of biodiversity, natural environments and green spaces." The related objective is to improve green infrastructures in Montréal by expanding the canopy coverage from 20% to 25% by 2025 in comparison with 2007. The associated actions focus on collaborative efforts to protect and enhance biodiversity-rich areas, the benefits of ecosystem services in the urban environment, sharing information to encourage action, and ecological management of green spaces. In addition, the Plan provides for the introduction of a biodiversity and greening strategy for Montréal.

Over 180 organizations have voluntarily signed on as partners and made a commitment to taking concrete steps for Montréal's sustainable development; some of these partners are taking actions specifically targeting biodiversity.

At the same time, the Montréal corporate sustainable development plan was prepared. The 2010-2015 plan calls for measures to integrate sustainable development:

- in Montréal's plans, policies, programs and major projects;
- in management practices, though environmentally responsible initiatives;
- in environmental, social and economic performance measurements.

Actions by the boroughs and reconstituted cities

The boroughs and reconstituted cities all have the option of adopting measures to boost biodiversity. For example, the Rosemont–La Petite-Patrie, Saint-Laurent and Villeray–Saint-Michel–Parc-Extension boroughs have adopted by-laws calling for more greenery on their territories. Readers are invited to consult the websites of the boroughs and reconstituted cities in the Montréal agglomeration for more information on the applicable by-laws.

Trees are a vital part of everyday life.

Measures taken to promote biodiversity

The following is a summary of the main accomplishments thanks to the different tools used by the City, as presented in the previous section.

Land Use Planning and Development Plan and Master Plan

The first step in identifying the components of the future green and blue belt in Montréal is to draw up a diagnosis of natural habitats in the agglomeration. The City is working to update its cartographic databases and prepare a multi-criteria analysis methodology, in collaboration with the CMM and the MDDEFP, so as to assign an ecosystem value to the natural habitats identified. The results will be used to prepare urban planning documents, which will be submitted for formal consultation with residents and other stakeholders.

Aquatic habitat monitoring program

According to the 2011 COURDO program, as compared with the previous report in 2004, water quality in Lake Saint-Louis and the St. Lawrence River had remained stable and was most often good or excellent. However, water remained polluted in the zone of influence of the discharges from the Jean-R. Marcotte wastewater treatment plant (at the eastern tip of Montréal Island). The same applied to the water along the shoreline of the north shore of the St. Lawrence.

Boating at the Cap-Saint-Jacques outdoor centre

The QUALO program showed that over the past five years an average of 70% of the sites sampled were suitable for uses involving contact with the water, with a maximum of 88% in 2009 and a minimum of 56% in 2011. Note that the bacteriological quality of water near shorelines varies from one year to the next, and depends on precipitation and the hydrology of the watercourses surrounding the territory.

The RUISSO program showed that, between 2009 and 2011, about 50% of sampling sites associated with watercourses and inland bodies of water had excellent, good or satisfactory water quality, an improvement from 2006 to 2008, when this percentage was about 30%.

Lastly, under the PLUVIO program, the detailed study of 86 storm sewers at the end of the 2011 season revealed that some fifty of them discharging into adjacent bodies of water and about twenty discharging into inland bodies of water had inverted connections between the storm and sanitary sewer systems. In the other systems, no inverted connections were found, and the contamination measured at the discharge outlet was caused by overflow structures or the presence of raccoons and other animals.

Ecosystem Management Program

The Ecosystem Management Program has made it possible, in particular, to:

- identify and monitor 11 exceptional sites (relatively undisturbed mature forests);
- monitor bird, amphibian and reptile populations;
- manage pressure due to the presence of certain animal populations (beaver, raccoon);
- work to control undesirable plant species (poison ivy, purple loosestrife, buckthorn, exotic varieties of knotweed, common and giant ragweed, etc.);
- work to protect stumps (dead trees useful for wildlife) and woody debris.

2.3 ACCOMPLISHMENTS AND CONCLUSIONS

Other measures taken include producing maps of ecosystem value for certain parks, installing equipment and other means to help protect wildlife (nesting boxes, rafts for turtles, etc.), monitoring water levels in marshes, preparing a census of remarkable trees and following up on at-risk (threatened or vulnerable) species.

The Ecosystem Management Program makes a significant contribution to maintaining Montréal's biodiversity. Readers may wish to consult Appendix A of the report for details on the results of the program.

Policy on the Protection and Enhancement of Natural Habitats

Since the Policy was adopted, the rate of protection of the agglomeration's inland territory has risen from 3.22% to 5.48% (see Map 4). Measures are continuing with the aim of reaching the objective of 6%. Various initiatives under the Policy have made it possible to enlarge a number of existing nature parks and create new ones, such as the De Montigny Stream and Rapides-du-Cheval-Blanc nature parks, which are to be developed so that they can be opened to the public.

The Policy has also made it possible to complete concept plans for three ecoterritories and launch the process to develop a fourth, in consultation with local residents and interested groups (we will look at this topic again in Chapter 3, concerning public participation in defining orientations for the City). Many other initiatives are currently underway, such as developing a human-scale landscape in the permanent agricultural zone on Île Bizard, recognizing the contribution of the agricultural activities there to preserving biodiversity and significant landscapes.

Protected spaces in Montréal will gradually be integrated into the directory of protected natural habitats in the Montréal agglomeration. In time, the directory will be accessible to everyone on the Internet, and will make it possible to officially confirm sites earmarked for maintaining and/or enhancing biodiversity in the long term, and to recognize conservation efforts by the community. Guidelines for inclusion in the directory and management of protected sites were adopted in 2009.

Eradicating buckthorn

A public information booth

Work is planned at the Rapides-du-Cheval-Blanc Nature Park (created in 2009) for its upcoming public opening.

By-law concerning pesticide use

Measures have been taken to support enforcement of the By-law and develop healthy maintenance practices for municipal lands, through integrated pest management.

Under the provincial Pesticides Act, any commercial use of pesticides must be done or supervised by employees holding the appropriate certification. In 2011, 78 employees held such certificates.

In addition, meetings of two committees, i.e. the roundtable of pesticide inspectors and the municipal committee on pesticides, encouraged discussions between the partners of the Central City and the boroughs and the identification and understanding of risks linked to pesticides and the eco-friendly management of green spaces.

Tests on controlling insects that are irritants to residents (basswood aphids and burrowing wasps) were carried out on target sites, to test the effectiveness of low-impact pesticides and specific approaches. Weed-control tests were also done as part of a pilot project, to determine whether certain seed mixtures could significantly reduce weeds on traffic medians and encourage biodiversity.

A communication plan has been implemented to support integrated pest control projects and tell residents about organic lawn care practices and alternatives to pesticides.

Tree Policy

The provisions of the complementary document to Montréal's current Master Plan with regard to trees have now been fully integrated into the boroughs' planning by-laws. Discussions were held concerning possible amendments to provisions regarding the felling of trees, and a draft template by-law was sent out to the boroughs by the Central City.

Many boroughs have updated part or all of their inventories of public trees. Most boroughs have undertaken steps to georeference their street trees. A common computer platform has been created to simplify the job of updating this data, with the goal of preparing an exhaustive portrait of Montréal's public trees. The City has also begun a research program aimed at developing an automated method of inventorying all trees (on both public and private property) by remote sensing.

In addition, a number of boroughs have completed their own tree plans. A draft reference guide to assist them was prepared by the City and is now in circulation.

The inventory of remarkable trees on the Mount Royal heritage site was completed in 2011. Discussions are now underway to decide whether this type of inventory could be done for the entire city.

Lastly, a number of communication tools have been produced and posted on the Internet, to provide residents with information on urban trees and related issues.

Sustainable development plans

Many of the City's accomplishments relating to enhancing the protection of biodiversity, natural habitats and green spaces are covered elsewhere in this report, along with progress related to the Policy on the Protection and Enhancement of Natural Habitats (as described earlier), the opening of the Biodiversity Centre (Chapter 3) and the creation of biodiversity discovery circuits in 10 of the large parks (Chapter 5). As mentioned, the City has also prepared a 2012-2021 Canopy Action Plan, in keeping with the goal of increasing the canopy from 20% to 25% in the Montréal agglomeration by 2025.

2.3 ACCOMPLISHMENTS AND CONCLUSIONS

Other achievements relating to biodiversity described in the 2010-2011 report on the 2010-2015 Sustainable Development Plan for Montréal include sharing best municipal practices for maintaining green spaces with local stakeholders, and updating and expanding information on natural habitats, biodiversity, urban trees and other subjects of interest as part of updating the website of the Direction des grands parcs et du verdissement (large parks and greening department).

Accomplishments by community partners include sitting on different committees relating to biodiversity, organizing awareness-raising activities, taking different steps to increase green infrastructures (planting trees, installing green roofs, urban agriculture projects, etc.) and, for certain partners, adopting eco-friendly management programs for their green spaces.

Progress has also been made in terms of implementing Montréal's corporate sustainable development plan, in particular the drafting of a sustainable development checklist for large development projects that includes a number of themes associated with biodiversity protection.

The shade of a tree makes a perfect picnic spot in a neighbourhood park.

Conclusions and challenges

Protecting biodiversity involves many different jurisdictions. The wide variety of stakeholders in the municipal administration points to this fact, although some units are more directly concerned. Clearly, interdepartmental communication and co-operation are an essential part of protecting biodiversity in Montréal. Joint consultations before projects are carried out can do much to encourage habitat preservation. Sharing information on biodiversity issues and ecosystem services, and on the City's commitments in this respect, such as the Durban Commitment (Appendix D), will contribute to generating opportunities for discussion and integrating natural protection in the municipal organization.

The City's different plans, programs, policies and other initiatives make a significant contribution to protecting biodiversity in Montréal. Ongoing evaluation of the results of these tools will make it possible to quickly identify challenges as they arise and consider possible solutions.

In terms of these challenges, maintaining assets and accessibility is key. With the addition of new protected areas to the large parks network, as repeatedly called for by residents, it is important to maintain the ecological integrity of these habitats and eventually make the sites accessible to the public, despite the difficult financial context. Discussions on new approaches (partnerships with community organizations, diversification of funding sources, etc.) may be required to preserve these sites and their rich biodiversity, while allowing residents to enjoy them.

Notes

1. Les amis de la montagne website, "Short history of Mount Royal" section (consulted in November 2012): http://www.lemontroyal.qc.ca/en/learn-about-mount-royal/short-history-of-mount-royal.sn
2. See the federal (www.canada.gc.ca) and provincial (www.gouv.qc.ca) websites for information on these tools.
3. The Metropolitan Land Use and Development Plan is available on the Communauté métropolitaine de Montréal website (consulted in April 2012): http://pmad.ca/
4. See http://ville.montreal.qc.ca/rsma for more information on this program (consulted in April 2012)
5. Information on this subject will soon be added to the "Grands parcs et verdissement" (large parks and greening) section of the Ville de Montréal website, http//ville.montreal.qc.ca/grandsparcs. Readers may also consult Appendix A for more information on the results of this program.
6. See http://ville.montreal.qc.ca/portal/page?_pageid=7237,74721602&_dad=portal&_schema=PORTAL for more details on this by-law (consulted in January 2013)
7. See http://ville.montreal.qc.ca/portal/page?_pageid=7377,94705582&_dad=portal&_schema=PORTAL for more information on the Policy (consulted in January 2013)
8. Consult the Policy at http://ville.montreal.qc.ca/pls/portal/docs/page/nature_en_ville_en/media/documents/polarbre_en.pdf
9. See http://ville.montreal.qc.ca/pls/portal/docs/PAGE/PES_PUBLICATIONS_EN/PUBLICATIONS/VERSION_SYNTHESE_EN.PDF

Looking out over Lake of Two Mountains, Cap-Saint-Jacques Nature Park

Access to biodiversity in Montréal

Biodiversity is everywhere – all around us in our daily lives and in the nature destinations that Montréal has to offer.

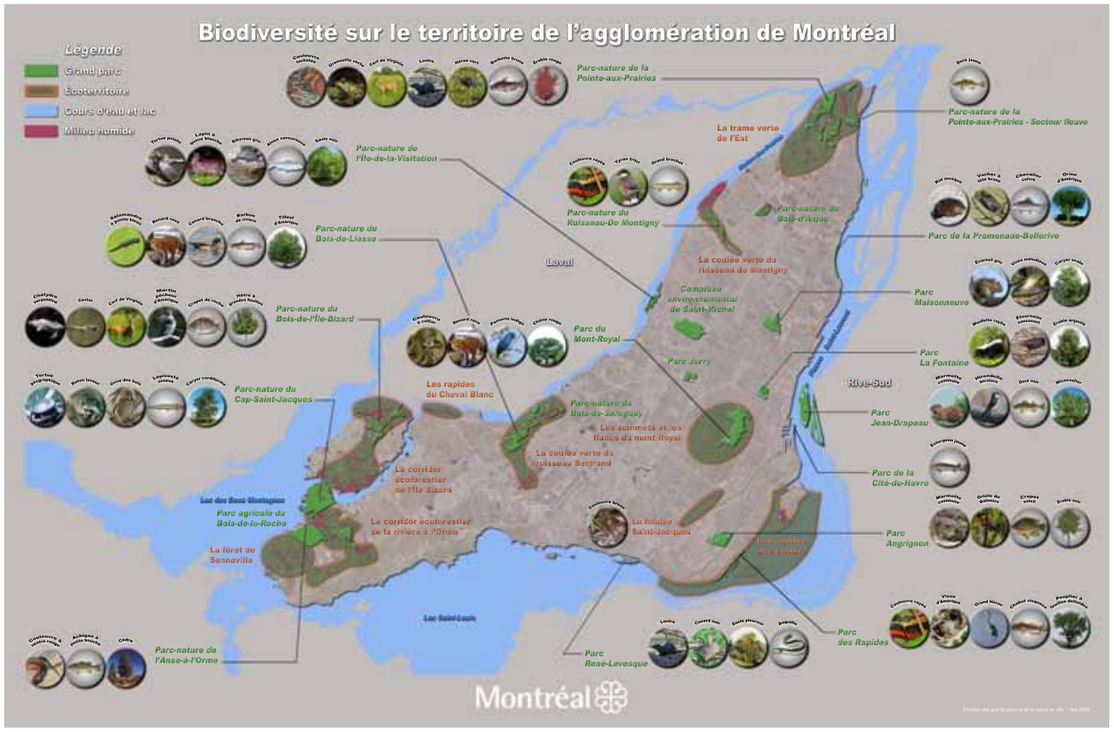
There are 24 large parks in Montréal's network, 19 of which are now open to the public. Each of these large parks, dotted across the island, has its own charms and attractions, and quality recreational facilities that encourage people to be active outdoors. Montrealers are invited to experience the nature accessible to them through this network, which includes many sites of ecological interest.

In addition to the elements presented in section 1.1 of this report, the Montréal biodiversity map created in 2009 offers examples of biodiversity in the city's large parks, such as the Baltimore oriole and black maple in Angrignon Park, hickory and wood thrush in the Cap-Saint-Jacques Nature Park, and red fox and channel catfish in the Bois-de-Liesse Nature Park (see below).

Many neighbourhood parks also have different species of trees, shrubs and other plants and may be home to birds, insects and small wildlife.

The large expanses of water surrounding Montréal Island are accessible not only at the different riverside parks, but also at other sites such as the Old Port of Montréal.

Many scientific, museum and educational institutions offer Montrealers access to interesting collections having to do with biodiversity.



For an electronic version of this map, see the "Grands parcs et verdissement" section of the Montréal website (www.ville.montreal.qc.ca/grandsparcs)

Montréal Botanical Garden

The Montréal Botanical Garden, Biodôme, Insectarium and Rio Tinto Alcan Planetarium make up the Montréal Space for Life, Canada's largest natural science museum complex[1]. The Montréal Botanical Garden, for instance, boasts a collection of 22,000 plant species and cultivars, 10 exhibition greenhouses and some thirty thematic gardens. The Space for Life draws 1.7 million people every year. The Biodôme, for its part, introduces visitors to the Laurentian forest and marine St. Lawrence ecosystems.

Since it opened in 1995, Environment Canada's Biosphere has been offering exhibitions and educational activities to help visitors better understand major environmental issues, and to discover and apply solutions for better environmental citizenship in their daily lives. The whole experience takes place in a fun, stimulating environment[2].

The McGill University Morgan Arboretum is located in the western part of Montréal Island. The 245- hectare site is used for research, teaching and preserving our ecological heritage. The integrity and extent of the mature forest make this a remarkable urban/peri-urban site[3].

Also in the western part of the island is the Ecomuseum zoo, where visitors can observe some one hundred local species and stroll along the paths through the 11-hectare site[4]. The institution's aim is to promote the appreciation and understanding of the physical and biological characteristics of the St. Lawrence Valley and responsible stewardship of the natural habitat, through education, research and conservation.

In addition, some local organizations have collections of specimens and can offer interpretation activities.

Environment-related education activities offered by the City

The Ville de Montréal website provides a range of information on urban biodiversity, sustainable development in the city and all kinds of topical subjects, including sections on ways for residents to get involved[5].

Through its regular activities and theme events, the Space for Life makes a significant contribution to environment-related education in Montréal. Programs for visitors of all ages at the Botanical Garden let them discover its splendid collections. The Montréal Biodôme introduces visitors to the ecosystems of the Americas. In 1999, it also launched the SEM'AIL program, an awareness, education and recovery program for wild leek in Quebec. The Insectarium takes part in the "Monarchs Without Borders" program run by the University of Kansas (United States), by tagging and releasing monarchs raised in captivity. The public is invited to watch them being released at the end of the summer. In addition, the popular "Butterflies Go Free" event put on by the Insectarium, in co-operation with the Botanical Garden, aims to build visitor awareness of the role of butterflies and moths in the ecosystem, their diversity and the importance of protecting them, through an annual theme.

To mark the 2010 International Day for Biological Diversity, the Space for Life team, accompanied by 4,200 students from the Quebec network of alternative schools, tossed seed balls onto the path linking the Insectarium and Biodôme, to fill it with colourful flowers. Then, to celebrate the 2011 International Day for Biological Diversity, eight parking spots were converted into four spaces reserved for biodiversity. Trees and other native species were planted there, with the help of students from the École des métiers de l'horticulture de Montréal.

2010 International Day for Biological Diversity at the Space for Life

Treasure hunt at the Saint-Michel Environmental Complex

At the Cap-Saint-Jacques Nature Park, the City manages an outdoor centre with an educational and recreational mission. Activities appealing to visitors' senses and interactive educational activities on nature pique their curiosity and teach them more about nature.

In the large parks network, City partners offer educational activities for the general public, groups and students throughout the year. These local organizations specialize in areas like environment-related education, protecting and enhancing natural habitats, and social reintegration.

In this way, parks and their ecosystems offer opportunities for outings to learn about different themes: the urban environment, water, organic farming, invasive plants, birds and so on. These activities make it possible to give visitors the tools they need to encourage responsible environmental choices. Some activities let them become directly involved, by planting, eradicating invasive plants or taking part in clean-up drives in natural habitats[6].

The Cap Saint-Jacques outdoor centre offers activities throughout the year.

The City's Eco-quartier program also represents a partnership with community organizations. The environmental action program, overseen by the boroughs, consists of funding community organizations that organize public awareness and participation projects[7]. Eco-quartiers have been involved in carrying out many of the green alley projects in Montréal.

Many specific examples of initiatives by non-profit organizations, including those in partnership with the large parks and eco-quartier offices and other community stakeholders, are presented in Chapter 4 (Spotlight on Community Initiatives).

Public participation in defining orientations and decision-making by the City

The Montréal Charter of Rights and Responsibilities, which took effect in 2006, emphasizes the importance of public participation in major issues and gives residents a chance to use their right to require consultations on a specific subject, as was the case in 2012 for urban agriculture.

Under the Policy on the Protection and Enhancement of Natural Habitats, concept plans[8] are designed in order to develop orientations specific to each ecoterritory. These planning tools are developed through a consultation process that takes the concerns of local residents and organizations into account.

Three concept plans have been submitted to date. The concept plan for the East Island greenbelt identifies the winning conditions for achieving the objectives of the Policy, on the theme of nature and water. The concept plan for the Île Bizard ecoforest corridor identifies three areas (nature park, meadow and shoreline) and objectives for protecting and enhancing each one. The concept plan for the De Montigny Stream basin identifies three objectives for the ecoterritory, i.e. enhancing biodiversity and landscapes, improving the continuity of and sense of privacy on the site, and improving the connection with adjacent neighbourhoods. Work on producing the concept plan for the Bertrand Stream basin is underway. A public forum with local residents was held in December 2012.

Public consultation for the preparation of the Ruisseau De Montigny green corridor concept plan (June 2010)

In addition, some institutions such as the Office de consultation publique de Montréal[9] (OCPM) and the standing committee on water, the environment, sustainable development and large parks (advisory body to the agglomeration Council)[10] sometimes consider biodiversity issues. In 2012, for instance, the OCPM gave residents the opportunity to speak out on the subject of urban agriculture in Montréal, and the standing committee heard them on the 2012-2021 Canopy Action Plan.

Notes

1. For more information, see the Space for Life website (consulted in March 2012): http://espacepourlavie.ca/en
2. For more information, see Environment Canada's Biosphère website (consulted in March 2012): http://www.ec.gc.ca/biosphere/
3. For more information, see the Morgan Arboretum website (consulted in March 2012): http://www.morganarboretum.org/
4. For more information, see the Ecomuseum zoo website (consulted in March 2012): http://www.ecomuseum.ca/en
5. See the Environment and sustainable development section of the city website, where readers can consult specific web pages concerning topics of interest (consulted in January 2013): http://ville.montreal.qc.ca/portal/page?_pageid=5977,87619593&_dad=portal&_schema=PORTAL
6. A list of partners working in large parks can be found in the "Grands parcs et verdissement" section of the Ville de Montréal website (consulted in March 2012): www.ville.montreal.qc.ca/grandsparcs
7. For more information, see the website on the eco-quarter program (consulted in April 2012): http://ville.montreal.qc.ca/portal/page?_pageid=7237,75372003&_dad=portal&_schema=PORTAL
8. The three completed concept plans are available (in French) in the "Grands parcs et verdissement" section of the Ville de Montréal website (see note 6).
9. For more information, see the Office de consultation publique de Montréal website (consulted in March 2012): http://www.ocpm.qc.ca/
10. See the section on the standing committee on the Ville de Montréal website for more information (consulted in January 2013): http://ville.montreal.qc.ca/portal/page?_pageid=6877,85299615&_dad=portal&_schema=PORTAL

For decades now, different stakeholder groups have been involved in protecting nature in Montréal. Their interventions have taken various forms, from greening paved and built-up sites to protecting and enhancing natural habitats, increasing awareness among different target groups and various research projects. The City of Montréal recognizes the importance of these initiatives, which will be covered in this part of the report.

Residents

Above all else, we must emphasize the tremendous contribution by Montrealers to greening their city and protecting its biodiversity. A large part of the island consists of private property, on which the City has little data. But as one walks through Montréal's residential neighbourhoods, the many individual initiatives to green and maintain private property are easily visible, often including planting trees, shrubs and other native perennials. Residents' interest in environmental issues, respect for nature and direct involvement (mobilization, active participation in a specific action) or indirect involvement (support for the cause, interest in staying informed) ultimately represent one of the greatest driving forces for change and for improving the city's "natural" face.

Non-profit organizations

Non-profit organizations committed to protecting and enhancing Montréal's natural habitats and biodiversity are responsible for a wide range of concrete initiatives. Their expertise when it comes to awareness building and public participation make them essential players.

In addition to the Conseil régional de l'environnement de Montréal, Les amis de la Montagne, Héritage Laurentien and the Saint-Jacques Eco-quartier office, some of whose actions are described in a sidebar, we should also mention the support of all the eco-quartier offices, the Groupe-uni des éducateurs-naturalistes et professionnels en environnement, the Montréal Urban Ecology Centre, the Comité écologique du Grand Montréal, Nature-Action Québec, Sentier urbain and many others who make a significant contribution to Montréal's natural heritage and to encouraging Montrealers to get actively involved in order to protect it. The Société de verdissement du Montréal métropolitain (SOVERDI), among others, is an important City partner in greening initiatives and is involved in implementing the 2012-2021 Canopy Action Plan.

A large number of the NPOs active in this field are in fact partners of the Montréal Community Sustainable Development Plan. Readers can consult their websites for more details on their actions and activities[1].

Environmental stewardship program[2]
Les amis de la montagne

For several years now, Les amis de la montagne group has encouraged Montrealers to take part in activities to protect natural habitats, through the organization's environmental stewardship program. By joining in clean-up drives, residents help to control invasive plants, restore ecosystems and create green corridors on Mount Royal.

Planting trees on Mount Royal, as part of the environmental stewardship program

Révélez votre nature[3]
Conseil régional de l'environnement de Montréal

The "Révélez votre nature" campaign, carried out in collaboration with local socio-economic and municipal players, aims to plant trees on business properties in industrial and commercial areas on Montréal Island. Through awareness building, information and turnkey initiatives, businesses are supported in their efforts to green their properties, in particular with the goal of increasing biodiversity. The campaign was launched in 2009 in the Saint-Laurent borough, and is helping to enhance biodiversity in what are often very built-up areas.

Since the start of the greening campaign, John Meunier Inc. (www.johnmeunier.com), specializing in the treatment of drinking water, process water and wastewater and storm runoff management, has planted several trees on its property.

Courtesy of the Saint-Laurent borough

Iniatives in Des Rapides Park[4]
Héritage Laurentien

Héritage Laurentien is contributing to restoring degraded habitats and controlling invasive species. Its actions in Des Rapides Park have made it possible to increase the number of duck nests fourfold, reintroduce the brown snake and attract more birds, amphibians, reptiles and mammals.

Des Rapides Park is visited by a number of species of waterfowl, like the great blue heron.

Greening of the Habitations Jeanne-Mance parking lots[5]
Saint-Jacques eco-quartier office

The green parking lot project involves:

- three initiatives:
  - green redevelopment with a bio-retention basin in the main parking lot
  - landscaping of the front of the housing units
  - greening of four other parking lots on the site
- a focus on residents
  - involvement of residents to make the project their own and increase environmental awareness

The presence of a variety of native plants adapted to the urban context, quality soil and landscaping to filter rainwater all help to reduce the urban heat island effect, manage rainwater on the site, improve air quality and encourage biodiversity.

Bio-retention basin

Courtesy of the Saint-Jacques eco-quartier

4.1 LOCAL INITIATIVES

The business community and institutional property owners

There is growing recognition of how important it is for the private sector to take part in greening the city and protecting urban nature. Many firms and institutions are interested in greening their properties or protecting and enhancing the natural habitats there, for instance, so as to increase their property values and improve their employees' and customers' quality of life. In addition to encouraging biodiversity, such efforts to protect and or add greenery to institutional or business properties generally help to improve Montrealers' living environment, by reducing urban heat islands, in particular. Other sustainable development initiatives (energy savings, recycling, carpooling and so on) also contribute, albeit more indirectly.

Property leases and creation of the Third Summit Park
Université de Montréal, Fabrique of the Notre-Dame-de-Montréal parish

One of the outcomes of the Mount Royal Heritage Pact[6], calling for the signatories to commit themselves to preserving this common treasure, was the agreement by the Université de Montréal and the Fabrique of the Notre-Dame-de-Montréal parish to lease their respective properties to the City for a 50-year period, free of charge. This initiative will allow the City to create a new park for Montrealers, to be known as the Third Summit Park. It will protect the biodiversity of the site while opening up the north slope of Mount Royal to the public.

Landscape, north slope, Mount Royal

Greening properties
ALDO Group

In recent years, considerable greenery has been planted around the head office of the ALDO Group, in the Saint-Laurent borough industrial park. Fifty species of trees and several species of shrubs, perennials, climbers and edible plants have been planted in an area totalling more than one million square feet. A natural fertilizer is used to maintain the plants.

**This is part of the "Révélez votre nature" initiative of CRE-Montréal.*

Research into biodiversity in Montréal

Montréal is fortunate to be home to many scientific institutions studying biodiversity issues. The city's universities, especially, make a tremendous contribution to advancing knowledge in this field. The Institut de Recherche en Biologie Végétale (IRBV) and the Quebec Centre for Biodiversity Science (CSBQ), for instance, have many researchers and students working on projects dealing with different aspects of biodiversity. A multidisciplinary working group on urban biodiversity determinants and management was recently formed at the CSBQ. It brings together some twenty researchers from the Université de Montréal, the Université du Québec à Montréal, the Université de Sherbrooke and Concordia University, in the natural and social sciences and land use development.

Dozens of research chairs, centres, groups and units are addressing biodiversity issues, in particular in urban settings. We suggest readers consult the websites of the Université du Québec à Montréal, Concordia University, the Université de Montréal and McGill University for more information on such projects[7].

We must also mention the Montréal Biodiversity Centre, opened in 2010 at the Botanical Garden. The project by the Université de Montréal, in collaboration with the Space for Life, is aimed at digitizing and preserving major collections, as well as advancing research and training the next

generation, making data from the vast biology collections accessible internationally through the Canadensys network, and building public awareness.

Although this part of the report concerns initiatives by community players other than the City, it is important to emphasize the contribution of the Space for Life, which benefits from the work of twelve researchers focusing specifically on biodiversity. For instance, the Montréal Botanical Garden's project looking at the plant diversity of urban forests in the Hochelaga archipelago involves inventorying the biodiversity of vascular plants in 82 urban forests. As at February 2013, over 610 plant species and 39 fern species had been inventoried, including a dozen native or non-native species observed for the first time in Quebec. The data are now being analyzed to better understand the eco-landscaping and local factors influencing urban biodiversity.
We invite readers to consult Appendix B for more details on the many programs, including research programs, at the Space for Life. Various research projects have also been initiated by different City departments.

Spread of an invasive species on Mount Royal: the Norway maple[8]
Institut de recherche en biologie végétale

Between 2005 and 2009, this research project made it possible to evaluate the spread of the Norway maple, an invasive alien species, on Mount Royal and its negative impact on the natural dynamics of the forest. The impact of tar spot disease on the species was also evaluated: according to this research project, it seems that this fungal disease, recently arrived in Montréal, could help limit the growth of the Norway maple population on Mount Royal.

Courtesy of the IRBV

Maple tree tar spot disease

Some regional initiatives

Although the territory considered in this report is the Montréal agglomeration, we should mention the importance of initiatives being carried out at the regional level. The following paragraphs are merely a very brief overview, including a few examples, to underscore their contribution to protecting biodiversity in Montréal and the southern part of Quebec.

In its 2010-2015 five-year development plan, the Conférence régionale des élus (CRÉ) de Montréal[9] identified "fighting climate change" and "encouraging biodiversity" as priorities for the region. In keeping with these goals, the CRÉ de Montréal and its partners launched the "Verdir" (greening) campaign[10] in 2012, bringing together a wide range of multi-sector greening and biodiversity projects and offering innovative solutions adapted to the specific urban context to make Greater Montréal a greener place. Projects resulting from joint efforts by the campaign partners encourage ecological connectivity by capitalizing on tree planting and innovative practices such as urban agriculture, along with green roofs, walls, parking lots, schoolyards and private property.

Courtesy of the CRÉ de Montréal

Launch of the "Verdir" campaign (October 2012)

One of the initiatives as part of the "Verdir" campaign is the greening of schoolyards undertaken with SOVERDI in collaboration with the five school boards on Montréal Island. The project revolves around two themes: health, through reducing heat islands and dust, and education, as a way of building young peoples' awareness, by "bringing trees to children," improving their knowledge of their plant heritage and enhancing their sense of pride and wellbeing.

In keeping with the goal of improving connectivity as a way of protecting biodiversity and increasing opportunities for contact, initiatives like that proposed by the Mouvement Ceinture Verte[11] have been launched in recent years. These initiatives, aimed at protecting and enhancing natural habitats and farmland in the region, could be included in the extended green and blue belt planned in the CMM's PMAD.

In addition, the Monteregian Hills are inarguably a jewel in Quebec's geological and ecological heritage, and particularly in the Montréal region. Following the seminar on the Monteregian Hills entitled "Les Montérégiennes – un avenir commun," held in May 2008 at the initiative of the Table de concertation du Mont-Royal, in partnership with the CMM, a project was developed for protecting and enhancing them[12]. The project, headed up by the CRÉ Montérégie Est, brings together the CRÉs of Montréal, the Eastern Townships and the Longueuil agglomeration, as well as the CMM and the MAMROT. Nature-Action Québec is the organization mandated to carry out the first phase of the project, i.e. preparing a diagnosis and identifying issues related to protecting and enhancing the Monteregian Hills.

An apple orchard on Mount Rougemont, part of the Monteregian Hills

Montréal has been home to the Secretariat of the Convention on Biological Diversity (CBD) since 1996. The CBD is one of three conventions signed at the Earth Summit held in Rio de Janeiro in 1992[13]. The three main objectives of the CBD are conserving biological diversity, making sustainable use of its components and fairly and equitably sharing its benefits. Canada ratified the Convention in 1992; Quebec decided to endorse the Convention that same year.

The 1992 Earth Summit attracted thousands of participants from over 170 countries. Through the adoption of the Agenda 21 Action Plan[14], the nations in attendance identified nine groups of non-state players considered main partners, including cities and other local authorities. They are considered to have an important role to play in sustainable development, since many problems, and solutions, emerge from local activities (urban development, transportation, waste management, etc.). In addition, because cities are the level of government closest to citizens, this facilitates concrete initiatives aimed at informing residents and encouraging them to get involved. As the global population becomes more and more urban[15], there is a growing need to take a different approach to urban development and to enhance the quality of life in cities.

In this context, the CBD Secretariat came up with an initiative for encouraging the sub-national application of the Convention and hence the protection of biodiversity on a local level[16]. As host city of the CBD, Montréal was invited to take part in the initiative right from the start.

The Curitiba Declaration on Cities and Biodiversity (Appendix C), the outcome of the first meeting on cities and biodiversity organized by the Secretariat, was adopted in 2007 by 34 mayors or their representatives, including the Mayor of Montréal at the time. The Declaration reaffirmed the participants' commitment to contribute to the goals of the Convention. The following year, the Global Partnership on Local and Sub-national Action on Biodiversity was officially launched[17].

Among other partners, this international network includes local governments, UN agencies, scientific institutions and large international NGOs. Montréal has been a member of the Partnership Advisory Committee on Cities since it was founded.

In 2010, at the initiative of the Partnership and certain national governments, the Conference of the Parties (CoP) to the CBD adopted an action plan[18] with several suggestions for national governments to encourage them to become more involved and offer greater support for cities and regional authorities on biodiversity issues. While the measures suggested are not binding on the states that are party to the Convention, the official recognition of the role of sub-national authorities in promoting biodiversity, through a decision of the CoP, raised considerable interest. Other decisions adopted at previous CoPs and the following CoP also helped to promote the importance of local action for biodiversity internationally.

At the third summit on cities and biodiversity (entitled Cities for Life), held in conjunction with the most recent CoP, the first United Nations global analysis on the links between urbanization, biodiversity and ecosystem services, the Cities and Biodiversity Outlook, was launched. The first section, Action and Policy, is now available online, courtesy of the CBD Secretariat, and presents 10 key

Courtesy of the CDB Secretariat

First city biodiversity summit (Nagoya, 2010), held in conjunction with the CoP10 of the CBD

messages to strengthen the conservation and sustainable use of natural resources in the urban context[19]. In fact, it includes a sidebar looking at Montréal and the approach it has taken in its ecoterritories.

Interest in the question of urban biodiversity may well be expected to grow even more in years to come.

After this overview of the global context, the following are a few examples of international initiatives to promote biodiversity that Montréal is involved in. They generate positive spinoff on a local level by raising our city's profile, sharing expertise and best practices, evaluating progress and challenges in terms of biodiversity in Montréal, developing new initiatives or informing Montrealers and seeking their commitment to protecting their city's biodiversity.

City Biodiversity Index

Co-ordinated by the National Parks Board of Singapore and the CBD Secretariat, the City Biodiversity Index[20] is intended as a self-assessment tool for cities, allowing them to evaluate their biodiversity conservation efforts. The Index, still under development, comprises some twenty indicators grouped under three core components: native biodiversity, ecosystem services, and governance and management. The indicators will help cities monitor biodiversity and facilitate discussions between cities on common bases.

Montréal is one of the cities helping to develop the index and apply it in the field, with a number of other cities including Singapore, Edmonton (Canada) and Brussels (Belgium). Some preliminary results were used, in fact, in preparing this report.

Courtesy of the National Parks Board, Singapore

Native biodiversity in built-up areas (birds) is one of the indicators used in the City Biodiversity Index.

Cities involved in the LAB project act to promote biodiversity on the local level and contribute to worldwide efforts.

Local Action for Biodiversity (LAB)

The goal of the LAB program, co-ordinated by ICLEI, is to develop and implement a local biodiversity strategy and action plan for each participating city. The process is as follows:

- Compilation of a report on biodiversity status and existing management practices (this report);
- Signing of the Durban Commitment (available in Appendix D);
- Preparation of a Local Biodiversity Strategy and Action Plan (LBSAP);
- Endorsement of the LBSAP by the City Council;
- Implementation of at least three biodiversity projects.

To support this program, a committee of representatives from various backgrounds (government, municipal, academic, community, etc.) has been formed (see the list of committee members on page 6).

The first step has now been completed, with the publication of this report. The second step, i.e. the signing of the Durban Commitment by the Mayor of Montréal at the time, was carried out on August 21, 2011 in Montréal, in conjunction with the Livable Cities Forum. In so doing, Montréal confirmed the importance of biodiversity, and its commitment to protect it through different initiatives.

The next steps in the program are underway, and in the medium term will lead to a strategy and action plan drawing people together to support biodiversity, and the implementation of concrete initiatives in the field.

Consortium of Scientific Partners on Biodiversity

The Montréal Space for Life has been a member of this consortium since 2007. It is co-ordinated by the CBD Secretariat, and brings together a number of scientific institutions, including the renowned Royal Botanic Gardens, Kew, in London. The goal is to leverage the expertise of member institutions in order to implement education and training activities to support developing countries that are building skills in the area of biodiversity.

In November 2011, the Space for Life hosted a training seminar on strengthening the role of science in reviewing national biodiversity strategies and action plans, and the 2011-2020 Strategic Plan for Biodiversity and related targets, adopted at CoP10 of the CBD. Over 50 delegates from different countries attended[21].

Note that the Space for Life is also a member of the Canadian Botanical Conservation Network and various international university networks.

Notes

1. The list of partners of the Montréal Community Strategic Plan for Sustainable Development is available on the City website (consulted in February 2013): http://ville.montreal.qc.ca/portal/page?_pageid=7137,78129621&_dad=portal&_schema=PORTAL
2. For more information, see the website on this initiative (consulted in March 2012): http://www.lemontroyal.qc.ca/en/activities-and-services/conservation-activities.sn
3. For more information, see the website on this initiative (consulted in March 2012): http://www.revelezvotrenature.com/
4. For more information, see the organization's website (consulted in March 2012): http://www.heritagelaurentien.org/
5. For more information, see the organization's website (consulted in February 2013): http://asccs.qc.ca/eco-quartier-st-jacques
6. Information on the Heritage Pact is available on the City website (consulted in February 2013): http://ville.montreal.qc.ca/portal/page?_pageid=1676,52655562&_dad=portal&_schema=PORTAL
7. The list of chairs, centres, groups and research units is available on Montréal university websites (consulted in February 2012), i.e.: Université du Québec à Montréal (http://www.recherche.uqam.ca), Concordia University (http://www.concordia.ca/research.html), the Université de Montréal (http://www.recherche.umontreal.ca/) and McGill University (http://www.mcgill.ca/research/).
8. Project head: Jacques Brisson (jacques.brisson@umontreal.ca). References: Lapointe, M., and J. Brisson. 2011. "*Tar spot disease on Norway maple in North America: quantifying the impacts of a reunion between an invasive tree species and its adventive natural enemy in an urban forest.*" Ecoscience 18: 63-69. Midy, J., P. Boivin and J. Brisson. 2007. *Invasion du Parc du Mont-Royal par l'érable de Norvège : évaluation de la situation, causes et conséquences.* Institut de recherche en biologie végétale. Report prepared for the Direction des sports, des parcs et des espaces verts, City of Montréal. 93 pages.
9. The mandate of the Montréal CRÉ is to encourage local development through joint action and to act as a valuable liaison with other levels of government on regional development issues. For more information, see the organization's website (consulted in February 2013): http://credemontreal.qc.ca/
10. The Verdir campaign is an initiative of the Conférence régionale des élus de Montréal and its partners: the Space for Life, the Commission scolaire de la Pointe-de-l'Île, the Commission scolaire de Montréal, the Conseil régional de l'environnement de Montréal, the UQAM Institut des sciences de l'environnement, the Forum jeunesse de l'Île de Montréal, the Montréal Urban Ecology Centre and the Société de verdissement du Montréal métropolitain (SOVERDI). For more information, see the campaign website (consulted in February 2013): http://credemontreal.qc.ca/cre_projets/verdir-2
11. For more information, see this website (consulted in March 2013): http://www.ceintureverte.org/mouvement.html
12. For more information, see the summary on the CRÉ – Montérégie Est site (consulted in February 2013): http://www.monteregie-est.org/cre_monteregie_fichiers/file/Doc_synthese_projet.pdf
13. For more information on the Earth Summit, see the United Nations site (consulted in October 2011): http://www.un.org/geninfo/bp/enviro.html
14. For more information on Agenda 21, see the United Nations site (consulted in February 2013): http://sustainabledevelopment.un.org/content/documents/Agenda21.pdf
15. For more information, see the United Nations Population Fund site (consulted in January 2012): http://www. unfpa.org/pds/urbanization.htm
16. The CBD Secretariat devotes part of its website to the sub-national and local implementation of the Convention (consulted in February 2013): http://www.cbd.int/en/subnational
17. The Global Partnership is presented on the CBD Secretariat website (see note 16).
18. Decision X/22, including the Plan of Action on cities and other authorities, is available on the CBD Secretariat website (consulted in March 2013): http://www.cbd.int/decision/cop/?id=12288
19. Available on the CBD Secretariat website (see note 16).
20. The CBD Secretariat website includes additional information on the initiative (see note 16).
21. A report on the training seminar is available on the CBD Secretariat website (consulted in February 2013): http://www.cbd.int/csp/csp-seminar-report-2011-11-05-en.pdf

This section focuses on two citizen-action initiatives that mobilize people around biodiversity issues: the Montréal Urban BioKit and the Bioblitz.

Courtesy of the Biosphere (Environment Canada)

The Montréal Urban BioKit

The Montréal Urban BioKit is designed to encourage families to get out and explore their urban environment, as a way of discovering and better understanding Montréal's biodiversity. It calls on Montrealers to see biodiversity in a different way, offering a dynamic and fun experience based on all five senses. The Biosphere has been producing BioKits since the early 2000s, and designed this one specifically for Montréal Island in collaboration with City authorities.

The abundantly illustrated guide covers a variety of themes, from water to plant and animal life, ecosystems, invasive species, urban agriculture and Montréal history. Participants are encouraged to record their observations and come up with their own diagnosis (from "Excellent" to "Things must improve") and to promote biodiversity through simple actions. They are also invited to share their discoveries (observationscitoyennes@ville.montreal.qc.ca).

The Montréal Urban BioKit may be combined with discovery circuits in ten large parks. The circuits include information on the history of the different parks, different points of interest, and sources of additional information for anyone wanting to know more. The geographic co-ordinates of the places to be visited are also identified, so that they can be located on a map or by GPS.

The Montréal Urban BioKit was launched in June 2011 in Mont-Royal Park, the site of one of the ten suggested circuits. A group of grade 3 students from the Enfants-du-Monde school tested the circuit for the occasion.

The BioKit and the suggested circuits are available on the Ville de Montréal and Biosphere websites[1].

Launch of the Montréal Urban BioKit in Mont-Royal Park

Bioblitz

A Bioblitz[2] is a way of making the public, especially young adults and families, aware of Montréal's biodiversity, through fun activities led by scientists in one of the city's large parks.

On May 11 and 12, 2012, scientists and members of the public met in Angrignon Park for two days of activities, including a biodiversity inventory of the park. Participants had a chance to learn more about the actions carried out in Montréal's large parks to protect biodiversity (combatting invasive species, etc.) and to meet with professionals working in the field (biologists, arboriculturists, wildlife technicians, botanists, etc.).

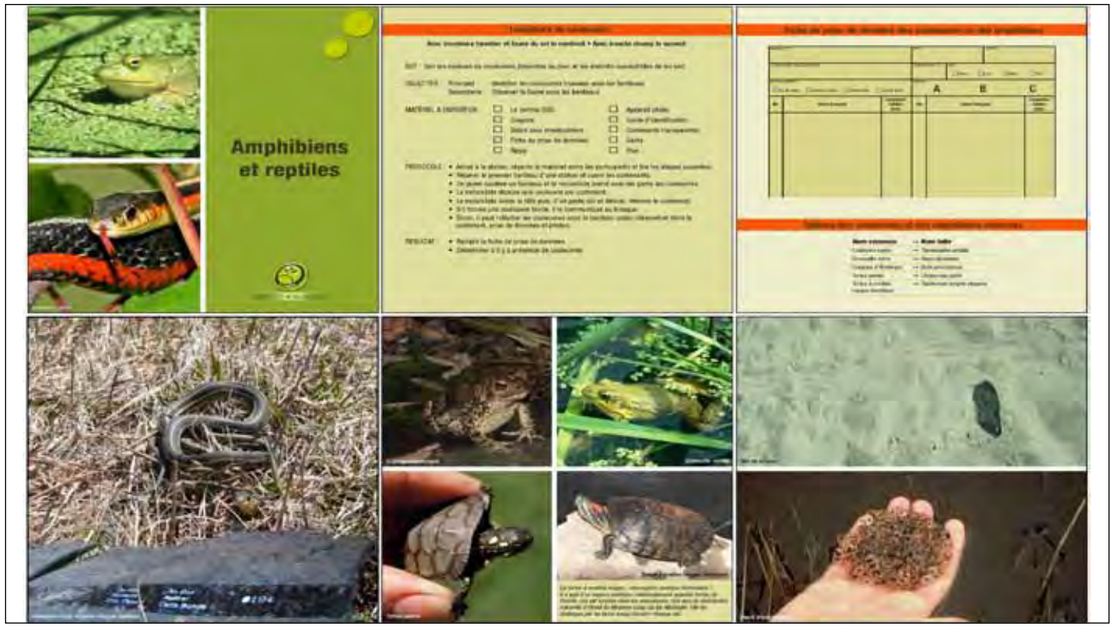
Organized by the Forum jeunesse of Montréal Island and the Conférence régionale des élus de Montréal as part of a greening project called Plant'action, the Bioblitz was carried out with the support of the Quebec Ministère des Ressources naturelles (MRN), the Ville de Montréal, Héritage Laurentien, Amis de la montagne, the Groupe uni des éducateurs-naturalistes et professionnels en environnement and the Biosphere.

Thanks to the Angrignon Bioblitz, 93 species were identified in 48 hours, many of them species at risk. The data compiled by participants are available on the Internet and will be used to prepare a discovery circuit of the park, associated with the Montréal Urban BioKit. An annual calendar of eco-citizen activities (environmental monitoring, green brigades, etc.) was also suggested for people wishing to become more involved and to help contribute to improving our knowledge of urban biodiversity.

The Bioblitz project is slated to last three years. A new activity will be carried out in the fall of 2013.

Notes

1. Information can be found on the Environment Canada's Biosphere website (http://www.ec.gc.ca/biotrousses-biokits/default.asp?lang=En&n=BBAECFE8-1) and the Ville de Montréal website (http://ville.montreal.qc.ca/grandsparcs)
2. For more details (in French), see the Direction des grands parcs et du verdissement section of the Ville de Montréal website: http://www.ville.montreal.qc.ca/grandsparcs



Inventory log for amphibians and reptiles – Angrignon Park

View of Montréal

The publication of this report on Montréal's biodiversity by the Ville de Montréal is a key step in the LAB project. In addition to confirming the interest on the part of the City and different community stakeholders in protecting and enhancing biodiversity, the report highlights a series of observations and perspectives based on the reflections of the LAB committee. This is an important first step in compiling a biodiversity strategy and action plan that will be useful and efficient and draw on the strengths of different partners.

A review of the status of biodiversity and management methods

This report describes different patches of natural habitats in the Montréal agglomeration that are conducive to biodiversity: the large expanses of water surrounding the island, and diversified inland habitats including wooded areas, uncultivated land, wetlands and streams. The agglomeration is also home to all kinds of green spaces, cultivated fields, vegetable gardens, vacant properties and so on. All these sites complement the natural habitats in the city, given their considerable environmental and social significance, and even potential as buffer zones or "green" links throughout the urban space. This variety of habitats sustains rich aquatic and terrestrial biodiversity, providing ecosystem services that contribute directly to Montrealers' well-being and quality of life. This wealth is fragile, nonetheless, threatened in particular by the loss and fragmentation of habitats resulting from urban development, and the presence of invasive species.

In terms of governance and management, the report emphasizes the major actions taken by the City, starting back in the 19th century with the protection of Mount Royal and the opening of the first large parks. Many significant initiatives to encourage biodiversity were taken in Montréal during the 1970s, 80s and 90s, in particular to protect aquatic habitats and to create a network of nature parks. Then, during the 2000s, different policies, plans and by-laws were adopted, including the Policy on the Protection and Enhancement of Natural Habitats and the Ecosystem Management Program, leading to the orientations underlying Montréal's efforts to protect its ecosystems and maintain their ecological integrity.

In keeping with its mandate, this biodiversity report focuses on initiatives sponsored by the City, but also recognizes the essential contribution by all Montrealers to protecting and enhancing biodiversity, as illustrated by examples of actions by residents and different groups committed to raising awareness of environmental issues, greening paved and built-up spaces and protecting plants and wildlife.

Challenges and outlook

Although Montréal's record in terms of biodiversity is positive in many respects, numerous challenges remain for the years to come. First of all, we must improve our knowledge of the different aspects of biodiversity and the threats to it, if we are to better protect it. In the current context, the question of the impact of climate change on Montréal's biodiversity, for instance, could be studied. It would also be useful to delve more deeply into the value of ecosystem services, in both qualitative and quantitative terms, since this value must often be demonstrated in order to justify the need for action. With the help of local scientific institutions and community organizations, sharing knowledge about biodiversity is also very important, to inform and interest different target audiences (residents, private sector, etc.). Many initiatives have already been launched by community stakeholders and must be supported to encourage even more people to take action, especially on private property.

SUMMARY OF CONCLUSIONS
AND POINTS FOR FURTHER CONSIDERATION

In addition, improving public access to spaces rich in biodiversity and developing appropriate recreational and tourism activities could help to enhance people's knowledge of Montréal's natural environment and further interest Montrealers in protecting it, while boosting their sense of attachment to the city's natural environment and fostering economic development.

In terms of governance and management by the City, one of the major issues is how to more forcefully integrate the concern for biodiversity into municipal actions, so as to intervene more effectively at different levels (agglomeration, neighbourhoods or individual buildings) and at different stages (planning, implementation, management). Revising the Land Use Planning and Development Plan and the City's Master Plan, in light of the PMAD and the Montréal Development Plan, offers an opportunity to review the extent to which considerations relating to natural habitats and biodiversity are integrated with planning tools and city by-laws.

Moreover, the issue of maintaining the quality of protected spaces and the need to create new parks and open them to the public, not to mention continuing to protect key territories, remain major concerns. An additional issue that is gaining importance is increasing the amount of space suitable for agriculture. Lastly, it would be worthwhile to consider the possibility of rehabilitating and restoring contaminated sites with a view to increasing natural habitats (especially in the eastern part of the island), reducing their fragmentation and creating green links in the heart of the city.

Proud and happy gardeners

The Ville de Montreal's biodiversity report highlights a series of initiatives by municipal authorities to meet different conservation and greening objectives.

- Initiatives to preserve natural habitats, promoting the maintenance of major ecosystems, like conservation projects in ecoterritories under the Policy on the Protection and Enhancement of Natural Habitats, and protection and monitoring initiatives like the Ecosystem Management Program in the City's large parks.
- Initiatives to increase the amount of greenery in the urban environment, like the 2012-2021 Canopy Action Plan or the urban promenades, as a way of combining biodiversity and urban life by providing "green" pedestrian routes in the heart of densely populated areas.
- Finally, the development of innovative initiatives like the plan for a human-scale landscape in the permanent agricultural zone on Île Bizard or that meet specific needs, like the 2012-2015 emerald ash borer eradication plan.

This report also describes the success of citizen-action initiatives like the BioKit and the Bioblitz, carried out under various partnerships. The network of concerned Montrealers is undeniably one of the city's great strengths. Given the extent of the challenges and shrinking public budgets, but also the strong interest and the expertise on the part of community players, it will be very important that all stakeholders participate and that partnerships be maintained and developed. The biodiversity strategy and action plan will have to draw on this experience and expertise and outline the concrete action to be taken in order to meet the challenges identified.

APPENDIX A

STATUS REPORT ON THE ECOSYSTEM MANAGEMENT PROGRAM FOR THE CITY'S NATURE PARKS

Plant inventory
Between 1987 and 1994: Basic inventory for all nature parks, including mapping plant communities, each one's successional stage, and plants at risk.

2000: Inventory for the Bois-d'Anjou Nature Park (new inventory)
Woodland No. 3 portion for the Anse-à-l'Orme Nature Park (new inventory)

Since 2002: Updates to the following inventories

- Cap-Saint-Jacques Nature Park (2002-2003)
- Île-de-la-Visitation Nature Park (2006)
- Pointe-aux-Prairies Nature Park (2008-2009)
- Bois-de-Saraguay Nature Park (2009-2010)
- Bois-de-Liesse Nature Park (2011-2012)

2006: Inventory in the woods of the Mount Royal Historic and Natural District

Inventory and monitoring of avian fauna
Annual monitoring from 1997 to 2000 and from 2002 to 2005.

Five-year monitoring in 2001 and 2007.

A five-year analysis was done in 2003, and a ten-year analysis in 2009.

2004: Inventory in the woods of the Mount Royal Historic and Natural District

2011 and 2012:

Monitoring of the reproduction of four species sensitive to woodland habitat fragmentation: the ovenbird, wood thrush, scarlet tanager and black-throated blue warbler.

Identification of territories, monitoring of territorial individuals, search for nests and monitoring of family groups to help determine whether populations in the nature parks are self-sufficient or rely on constant immigration of individuals from other zones outside Montréal Island.

This project is being carried out in collaboration with the Club d'ornithologie de Ahuntsic, a birdwatching club.

Database
Since 1996, data from all vegetation and avian fauna inventories have been included in a database.

The database was updated in 2012.

Ecosystem value maps
In 1996, data from vegetation and avian fauna inventories were used to produce ecosystem value maps for plants, wildlife, biotic value, abiotic fragility and ecological sensitivity.

In 2012, these maps will be updated for the nature parks and others will be produced for the woods of the Mount Royal Historic and Natural District.

1

Herpetofauna
An initial series of inventories was carried out from 2000 to 2003.

The nesting boxes installed in the Bois-de-l'Île-Bizard Nature Park and the Pointe-aux-Prairies Nature Park were monitored in 2005 to determine their success and usefulness and see whether any changes were necessary.

Another series of monitoring visits was done to check on species at risk, more specifically, and to broaden the program in 2005-2006-2007 and 2008 to cover all the nature parks.

2004: Inventory in the woods of the Mount Royal Historic and Natural District

Impacts of path usage
Monitoring frequency: 5 years

Studies were done in 1996, 2001 and 2007-2008 to give us a picture of the situation and allow us to remedy problems with deterioration and unauthorized and undesirable paths that adversely affect the quality of the natural habitat.

2008: Study done in Mont-Royal Park

☑ Actions proposed

- Use new plants, fences or woody debris to close off unauthorized paths.
- Officially confirm heavily used paths by making them clearer.
- Restore damaged paths.
- Restore damaged official paths.

Exceptional sites: plant communities
Monitoring frequency: 10 years

Studies were done in 1997 and 2002-2003-2004.

A statistical analysis was done in 2005, so as to draw up a status report and identify changes to the sites between the two inventories.

The situation was also monitored following the ice storm, in 1998-1999 and 2000.

A status report on the presence of buckthorn, an invasive plant species, was carried out on all sites in 2008.

2

Plant or animal species at risk (threatened, vulnerable, or likely to be so designated)

Plant species
A study to locate all the plants at risk in the nature parks was conducted in 1998-1999.

It was initially stipulated in the Ecosystem Management Program that this monitoring would be done every 10 years; this aspect is currently being reassessed.

In future, whenever plant inventories are updated, a report on species at risk will be included in the protocol.

☑ Actions proposed: Sowing wild leek

- In 2000, we began reintroducing wild leek, a vulnerable species under the Quebec Act respecting threatened or vulnerable species, through the Montréal Biodome's Sem'ail program.
- An annual follow-up on the growth and number of the plants at each reintroduction site was done up until 2009, to monitor the success of the program.

Animal species
Census and localization of animal species, in particular birds, amphibians and reptiles.

☑ Actions proposed

Herpetofauna:

- Greater efforts to identify species at risk and relocate them if necessary as part of development projects.
  - ✓ Plan to relocate and monitor the brown snake (*Storeria dekayi*) in the sector affected by the planned extension of boulevard Thimens (2011-2012): snakes were trapped, marked and relocated to the Bois-de-Liesse Nature Park.
  - ✓ Planned extension of boulevard Maurice-Duplessis between boulevard Saint-Jean-Baptiste and 71e Avenue. Pointe-aux-Trembles/Rivière-des-Prairies borough (2012): mainly brown snakes (*Storeria dekayi*), and other snakes, were marked and relocated locally.
  - ✓ Planned sewers and waterworks at the Cap-Saint-Jacques Nature Park (2009-2010): mainly brown snakes (*Storeria dekayi*), and other snakes, were marked and relocated in the nature park.
  - ✓ Planned doubling of the CN tracks in the Pointe-aux-Prairies Nature Park sector (2009): mainly brown snakes (*Storeria dekayi*), and other snakes, were marked and relocated in the nature park.
- The condition of nesting boxes is monitored regularly and any necessary adjustments are made.

- Participation in the provincial plan to re-establish the map turtle (*Graptemys geographica*), a vulnerable species under the Quebec Act respecting threatened or vulnerable species.
  - Participation in the plan to acquire knowledge about essential habitats, demographics, movements and threats affecting the map turtle, with a view to preparing a plan to re-establish the species in the province.
  - Addition of various platforms to encourage sunbathing by map turtles in the Cap-Saint-Jacques Nature Park (rock islands, stabilized logs), for use during severe variations in water levels.
  - Installation of buoys to mark the protected zone in Lake of Two Mountains, to warn boaters of a map turtle rest area in Pointe Madeleine bay in the Cap-Saint-Jacques Nature Park.
  - A new look-out and path to it to make it easier for people to observe map turtles on the shoreline and in the bay without disturbing them (planned for 2013).
  - Planting trees and shrubs to close off unauthorized and abandoned trails and block access to the shoreline in the bay, to prevent people from disturbing turtles on the shore (planned for 2013).
  - Installation of warning and information panels on the map turtle in the new look-out (planned for 2013).
  - Study on disturbances caused by boaters in the map turtle resting area.

Actions

Planting

Monitoring frequency: every year for five years

We monitor all planting in the nature parks, with the goal of consolidating tree stands, accelerating plant succession on cleared lots, closing off paths, increasing the biodiversity or ecosystem value of part of the park, etc.

Blocking plant succession

In some parks, zones have been identified where plant succession is to be blocked, so as to maintain fields or cleared land rather than allow such zones to become forested. This program targets the Bois-de-Liesse, Île-de-la-Visitation and Pointe-aux-Prairies nature parks and the Bois-de-la-Roche Agricultural Park in conservation zones and fields intended for agriculture but not yet under cultivation. This will allow us to preserve landscapes, ecosystems and greater plant and animal diversity, in particular pollinating insects.

In some cases, work to block the succession is done annually – at the Bois-de-Liesse Nature Park, for example – while in other cases it is done every three years, for instance at the Pointe-aux-Prairies Nature Park. The timing depends on the nesting habits of birds in open areas such as fields, i.e. after mid-July, but more often is recommended for late September.

2010: A management plan for meadows and lawns was implemented at the Saint-Michel Environmental Complex. Plant succession is blocked at frequencies depending on the target sectors in the park each season, meaning from one to three mowings per year, so as to maintain a variety of landscapes and biodiversity. The composition of each zone has been characterized and their evolution is monitored annually.

2012: The zones in which plant succession in fields is being blocked were characterized for the Bois-de-Liesse Nature Park.

Invasive or harmful plant species
Monitoring program

- Localization of the species and assessment of its density, so as to assess the situation and determine whether action is necessary. Detection of new zones where the species is present.

The following plants are being monitored to determine their extent and their impact on the natural habitat:

- Loosestrife: 1995-2000-2006-2012
  Monitoring frequency: 5 years
  No control action taken

- Poison ivy: 2002-2006-2011
  Monitoring frequency: 5 years

  ☑ Actions proposed
  Signs have also been installed to warn visitors of its presence alongside the paths concerned or in public areas.
  Steps have been taken to eradicate it in certain zones, because of its extent and its impact on visitors' safety and health.

- Ragweed:
  Monitoring frequency: annual since 1992

- Japanese knotweed and giant knotweed: 2006
  An inventory was done in all the nature parks.

- Water reed: 2012.
  Zones where it is present and its extent, as a percentage, were identified in the marshes in the marsh zone of the Pointe-aux-Prairies Nature Park, giving us a baseline.

Control plans
Objectives:

- ✓ Eradicate the designated invasive species (e.g. European buckthorn and alder buckthorn, Japanese knotweed and giant knotweed, ragweed).
- ✓ Limit the spread of the invasion.
- ✓ Limit the spread of the plant to other zones.
- ✓ Restore plant and wildlife habitats by planting native species, as applicable.
- ✓ Explain to visitors in the parks affected by the eradication program, the problems caused by and the impact of invasive plants in natural habitats and the principles governing intervention.

- Ragweed: Annual program to eradicate the plant, either by manual weeding or mechanical mowing.
- Japanese knotweed and giant knotweed: Since 2008, a control program has been instituted in five nature parks where this species is present, i.e. stems are cut back three to four times a year, in order to eradicate it.

  Nature parks concerned: Cap-Saint-Jacques, Bois-de-Saraguay, Île-de-la-Visitation, Ruisseau-De Montigny and Pointes-aux-Prairies

- Buckthorn:
  - ✓ Cap-Saint-Jacques Nature Park (2005 to 2008): This project allowed us to eradicate buckthorn from an area of nearly 6 hectares of vacant land. Large stems were uprooted and small stems and seedlings were ripped out. The habitat was restored by sowing and planting trees, native shrubs and herbaceous plants.
    The project was carried out in collaboration with the Comité écologique du Grand Montréal and with the financial support of the Environment Canada Eco-Action program.

  - ✓ The urban biodiversity restoration and enhancement plan (PRVBMU) (2008 to 2013): The plan is aimed at controlling buckthorn by repeatedly cutting back stems in zones located in woods in the Bois-de-Liesse and Île-de-la-Visitation nature parks, and on the ecoterritory of the summits and slopes of Mount Royal. Between 2008 and 2012, over two million stems and suckers were cut back, representing 1,033 m^3 of buckthorn biomass removed. In addition, 8,338 native trees and shrubs were planted. The species are representative of the existing plant communities on each site. The work will continue in 2013.
    Carried out with the financial support of the Fondation Hydro-Québec pour l'environnement, the C-Vert project of the Claudine and Stephen Bronfman Family Foundation, the "Valorisation Jeunesse – Place à la relève" program of the Ministère de l'Immigration et des Communauté culturelles, and the Ministère de la Culture, des Communications et de la Condition féminine for the Mount Royal sector, under the Agreement on the cultural development of Montréal.
    Carried out in co-operation with Soverdi, Les amis de la montagne and the Groupe Uni des Éducateurs-Naturalistes et Professionnels en Environnement (GUEPE).

  - ✓ Bois-de-la-Roche Agricultural Park (2010-2011): Program to eradicate buckthorn by uprooting it and sowing grasses to recreate a field, a habitat for the bobolink present in the sector, a very rare bird in Montréal because of habitat and nesting area loss. Buckthorn in ditches around farm fields was also controlled by uprooting it.
    The program was carried out with D3-Pierres, a partner of the agricultural component in nature parks.

  - ✓ Angrignon Park (2011-2012): Program to control vegetation, including buckthorn in wooded areas and partly in semi-open areas. Buckthorn stems were cut back annually. The habitat was restored by planting native trees and shrubs.
    The project was carried out in co-operation with Héritage Laurentien.

- Buckthorn and Norway maple: A control program to eradicate these species has been instituted.
  - ✓ Mont-Royal Park (since 2006): Research project on controlling European buckthorn and Norway maple. It involves tracking the evolution of eight 20 x 20 m lots invaded by buckthorn or Norway maple, where the stems of these invasive alien species are cut back mechanically, with the help of saws, secateurs and other tools. The project was developed in collaboration with researchers from the Institut de recherche en biologie végétale (IRBV) and a scientific committee including professionals from Les amis de la montagne, the Ville de Montréal and the Université de Montréal.

  - ✓ Mont-Royal Park (since 2008): Buckthorn and Norway maple in various zones invaded by these species are cut back and the zones are being renaturalized with native species. Carried out by Les amis de la montagne in collaboration with the City's Direction des grands parcs et du verdissement (large parks and greening department).

Impact of overpopulation by certain wildlife species and protection of plant life
White-tailed deer - Pointe-aux-Prairies Nature Park

2005: Field study of the population density of white-tailed deer

2006: Aerial inventory of the population of white-tailed deer

2011: Enclosures were installed (fenced zones to keep the deer out) to protect plant communities and their accompanying grassy and shrub species from over-browsing by white-tailed deer

2012 and following years: the regrowth of the vegetation in the enclosures is being monitored by means of quadrats inside and outside the enclosures

Control of animal populations
Control the beaver population

Monitoring frequency: Each case as it occurs and seasonal monitoring of sites where beavers are likely to be found; intervention as necessary.

Program implemented in 1990.

☑ Actions proposed

- Protect trees
- Control and monitor water levels in streams and wetlands
- Trap and dispose of beavers
- Vasectomies for males

Prevention of diseases related to raccoons and population control measures

Intervention frequency: Every two years for target parks under the vaccination program introduced in 1993, ongoing

Parks concerned: Cap-Saint-Jacques Nature Park, Bois-de-l'Île-Bizard Nature Park and Mont-Royal Park

Equipment and other means to protect wildlife
Installation of birdhouses and nesting boxes for different bird species, including wood ducks, rafts for turtles, buoys marking the map turtle protection zone in the Cap-Saint-Jacques Nature Park, etc.

Monitoring frequency: Annually

This program was introduced in 1992.

☑ Actions proposed

- Monitor the success of 42 nesting boxes for wood ducks annually, with the help of a volunteer.

Nature parks concerned: Cap-Saint-Jacques, Bois-de-l'Île-Bizard, Bois-de-Liesse, Bois-de-Saraguay, Pointe-aux-Prairies

- Monitor birdhouses for tree swallows annually (done internally).

Wetland water management: monitor water levels
Frequency: Annually

This program was introduced in 1993 for the marshes and bogs in the Bois-de-l'Île-Bizard, Bois-de-Liesse, Bois-de-Saraguay, Pointe-aux-Prairies nature parks and Mont-Royal Park.

Specific projects
Remarkable trees

Planned monitoring frequency: Every five years (under review)

Census and localization of trees considered remarkable in dendrological terms. A census was done in 1996 and the trees were monitored after the ice storm and again in 2002-2003.

Recommendations for conserving trees for wildlife and woody debris
Trees for wildlife are created and workers are asked to leave woody debris in place every year during tree-trimming operations.

Trees that have died naturally in the forest are also left in place.

2010-2011: An inventory of stumps and woody debris alongside the paths in the Bois-de-Liesse Nature Park was conducted / Pilot project

Biodiversity programs and research projects conducted by the Montréal Space for Life

Biodôme programs

Conserving and restoring American ginseng in Quebec, an endangered species in Canada
Andrée Nault, 1994 – ongoing

Quebec network of acoustic bat inventories
Jacques Jutras, Claire Vasseur and Michel Delorme, 2000 – ongoing

SEM'Ail jr: Maintaining biodiversity at school

Plan to protect map turtle nests from predation at a nesting site on Lake of Two Mountains

Raising and breeding striped chorus frog, with the goal of restoring wild populations

Botanical Garden research programs and projects concerning biodiversity on the Island of Montréal

Ash woodland restoration program at the Botanical Garden; eliminating invasive species (*Rhamnus*) and planting natural species
Stéphanie Pellerin and Alain Cogliastro, 2008 - 2011

Plant diversity in the urban forests on the Hochelaga archipelago
Stéphanie Pellerin, 2009 – ongoing

Re-establishing false hop sedge (*Carex lupuliformis*), an endangered species in Canada, and conserving the species *ex situ* at the Montréal Botanical Garden
Stéphanie Pellerin, 2005 – ongoing

Study of processes involved in decontaminating soil using plants, fungi and bacteria
Michel Labrecque, Marc St-Arnaud, Frédéric Pitre and Simon Joly, 2011 – ongoing

Emergency conservation program for the *ex situ* conservation of rare southern Quebec plants
Stéphanie Pellerin and Stéphane Bailleul, 2001 – ongoing

Developing a tool for estimating forest biomass, for managing urban development
Alain Cogliastro, 2009 – 2011

Biorestoration of degraded sites and brownfields: various examples of demonstration projects in Montréal
Michel Labrecque, 2002 – 2003 and 2006 – 2007

Genetic diversity of American water willow, an endangered species in Canada, present in the Montréal archipelago
Stéphanie Pellerin and Simon Joly, 2012 – ongoing

A DNA bar code for Quebec plants
Simon Joly, 2012 – ongoing

CURITIBA DECLARATION
On Cities and Biodiversity

We the Mayors and other high-level officials participating in the meeting on Cities and Biodiversity held in Curitiba, Brazil, from 26 to 28 March 2007,

Recalling the United Nations Convention on Biological Diversity and its three objectives aimed at the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources,

Deeply concerned by the unprecedented rate of loss of biodiversity of our planet and its far-reaching environmental, social, economic and cultural impacts, exacerbated by the effects of climate change,

Deeply concerned also that the consequences of biodiversity loss and ecosystem disruption are harshest for the poor and that biodiversity loss poses a significant barrier to the achievement of the Millennium Development Goals, especially Goal 7, to ensure environmental sustainability,

Reaffirming that healthy ecosystems provide social, economic and ecological benefits to urban areas, as well as goods and services that underpin various industries, and, thereby, the well-being of the residents of cities,

Recalling the adoption of the 2010 biodiversity target during the 2002 World Summit on Sustainable Development in Johannesburg, aiming to significantly reduce the rate of biodiversity loss at the local, national and global levels, as a contribution to poverty alleviation and to the benefit of all life on Earth,

Recalling the commitment by Heads of State in the 2002 World Summit on Sustainable Development and reflected in the Johannesburg Plan of Implementation to negotiate an international regime to promote and safeguard the fair and equitable sharing of benefits arising out of the utilization of genetic resources (ABS),

Recalling also that, at the eighth meeting of the Conference of the Parties to the Convention on Biological Diversity, held in Curitiba, Brazil, in 2006, the Convention on Biological Diversity entered a new phase of enhanced implementation of its three objectives, and the Parties agreed to accelerate the efforts to achieve the 2010 biodiversity target and to negotiate an international regime on access and benefit sharing (ABS) at the earliest possible time before the Tenth Meeting of the Conference of the Parties, in 2010,

Considering that in 2007 the majority of the Earth's population will live in cities, and that much of this growth will occur in developing countries,

Recognizing the crucial importance of the involvement of local authorities in the global efforts towards the protection and sustainable use of biodiversity, as it is through local actions that biodiversity issues are addressed most efficiently,

Recognizing that particularly in the developing countries, communities are directly dependent on ecosystems goods and services provided by biodiversity,

Considering that urbanization can contribute positively to human development as cities offer many social and economic opportunities,

Underlining that urban experiences in ecosystem conservation and biodiversity protection can contribute to strengthening national policies, regional strategies, and global agendas that respond to urban needs,

Recalling that the role of local authorities was acknowledged during the 1992 Earth Summit: in adopting chapter 28 of Agenda 21, 101 Heads of State and Government recognized local authorities as key actors in sustainable development and called for the establishment of Local Agenda 21 campaigns,

Recognizing the important support provided by the inter-agency task force constituted to support this event with the participation of the United Nations Environment Programme (UNEP), the United Nations Human Settlements Programme (UN-HABITAT), the United Nations Institute for Training and Research (UNITAR), and IUCN—the World Conservation Union, in particular through its Countdown 2010 initiative,

Recognizing the contribution to the task force of ICLEI—Local Governments for Sustainability, and noting the important contribution of ICLEI's Local Action for Biodiversity (LAB) Project in mobilizing key cities and promoting the exchange of experience on urban biodiversity best practices to foster the international cooperation of municipal leaders on achieving 2010 biodiversity target,

Underlining the importance of institutions such as United Cities and Local Governments (UCLG), as well as the World Mayors' Council on Climate Change (WMCCC) and its biodiversity component, in the cooperation between local governments,

Recognizing the importance of the cooperation between key cities for the Convention on Biological Diversity, which also stand as global references for their initiatives on urban biodiversity, such as Curitiba, as host of the eighth meeting of the Conference of the Parties, Bonn, as host of the ninth meeting of the Conference of the Parties, Nagoya, as representative of the candidate cities for the hosting of the tenth meeting of the Conference of the Parties, and Montreal as host of the Secretariat of the Convention on Biological Diversity,

Considering the value and importance of the case-studies, best practices and experiences presented during this conference, which are contributions to address the issue of environmental degradation,

1. *Reaffirm* our commitment to contribute actively to the implementation of the three objectives of the Convention on Biological Diversity and to the achievement of the 2010 biodiversity target aimed at reducing substantially the rate of loss of the biodiversity of our planet, as well as the establishment of an international regime to promote and safeguard the fair and equitable sharing of benefits arising out of the utilization of genetic resources (ABS);

2. *Reaffirm also* our resolve to integrate biodiversity concerns into urban planning and development, with a view to improving the lives of urban residents, in particular those affected by poverty, securing the livelihood base of cities and developing appropriate regulatory, implementation and decision-making mechanisms to ensure effective implementation of biodiversity plans,

APPENDIX C

3. *Further reaffirm* the urgency to act on the 2010 biodiversity target and the Millennium Development Goals to secure livelihoods for present and future generations in a sustainable way. To this end, we welcome the coming together of existing initiatives, such as Countdown 2010, Local Action for Biodiversity, and UNEP's Campaign on Cities and Biodiversity to form a global partnership of cities, national Governments, development agencies, private sector partners, non-governmental organizations, knowledge and research institutions, and multilateral organizations to address the challenges of meeting the 2010 biodiversity target and create political momentum at local level;

4. *Stress the need* to raise public awareness and change biodiversity depleting behaviour of all sectors of society through means such as dissemination of urban success stories, city-to-city cooperation, community education programmes and by celebrating International Biodiversity Day on 22 May every year as well as actively contributing to marking the 2010 International Year for Biodiversity as proclaimed by the General Assembly of the United Nations, in ways which directly and indirectly enhance the lives of communities;

5. *Invite* the Secretariat of the Convention on Biological Diversity to make available to larger public the case studies presented at the meeting, with a view of establishing with the support of the task force and advise of the Curitiba Steering Committee, a clearing house mechanism for local authorities and to provide access, via its website, to information related to urban biodiversity,

6. *Encourage* UNEP to assemble a publication of case studies from around the world, on cities, ecosystems and biodiversity, in collaboration with UN-HABITAT and ICLEI.

7. *Invite* the Mayor of Montreal, as the official representative of UCLG to this event, to present the report of this meeting on cities and biodiversity to its World Congress in Jeju, South Korea, in October 2007;

8. *Invite* the Mayor of Curitiba to present the report of this meeting on cities and biodiversity to the Municipal Conference to be held from 26 to 27 May 2008 in Bonn, Germany, prior to the high-level segment of the ninth meeting of the Conference of the Parties to the Convention on Biological Diversity, and *invite* representatives of the Curitiba meeting to present its report to the next World Urban Forum, to be held in Nanjing, China, in 2008, and to other related events,

9. *Mandate* the Mayor of Curitiba, as the host city of the eight meeting of the Conference of the Parties, and the Mayor of Montreal, as the host city of the Secretariat of the Convention, as well as the Mayor of Bonn, as the host city of the ninth meeting of the Conference of the Parties and the Mayor of Nagoya, Japan, as the city offering to host the tenth meeting of the Conference of the Parties, to act as a Steering Committee in order to develop synergies between existing associations, such as ICLEI (WMCCC) and UCLG, and the task force established for the current meeting, to carry a strong common message, and to follow up through concrete projects, awareness campaigns and exchange of best practices;

10. *Invite* the four mayors of the Steering Committee and the Mayor of Johannesburg to work together to present the results of the Curitiba and the Bonn meetings on cities and biodiversity to the ninth meeting of the Conference of the Parties to the Convention on Biological Diversity, to be held from 19 to 31 May 2008 in Bonn, Germany;

11. *Express our deep gratitude* to the city government of Curitiba, through its Mayor, city officials, and population, for the warm welcome granted to all participants in the meeting on Cities and Biodiversity, and *congratulate* the city government for its unique and innovative Biocities initiative.

Curitiba, Brazil, 28 March 2007

The Durban Commitment
Local Governments for Biodiversity

The Durban Commitment: Local Governments for Biodiversity was developed, founded and signed by 21 Local Action for Biodiversity Local Governments:

- Barcelona City Council (Spain)
- City of Amsterdam (Netherlands)
- City of Bonn (Germany)
- City of Cape Town (South Africa)
- City of Curitiba (Brazil)
- City of Edmonton (Canada)
- City of Johannesburg (South Africa)
- City of Joondalup (Australia)
- City of Nagoya (Japan)
- City of Tilburg (Netherlands)
- City of Zagreb (Croatia)
- eThekwini Municipality (South Africa)
- Ekurhuleni Metropolitan Municipality (South Africa)
- Île de France (France)
- King County (U.S.A)
- Leicester City Council (England)
- Liverpool City Council (Australia)
- Municipality of Walvis Bay (Namibia)
- São Paulo City (Brazil)
- Seoul Metropolitan Government (South Korea)
- Waitakere City Council (New Zealand)

as a commitment and model by local government, for local government and the communities they serve, to protect and enhance biodiversity at the local level.

1. By signing this Commitment, Montréal joins these leading local governments from across the world as a partner and we acknowledge accountability and responsibility for the health and well-being of our communities through protecting, sustainably utilising and managing biodiversity and recognising its role as the foundation of our existence.

This Commitment recognises that biodiversity is the variety of life on earth on which human well-being is dependent and that biodiversity provides ecosystem services that underpin all of our community's needs. Furthermore, it recognises that the value of biodiversity is multi-faceted - including ecological, economic, tourism, recreational, environmental, heritage, stewardship, spiritual, intrinsic, medicinal, nutritional, health, educational, scientific, cultural and social dimensions.

2. Through signing this Commitment we acknowledge that:

2.1 Biodiversity is increasingly under pressure with unprecedented rates of loss due to human activities including the over-consumption of natural resources;

2.2 Increasing global trends towards urbanisation are placing increased direct pressure on biodiversity at both the local area level and globally through increased resource consumption and ecological footprints;

2.3 The impacts of climate change on biodiversity pattern and process will be significant and therefore we need to build appropriate programmes to address, mitigate and adapt to these changes;

2.4 Future sustainable development and human well-being are dependent on our ability to meet the biodiversity challenges we face;

2.5 Ecosystem services can play an important role in poverty alleviation and as a result the consequences of biodiversity loss and ecosystem disruption are harshest for the poor;

2.6 It is our collective responsibility to reverse the current trends of biodiversity loss; and

2.7 Local government, which works most closely with communities and biodiversity, has a critical role and responsibility (globally, nationally and locally) to ensure that biodiversity is conserved, protected, restored and sustainably used for the benefit of current and future generations.

3. By signing this Commitment, we commit to promoting, increasing and enhancing biodiversity within our administrative area and recognise that our ecological footprint extends beyond our administrative area: we will therefore integrate biodiversity considerations into all aspects of our governance and development planning.

4. By signing this Commitment we declare our intention to:

4.1 Regularly publish biodiversity reports on the state of biodiversity within our administrative area and our progress in protecting biodiversity, which will stand as public record;

4.2 Contribute towards the formulation of globally relevant local authority biodiversity good practice guidelines;

4.3 Develop and implement a long-term local biodiversity strategy for our administrative area and governance practices, which will address, for example:

4.3.1 The consideration of biodiversity in all aspects of local planning including, amongst other things: land-use planning, mobility planning, economic development planning, and conservation planning;

4.3.2 The management of natural areas and green spaces, including the restoration and rehabilitation of degraded natural areas and the control of invasive species;

4.3.3 The provision of municipal services, including fresh and waste water treatment, energy generation and housing;

4.3.4 Public procurement strategies, including purchasing of eco-certified goods and services and the ban of hazardous products;

4.3.5 Social development including poverty alleviation and job creation;

4.3.6 Awareness-raising of the value of biodiversity and the need for its protection in all sectors of society;

4.3.7 Stakeholder participation in all relevant aspects of local biodiversity governance; and

4.3.8 The inclusion of biodiversity in city partnerships and cooperation projects with public and private partners.

4.4 Remain committed to ongoing implementation of that long-term local biodiversity strategy through the enactment of guiding policies;

4.5 Actively engage with, and ensure participation and involvement of all stakeholders; and

4.6 Actively participate in the ICLEI Local Action for Biodiversity Initiative as the global network of local governments for biodiversity.

5. As a local government, we support efforts to promote greater recognition by national governments and international bodies of the critical role local government plays in protecting biodiversity at the local and global level. We recognise our own role within the global environment and by signing this Commitment we entrench our dedication to global biodiversity. We recognise the need to contribute actively to the implementation of the objectives of the United Nations Convention on Biological Diversity and the objectives of the biodiversity targets, aimed at reducing the rate of loss of biodiversity on our planet.

Signé par Gérald Tremblay en qualité de maire de Montréal le 21 août 2011

Signed in Montréal, this 21st day of August 2011
Local authority name: Gérald Tremblay
Name/position: Mayor of Montréal

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General websites

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Concordia University: http://www.concordia.ca

Conférence régionale des élus de Montréal: http://credemontreal.qc.ca/

Conseil régional de l'environnement de Montréal: http://www.cremtl.qc.ca/

Ecomuseum Zoo: http://www.ecomuseum.ca/en

Federal government: www.canada.gc.ca

Héritage laurentien: http://www.heritagelaurentien.org/

ICLEI – Local Governments for Sustainable Development: www.iclei.org

International Union for Conservation of Nature: www.iucn.org

Les amis de la montagne: http://www.lemontroyal.qc.ca/

McCord Museum: www.musee-mccord.qc.ca/en

McGill University: http://www.mcgill.ca/

Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs: http://www.mddefp.gouv.qc.ca/

Morgan Arboretum: http://www.morganarboretum.org/

Mouvement Ceinture verte: http://www.ceintureverte.org/mouvement.html

National Film Board of Canada: www.nfb.ca

Office de consultation publique de Montréal: http://www.ocpm.qc.ca/

Quebec government: www.gouv.qc.ca

Saint-Jacques Éco-quartier office: http://asccs.qc.ca/eco-quartier-st-jacques

Secretariat of the Convention on Biological Diversity: www.cbd.int

Tree Canada: www.treecanada.ca

United Nations: www.un.org

Université de Montréal: http://www.umontreal.ca/

Université du Québec à Montréal: http://www.uqam.ca/

Ville de Montréal: www.ville.montreal.qc.ca

Biodiversity
Biodiversity, or "Biological diversity," means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.
United Nations Convention on Biological Diversity, 1992.

Canopy
The canopy is the area of the crowns of trees (branches and leaves) in a territory. The canopy index is the ratio between the summation of the surface area of the tree tops (over 3 metres high) projected on the ground (canopy) and the total surface area.
Ville de Montréal, Draft Montréal Development Plan, Glossary, 2012.

Ecoterritoire
The City has identified 10 sectors, referred to as ecoterritories, in which natural spaces are slated for priority protection and enhancement. These sectors represent considerable tracts of land which include existing protected areas (large parks, nature reserves, etc.), urban areas and natural spaces over 15 ha in need of protection and enhancement. These ecoterritories were established in the Policy on the Protection and Enhancement of Natural Habitats and are recognized in Montréal's Master Plan.
Ville de Montréal, Policy on the Protection and Enhancement of Natural Habitats, 2004.

Ecosystem
A whole formed by a community of living beings and its atmospheric, soil and geologic environment. The components of an ecosystem develop a network of interdependencies that sustain and develop life.
Fisheries and Oceans Canada, The Shore Primer, Glossary, 2001.

Green space
A green space is a space covered with vegetation. This includes natural habitats, all parks (large parks and local parks), cemeteries, golf courses, community gardens, the Botanical Garden, the Morgan Arboretum, the Lachine Canal urban park, the banks of the aqueduct canal, the Old Port, cultivated farmland, undeveloped land, grassy medians and Hydro-Québec rights of way.

Invasive alien species
An invasive alien species is a non-native plant or animal that, once introduced in a location other than its native range, propagates rapidly and often harms native species. Such species may be intentionally introduced by humans for domestication, cultivation or other purposes, or accidentally, either blown in by the wind or transported by ship, train, truck, etc., to then spread and establish themselves.

Large park
The City has 24 large parks managed by its central departments, while local parks are managed by the boroughs and reconstituted cities. The large parks network comprises 11 nature parks, and the Saint-Michel Environmental Complex, Mount Royal, Third Summit and Jean Drapeau parks, which are managed by the agglomeration Council. The network also includes Angrignon, Des Rapides, Maisonneuve, Cité-du-Havre, Jarry, La Fontaine, Promenade Bellerive, René Lévesque and Jeanne Mance parks, for which Montréal City Council is responsible.

Natural habitat
The Island of Montréal enjoys a broad diversity of natural habitats inside and outside existing parks which together form a mosaic made up of open fields, tracts of unimproved land, wooded areas, lakes, waterways, and wetland marshes and bogs.
Ville de Montréal, Policy on the Protection and Enhancement of Natural Habitats, 2004.

Inland natural habitat
Inland natural habitats are located within the territory of the agglomeration, and hence do not include the large bodies of water in the archipelago (St. Lawrence and Des Prairies rivers, Lake of Two Mountains, Lake Saint-Louis).

Nature park
The City of Montréal's regional parks have been known since 1994 as nature parks, and are part of the network of large parks. Nature parks are intended to conserve and enhance the sites' natural and cultural heritage and make it accessible to current and future generations.
Ville de Montréal, Vers une vision du réseau des grands parcs, 2006.

GLOSSARY

Ecological network
An ecological network is defined as a natural environment comprising three zones: a core zone, a pocket of biodiversity; a buffer zone protecting the core zone and offering essential habitats; and an ecological corridor linking core zones. Conservation projects under the Policy on the Protection and Enhancement of Natural Habitats are based on this model of an ecological network.
City of Montréal, Policy on the Protection and Enhancement of Natural Habitats, 2004.

Montréal administrative structures

The Communauté métropolitaine de Montréal (CMM) is a planning, co-ordinating and funding body serving 82 municipalities (including the city of Montréal). It is home to 3.6 million residents spread over an area of 4,360 square kilometres.

The Montréal agglomeration comprises 16 municipalities (including the city of Montréal and 15 reconstituted cities). It has a population of 1.9 million residents spread over an area of 500 square kilometres.

The Ville de Montréal consists of 19 boroughs, sharing jurisdiction with the central departments. Each borough has certain powers and its own budget for offering services directly to residents.

Some useful figures (as a percentage of the territory of the agglomeration)

Green spaces (see definition, p. 83): 21.3%
Montréal parks: 9.5%
Canopy index: 19.1% (Ville de Montréal) 20.3% (agglomeration)

Natural habitats:
- Inland natural habitats (wooded areas, uncultivated land, wetlands): 9.7%
- Natural habitats (including large bodies of water): 27.6%

Protected natural habitats:
- Protected inland natural habitats: 5.5%
- Protected natural habitats (including large bodies of water): 17.3%

ACRONYMS

CBD	United Nations Convention on Biological Diversity
CMM	Communauté métropolitaine de Montréal (Montréal metropolitan community)
CoP	Conference of the Parties
CRÉ	Conférence régionale des élus (regional conference of elected officials)
CRE	Conseil régional de l'environnement (regional environment board)
CSBQ	Centre de la Science de la Biodiversité du Québec (Quebec biodiversity science centre)
ICLEI	Local Governments for Sustainability
IRBV	Institut de recherche en biologie végétale (plant biology research centre)
IUCN	International Union for Conservation of Nature
LAB	Local Action for Biodiversity
MAMROT	Ministère des Affaires municipales, des Régions et de l'Occupation du territoire du Québec
MDDEFP	Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec
MRC	Municipalité régionale de comté (regional county municipality)
MRN	Ministère des Ressources naturelles du Québec
NGO	Non-governmental organization
NPO	Non-profit organization
PMAD	Metropolitan Land Use and Development Plan
UdeM	Université de Montréal
UQÀM	Université du Québec à Montréal

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