Biodiversity initiatives report -

Université de Montréal campus

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March 14, 2018

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INTRODUCTION

The 2012 assessment concluded with a question from Pinna (2010): "*Are urban ecosystems (...) "biological deserts" dominated by exotic and invasive species, or do they provide favourable conditions for native species? "*At that time, inventories and monitoring were still in their infancy, so it was not easy to answer this question. Five summers later, we are beginning to have enough information to try to answer it. This review will outline the various work that has taken place since then. But first, let's take a look at the local, provincial, federal and international context in order to position the priorities for action and how UdeM is trying to respond to them.

We have just come out of the COP23 in Bonn, a follow-up conference to those in Marrakech (COP22) and Paris (COP21). The commitments remind us of our duty to respond together in solidarity and cooperation to meet what is emerging as one of the greatest challenges of our era. Here are some of the directions that could affect UdeM's activities:

- Increase awareness of the linkages between health, climate and the environment, and the importance of an inclusive approach to environmental health.
- Develop the recognition and networking of traditional knowledge
- Ending the use of plastic that ends up in the ocean
- Ecological transitions of territories :
- Food and Agriculture
- Sustainable City
- Energy and circular economy

Closer to home, the Canadian government has set ambitious climate objectives while allowing the development of pipelines that will increase oil consumption. This paradox places the fight against climate change in a bipolar political context and makes attempts to respond to Canada's climate challenges seem futile. However, Environment and Climate Change Canada's Environmental Damage Fund is a call for environmental projects that have an impact on air quality (without indicators). Some of our projects could be financed by this envelope.

To promote the opening up of Mount Royal and thus foster better preservation of biodiversity, the Ville de Montréal and the Ministère de la Culture et des Communications implemented in June 2011 the subsidy program for the maintenance and enhancement of biodiversity on Mount Royal's institutional lands.

In Quebec, few actions have been taken in recent years, focusing mainly on GHG reduction through the carbon exchange tools put in place by the current government. Despite this orientation, the Conseil patronal de l'environnement du Québec (CPEQ) criticizes the weakness of the government's actions: The Quebec government currently favours a GHG reduction target for 2030 of 37.5% below 1990 levels. From the outset, the CPEQ has doubts about the realism of this target, considering that Quebec, unlike other states and provinces that have set comparable targets, can already rely on renewable energy for a large part of its energy balance. The CPEQ would like to remind that the current Quebec target corresponds to a reduction of GHG emissions by 20% below 1990 levels by 2020 and that, according to government and university sources, these reductions will likely be 8% in 2020, despite the significant reductions already achieved by Quebec industries (21%).

Several projects implemented at the University follow the same guidelines as the City of Montreal, which wants to increase the canopy on the island from 20 to 25% by 2025 (City of Montreal, 2012). Also in Montreal, the Conseil régional de l'environnement (CRE) is pressuring the city to report on the 2013 commitments of the canopy index (the only city in the world with targets for plant cover).

Meanwhile, in a more territorial approach, Mount Royal is about to adopt its new enhancement plan following the public consultations that took place in the fall of 2016. The UdeM has made its voice heard in this matter by making its recommendations.

Closer to home, the EDDEC institute has integrated the enhancement of biodiversity into its mission.

In its global vision of this responsibility, the Université de Montréal aims, among other things, to :

- Carry out its projects with a view to sustainable, educational and environmental management;
- Improve and take into account the quality of natural environments;
- Ensure the monitoring of the quality of its natural environments;
- Implement the entire action plan as soon as possible;
- Increase forest cover, in line with the targets proposed for the City of Montreal;
- Promote the maintenance and establishment of certain native species;
- To document methods and their successes in controlling invasive plants;
- Develop a forest / feeder city component;
- Integrate values of sustainable development and sound management of biodiversity;
- Inform and sensitize the university community to urban biodiversity issues;
- Include students from the university community in the development of the project from the outset;
- Promote social and humanitarian commitment and celebrate diversity;
- Raise awareness among the general public;
- Get adequate media coverage of its students' positive environmental actions;
- Put in place relevant awareness panels in the field;
- Provide users with new landscape perspectives;
- Offer users enriched ecosystems to discover during their visit.

The previous document (2012) proposed a list of 68 recommendations in the appendix. In connection with these, many actions have been carried out and other opportunities have also presented themselves. We need only think of our biodiversity plan whose importance has recently been recognized by obtaining one (1) point in the STARS certification, an international recognition of institutions in sustainable development.

These actions were carried out with the support of many partners (see ANNEX II).

Status of 2012 Recommendations by Theme

The recommendations that follow were written after reading certain documents that mentioned these problems or were proposed by Alexandre Beaudoin after finding gaps, either in the inventories or proposals to improve the state of biodiversity on campus.

Table 1: Status of implementation of the various recommendations made in the *State of Biodiversity on the Université de Montréal Campus* (Beaudoin, 2012) as of March 15, 2018, reported in absolute numbers.

Section	Realized	In progress	Things to do	Abandoned	Grand Total
FAUNA	3	2	4	-	9
FLORA	8	1	1	1	11
MUSHROOMS	-	1	-	-	1
EDUCATION	5	3	3	1	12
FITTINGS	3	1	4	-	8
HUMAN	6	-	2	-	8
INTERNSHIPS	3	1	8	1	13
AICHI	4	-	2	-	6
Grand Total	**32**	**9**	**24**	**3**	**68**

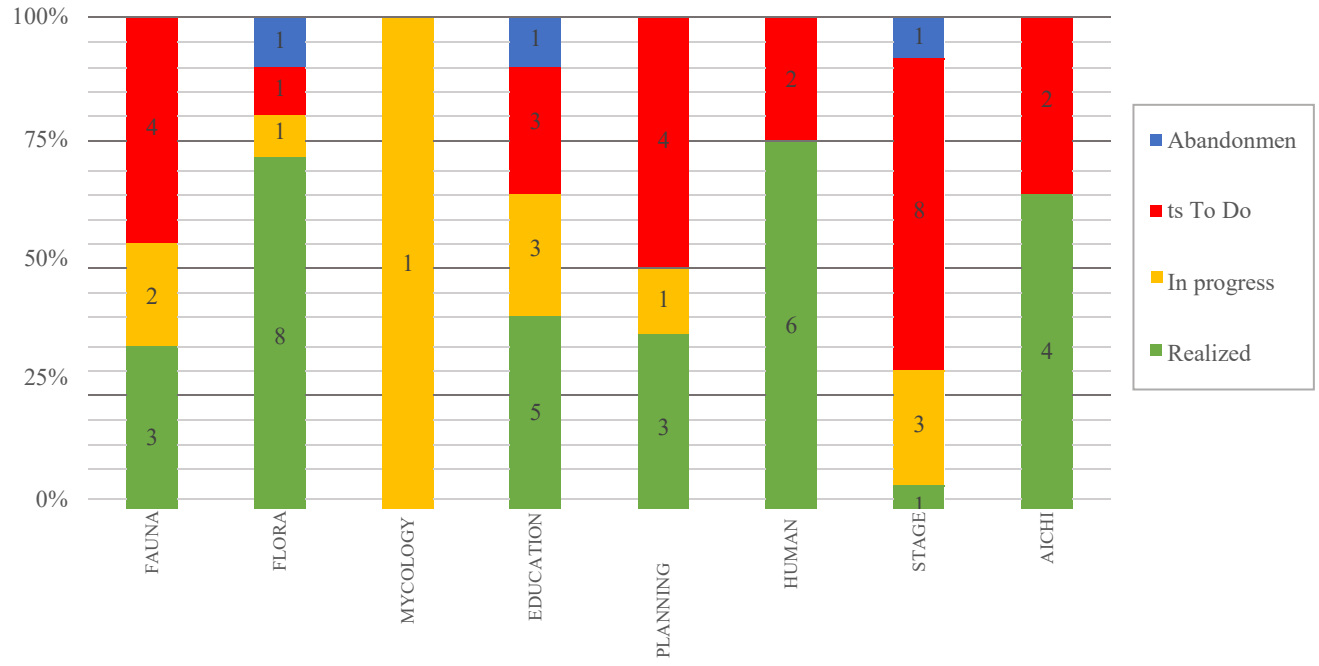

Figure 1: Status of implementation of the various recommendations made in the *State of Biodiversity on the Université de Montréal Campus* (Beaudoin, 2012) as of March 15, 2018, reported as a percentage.

Wildlife

Realized :

1. Install a bat nesting box

    - Installed in 2013, this energy self-sufficient facility provides a temperature-controlled environment for bats to reduce mortality rates, including those associated with the white snout syndrome epidemic, during the winter period. The occupancy/utilization rate is currently unknown. This project was carried out with funds from the Sustainable Development Unit.

2. Laying bluebird nesting boxes

    - Installed near the residences on the Université de Montréal campus in the spring of 2013, the ten nesting boxes for eastern bluebirds are intended to help maintain the populations present on the mountain. They were built and installed by young people from École St-Germain d'Outremont. The costs were shared between the Université de Montréal and Les amis de la Montagne.

3. Prepare a feeder circuit

    - 2 feeders have been installed.

Ongoing :

4. Assess ecological value based on wildlife and soil (Bourdages et al., 1988; Lajeunesse et al., 1995; Cogliastro et al. 1996).

    - Some inventories have been carried out (notably the 2013 Bioblitz, see information on the Bioblitz in the EDUCATION section)

5. Encourage the return of host plants for the 30% of the butterflies whose resource is absent (e.g., the American Copper (Lycaena phlaeas americana) associated with Rumex acetocella, R. acetosa and R. crispus; the only one of this family found on the site is Rumex obtusifolius, but is not found in any diet).

    - If no specific action has been taken, more general actions to protect and improve the natural environment are in line with this recommendation.

Things to do:

6. Use ground beetles and butterflies as indicators in longer-term studies.

7. Identify wasps, aphids, dragonflies, moths, bedbugs, springtails, etc.

8. Installing a chimney for chimney sweeps

9. Repeat inventories from pit traps with a solution for raccoons. Ideally, the assistance of a bioecology technician would be very helpful.

Flore

Realized :

1. Evaluate the potential to develop the sugar bush in the spring1

    - The production potential of the sugar bush, located at the Édouard-Montpetit woodland, was estimated based on the work carried out during an internship in 2016. The student from Cégep St-Laurent having inventoried the different tree species, a proportion of maple trees amounting to 33%, or 64 trees, was thus identified. According to estimates2, roughly 50 liters of maple syrup could be harvested annually.

2. Geo-referencing butternut trees and assessing their state of health

    - This will be achieved in 2015, and it would be interesting to resume the exercise later to monitor progress.

3. Identify the 75 remarkable trees and shrubs and identify them on campus in the landscaped air.

    - The project, under the name of The Arboretum, was completed in the year 2017. It proposes a path allowing to observe three different types of planted forests as well as 13 remarkable trees and shrubs present on the campus. The location of these trees and shrubs as well as their particularities are explained. All the illustrations were produced by a biology student from the Université de Montréal. This project was made possible thanks to funding from the Sustainable Development Unit. http://durable.umontreal.ca/biodiversite/milieux-de-vie/arboretum/

[1] The wording has been revised with the agreement of the Biodiversity Councillor.

[2] Estimated using information from http://www.foretmeridionale.ca/wp-content/uploads/2016/12/entaillage-et-rendement-en-erabliere.pdf

4. Develop a management plan for butternut trees (Juglans cinerea).

    - The butternut trees are managed in collaboration with Les Amis de la montagne.

5. Positioning invasive alien species on a map for use by Université de Montréal employees.

    - The main invasive alien species have been mapped.

6. Trail degradation

    - Three approaches have been targeted to prevent trail degradation:
      1) 1170 meters of useless trails have been closed;
      2) 420 meters of trails have been consolidated;
      3) Signage has been placed in the wooded area to indicate the location of the trails.

7. Maintain biotopes that are home to a wide variety of butterflies open, i.e., if vegetation follows its normal course, these biotopes will gradually close and make the butterflies' habitat disappear.

8. Identify black dog stations, if any, and apply the recommendations of https://wiki.bugwood.org/Vincetoxicum_nigrum.

Ongoing :

9. Continue planting in the green flow

    - Considerable planting efforts have been dedicated to Green Casting.

Things to do:

10. Assess the potential impact of the establishment of nut and fruit trees on campus.

Abandoned:

11. Cutting down shrubs of Giguère maple and cottonwood would be a measure to conserve grasslands in open environments, otherwise we risk losing many species of butterflies, according to Pinna (2010).

    - This initiative was abandoned considering that the land in question is no longer part of the UdeM campus following the signing of the emphyteutic lease between the University and the City of Montreal.

Mushrooms

Ongoing :

12. Make an inventory of the mushrooms encountered during the summer season, starting in 2012.

    - Some species have been inventoried, but no complete inventory has been carried out.

Education

Realized :

1. Organize birdwatching outings (First in May 2017)

    - As part of the first Biodiversity Summer School, held in May 2017, a birdwatching hike was organized as a welcoming activity. Organized in collaboration with Les amis de la montagne, it allowed the observation of about thirty species of birds. A guide accompanied the 40 or so participants on a hike on the campus of the Université de Montréal and the surrounding area. http://praxis.umontreal.ca/formation-professional/training-catalogues/university-of-you-have-said-biodiversity/

2. Promote student awareness of the richness of the campus through animation kiosks.

    - Some animation kiosks on the theme of biodiversity were held.

3. Organize the Corvée du mont Royal in partnership with Les amis de la montagne, but on the UdeM side with students

    - Each year, the university community is invited to mobilize for the cleanup of Mount Royal's natural environments located on the UdeM campus.

4. Create a trail map and distribute it to the entire student community.

    - A map has been produced and is available online (http://durable.umontreal.ca/fileadmin/durable/documents/carte_beta3_sentiers.pdf).

5. Produce a simple book presenting the overall biodiversity of the campus with a brief description of the ecology of the species in the same genre as the guide Le campus : Le patrimoine architectural... or in the style of the Fauna and Flora maps of the Guides Gallimards. This book would be sold in coops and student cafés at UdeM.

    - A variation of this is the Remarkable Trees Course.

Ongoing :

6. Integrate the Bioblitz into the biology/geography curriculum
    - Some biology students participated in the 2017 Bioblitz without being part of the academic curriculum.
7. Produce a panel at the entrance of the wood
    - A sign was placed in the wooded area along Édouard-Montpetit Street.
8. Bring out a photo-documentary of all the species listed to date and make it accessible to students wishing to identify certain observations during their hike.
    - The Remarkable Trees Course is a step in this direction.

Things to do:

9. Provide a trail map to students at the beginning of the school year.
10. Create a tool to learn about plant and animal species (citizen science approach)
11. Create a photographic bank (photo identification) of various specimens found on the slopes of Mount Royal belonging to the UdeM (insects, plants, mammals, birds, etc.).

Abandoned:

12. Develop an interactive tool with My Health at the Top, to make information more accessible
    - This initiative was discontinued after the end of the *My Health at the Top* program http://awg-cepsum-v02.cepsum.umontreal.ca/toutes-les-nouvelles/le-programme-mss-cesse-ses- activities

Facilities

Realized :

1. Issues in urban agriculture: UdeM's position
    - With its feeder forest, the P.A.U.S.E., Géovert and S.A.U.F.A. gardens, as well as the ephemeral projects on the MIL campus, UdeM is demonstrating its intention to make room for urban agriculture on its campuses.
2. Landscaping ecosystems (internship)
    - The landscape component is constantly integrated into the landscaping (gardens, plantations, etc.) carried out.

3. Remove secondary and tertiary trails to reduce the adverse effects of erosion and trampling.
    - See section FLORA
4. Formalize certain trails to channel traffic according to the ecological value of the unit and its use.
    - See section FLORA

Things to do:

5. One way on campus
6. Plant native shrubs that provide fruit for birds in the semi-natural area of the subway (e.g., three-lobed viburnum, fragrant bramble, etc.).
7. Produce a general plan of green spaces with the objective of reducing repetitive and costly work.
8. Consolidate horticultural maintenance efforts in order to reduce the expansion of large or high amplitude spontaneous species (Acer negundo, Parthenocissus quinquefolia).

Human

Realized :

1. Set clear Objectives with precise deadlines.
    - The 2012-2020 Biodiversity Action Plan has 8 main points and aims to enhance and maintain biodiversity on the northern flank of Mount Royal. http://durable.umontreal.ca/biodiversite/plan-biodiversite/#c7478
2. Alliance Flanc Nord (UdeM/Brébeuf/Les amis de la montagne)
    - The Alliance is created, but Collège Brébeuf is not part of it.
3. Biodiversity issues: UdeM's position
    - Biodiversity Action Plan 2012-2020.
4. Create a part-time position in biodiversity management
    - The position of Biodiversity Advisor was created in 2012. The latter was assigned to the Sustainable Development Unit under the Vice-Rectorate for Finance and Infrastructure.
5. Carry out a woodland clean-up in partnership with Les amis de la montagne.

- The Université de Montréal has been involved as a partner in the Corvées du Mont-Royal organized by Les amis de la Montagne since the 2013 edition (see EDUCATION section).

6. To perpetuate agricultural activities, by creating a position of coordinator of food activities.

    - Hiring of a first technical assistant in agriculture in 2013. The financing of his salary was provided by the Sustainable Development Unit.
    - A resource has been re-allocated for the years 2015, 2016 and 2017. Here, funding came from the Fonds d'amélioration de la vie étudiante (FAVE).

Things to do:

7. Choose, through a contest, the insect, mammal, amphibian, etc. emblematic of the campus.
8. Build a bank of documents and books dealing with the biodiversity of Mount Royal's woodlands;

Internships

Realized :

1. Plan actions in a global perspective with the City

    - The Darlington ecological corridor project, the Joint Plan (UdeM and City of Montréal) to maintain and enhance biodiversity, and the contribution to the Canopy Action Plan are among the actions that demonstrate UdeM's desire to plan biodiversity actions in a global perspective in collaboration with the City.

2. Water retention according to the original hydrography (internship)

    - A report concerning the evaluation of the watershed and the various associated problems was carried out by the firm Vinci Consultants.

3. Carry out a characterization of the geomorphology and drainage (hydrology, hydrography) of the northwestern slope of Mount Royal.

    - A report on the hydrogeology of the Édouard-Montpetit woodland slope was produced by the firm Amec Foster Wheeler.

Ongoing :

4. Renaturalization of wetlands (internships)
    - Feasibility assessment of the project is ongoing. A report has been produced by the firm Biodiversité Conseil on the reintroduction of anurans in these wetlands. An intern is currently working on the technical constraints and legal framework surrounding this project.

Things to do:

5. Impact Indicators (internship)
6. Monetization of campus ecological services (Internships)
7. In order to reduce heat islands and allow for better water infiltration into the ground, it would be advantageous from a climatic and environmental standpoint to green parking lots by taking inspiration from various existing practices.
8. Carry out a time scale of actions related to biodiversity at the UdeM (inspired by the history of forest stands).
9. To carry out a detailed characterization of the soil according to the various stations (34) of the forestry groups.
10. Research internship on bee health and its impact on urban biodiversity.
11. Obtain the 2002 orthophotos presenting the UdeM site. (Thiffault, 2003) Direction des Parcs et espaces verts de la Ville de Montréal
12. Reflection to be developed initiated by Pinna: Why the Lycenae (2), the Silver Blue and the repealed Tail Carrier are absent from the site when their host plant (oligophagous) is there and these butterflies are abundant in the region.

Abandoned:

13. Mont Royal a well of Biodiversity (Arce, 2009) Better maintenance + green corridor

Aichi (Nagoya 2010)

Realized :

1. Sustain the Bioblitz to participate in the changes in the agricultural sector in relation to Biodiversity.
    - Bioblitz are now part of the regular activities of the Sustainable Development Unit.

2. Participate in joint programs with the City to control invasive species

    - The Joint Plan (UdeM and Ville de Montréal) to maintain and enhance biodiversity is a major program aimed in particular at controlling invasive species.

3. Continue the plantations on Mount Royal and ensure that the wood cut on site is revalued in local constructions.

    - In the summer of 2017, ash wood cut as part of the EAB control program was upgraded and included as building materials for the first phase of the renovation of the *Chez Valère* food service point.

Things to do:

4. Eat only MSC fish in the cafeteria, prepare for 2020
5. Set up an aid program for underprivileged countries
6. Construct landscape retention ponds to allow for better water infiltration (Portland, Oregon style)

CONTEXT OF INTERVENTION

The campus of the Université de Montréal is located in the Historic and Natural District of Mount Royal (AHNMR), so it is in a special environment in terms of protection standards. It is also one of the nine Monteregian Hills, but it is the only one to be located in such a densely populated area, hence the importance of its conservation (Ville de Montréal, 2008). Indeed, this causes extremely high anthropogenic pressure and habitat fragmentation that is difficult to avoid (Poitras and Burgess, 2005).

Geomorphological setting

The Monteregian Hills are the result of magmatic intrusions that occurred in the Earth's crust along the path of a weakness (hot spot) in the North American tectonic plate. These hills are formed of intrusive rocks (very resistant to erosion) since the magma has cooled down within the earth's crust. It is differential glacial erosion that makes these intrusions into hills today. The result is a succession, from the top to the bottom of Mount Royal, of igneous, metamorphic and then sedimentary rocks (Gutiérrez, 2013). The surface deposits are almost exclusively glacial in origin, hence the predominance of till, a deposit characterized by a very weak sorting and a rather silty matrix (Robitaille and Allard, 2007). Glacial heritage also explains the presence of erratic boulders, transported over long distances by glaciers (Bédard, n.d.). While topography is the main determinant of surface water flow paths, the nature of surface deposits is a major control on the speed and trajectory of groundwater flow (Knighton, 1998).

A unique socio-ecological system

The UdeM woodland is located on the northwestern flank of Mount Royal, in the heart of Montreal, Quebec's metropolis. Covering a total area of 2.18 ha, this woodland is divided between the primary core area of approximately 1.5 to 2.84 a (Édouard- Montpetit woodland), which includes a sugar maple grove, an ash, poplar and oak grove, and the secondary area of approximately 1.5 to 2.84 a (Édouard- Montpetit woodland).

red and, on the other hand, the small wooded area of the ecological corridor with an area of approximately 0.65 to 0.68 ha (Coulée verte in front of the École polytechnique), including an oysteria and a cottonwood grove with deltoid poplar. It is a wooded area exposed to strong human pressure. This makes Beaudoin (2012) say that it is possible to describe this area as a socio-ecological system and not purely ecological. Indeed, the forest resembles a mosaic made up of century-old forests, young forests and disturbed or semi-natural sites made up of trees and lawns (Boivin et al., 2005). Nevertheless, it abounds in a rich and unique biodiversity made up of several protected species and it is also the only place in Quebec where the phasme is found (Beaudoin, 2012).

The division of the site into groups of more or less distinct plant formations was proposed by Les amis de la montagne (see Figure 2).

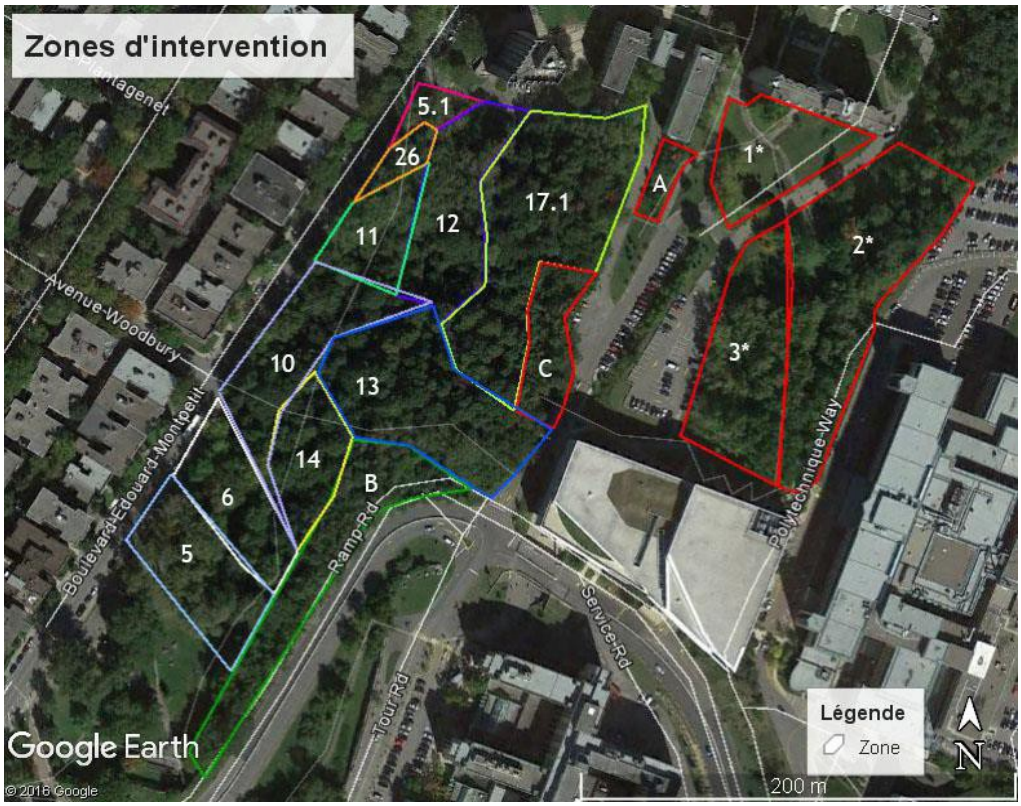

Figure 2: The UdeM woodlot and its division into plots

In addition, there are the garden plots of the PAUSE initiative, where 10% of each plot is destined for the creation of 800 ^{m2} housing.

Figure 3: Map showing the location of the PAUSE gardens.

Several plantations were made to expand or consolidate woodlands, or to close trails. Some plantings were done directly on the grassed areas to increase the canopy throughout the campus. A description of the plantings by year will follow later in the text.

In order to better understand our physical context of intervention, hydrological studies have been carried out. We can now know the granulometry of the soil in the woodland, the rate of water infiltration and the flow of groundwater. These same studies also allow us to know the location of power lines.

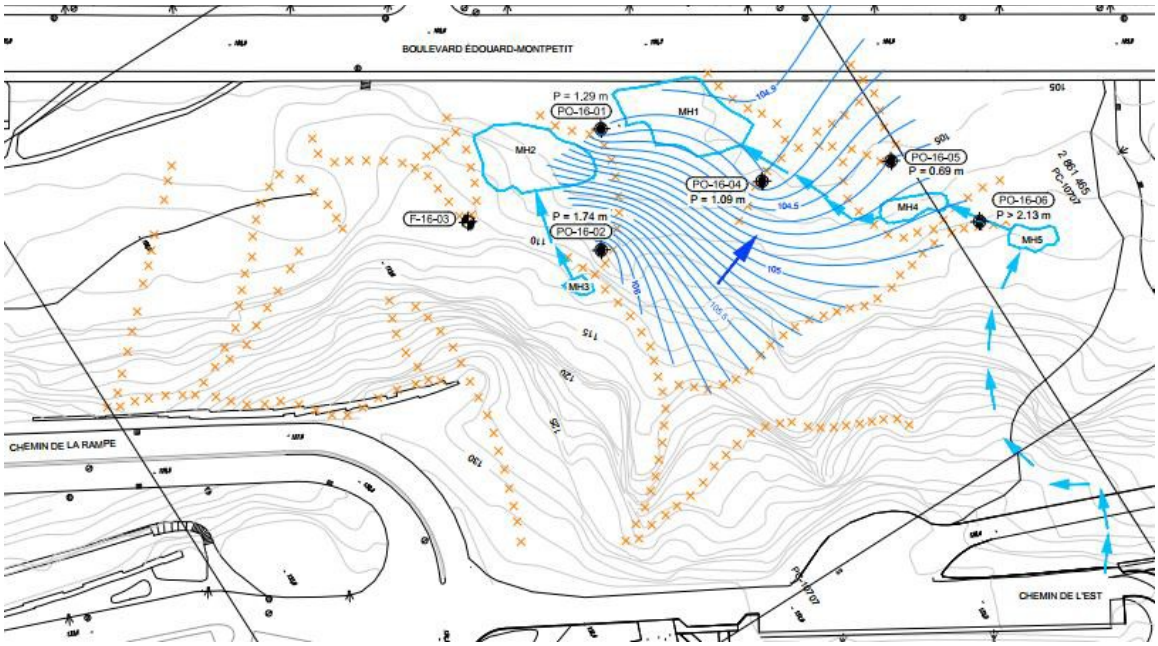

Figure 4: Map of water flow in the woodland, produced by AMEC (Dec 2016)

In addition to the existing site, the acquisition of the Outremont site, covering an area of 40 ha, was added. This new space will house many institutional buildings, including the departments of chemistry, physics, geography and biological sciences. In addition, the INRS, École Polytechnique and Innovation Centre pavilions will be grouped together. Some spaces are currently delimited to receive interventions for biodiversity, which explains the inclusion of this new territory in this assessment.

As mentioned previously, to offset these negative effects of habitat fragmentation, conservation biologists have advised increasing connectivity between habitats to maintain and, if possible, improve the viability of the target species population (Bennett, 2003). For Beier and Noss (1998), an ingenious and effective way to ensure connectivity of existing protected areas is through the creation of ecological corridors and the protection of existing natural corridors. Thus, to promote the opening up of Mount Royal with a view to better preservation of biodiversity, the Ville de Montréal and the Ministère de la Culture et des Communications implemented in June 2011 the subsidy program for the maintenance and enhancement of biodiversity on Mount Royal institutional lands. This

The program calls for the creation of an ecological corridor that would link the Mount Royal and Bertrand Creek eco-territories, which are considered the two most important biodiversity hotspots in the area. Between these primary cores, secondary biodiversity cores with a minimum size of 5,000 ^{m2} will be created every 200 m or so. In order to do so, several urban spaces such as wastelands, squares, parking lots and wide sidewalks could be reconverted or modified. To facilitate the realization of this corridor, the City of Montreal has involved the partner institutions present on the Mount Royal site in the implementation, including UdeM and McGill University. Each stakeholder involved in the corridor's route will thus be responsible for carrying out, through various projects, activities aimed at maintaining and enhancing biodiversity on their property.

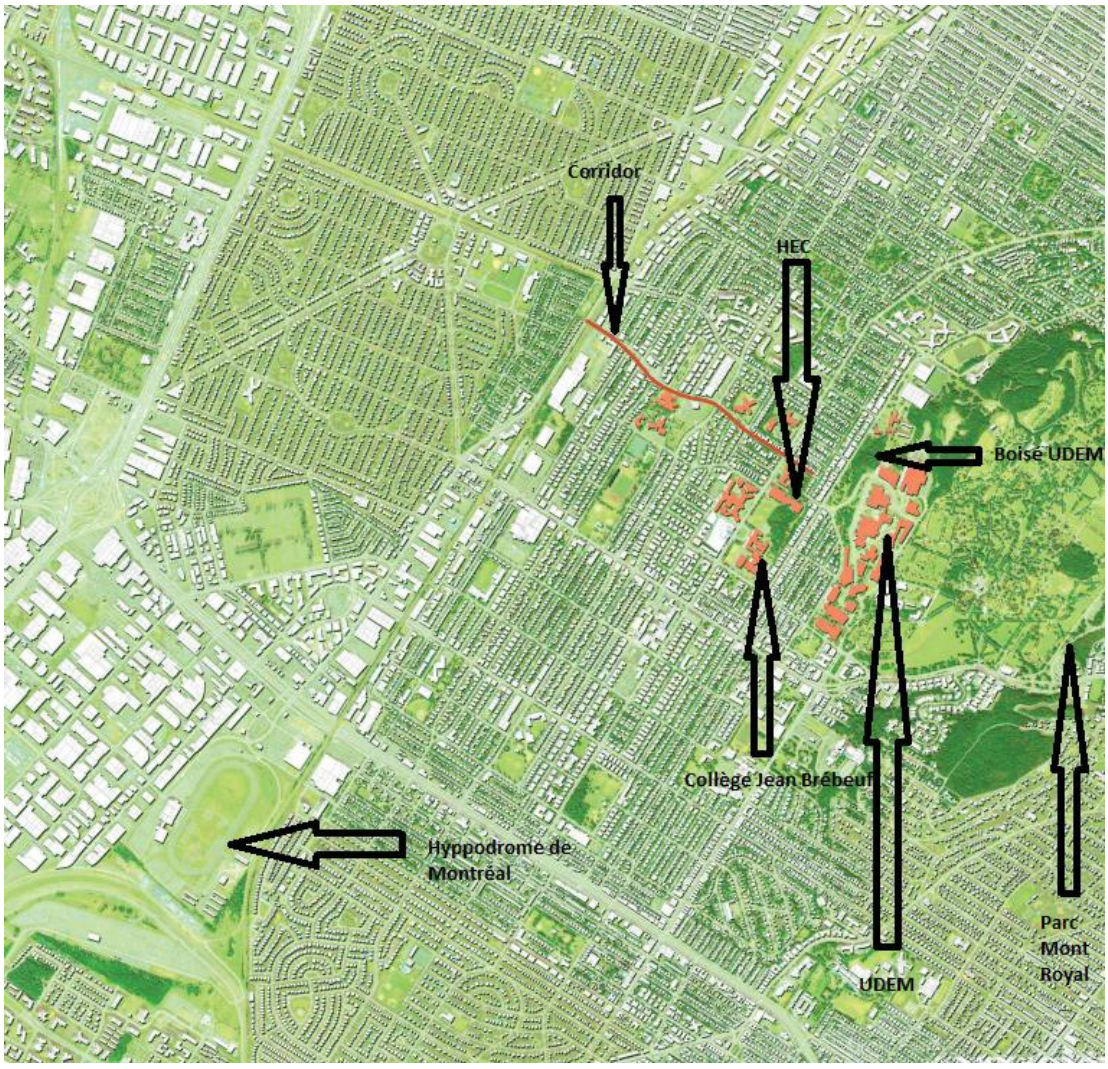

Figure 5: Darlington Ecological Corridor alignment

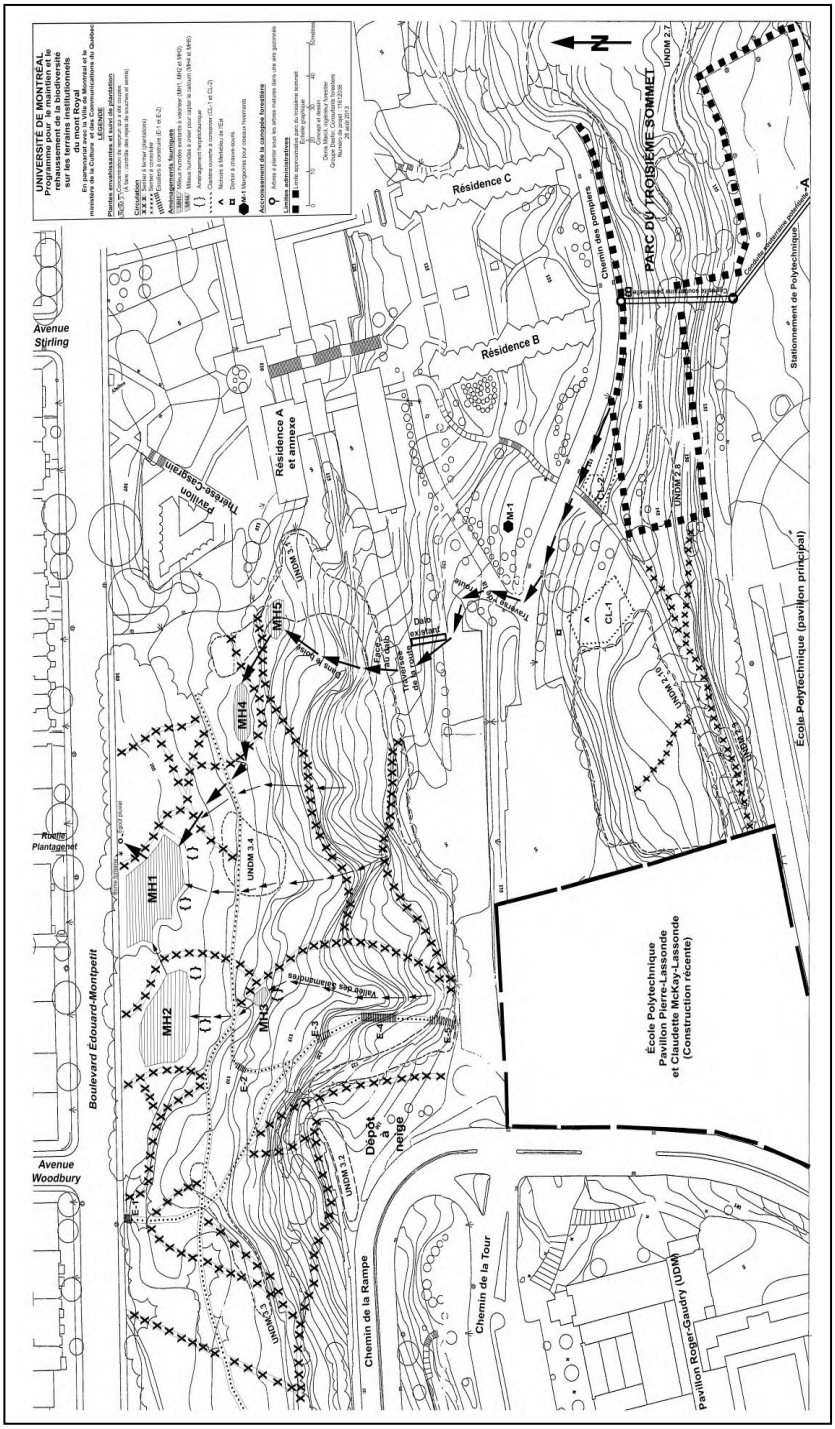

Figure 6: Map Project plan for biodiversity enhancement in institutional settings

Acts, regulations and policies

The Mountain Campus is located on the territory of the former Mount Royal Historic and Natural District (created in 2005), now known as the Mount Royal Heritage Site. The status of this territory is dual and therefore ambiguous, being both a heritage site (Ministère de la Culture et des communications) and a conservation site (Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques). This has the effect of complicating the authorization process for interventions.

The Migratory Birds Convention Act, 1994 (http://laws-lois.justice.gc.ca/eng/laws/M-7.01/page-1.html#h-3), which provides for the protection of migratory birds and their eggs and nests through the Migratory Birds Regulations and the Migratory Bird Sanctuary Regulations and which applies across Canada, places significant constraints on the timing of development projects and other work in woodlands, urban brownfields, vacant lots and other vegetated areas. The interpretation of this law by the Bureau des grands parcs et du verdissement of the City of Montreal is more severe and provides for the prohibition of any intervention within a radius (variable according to the species) around the nest of a migratory bird for a period from late spring to early fall.

The By-law respecting the protection and planting of trees on private property on the Mount Royal Heritage Site (RRVM c. P-16: http://ville.montreal.qc.ca/sel/sypre-consultation/affichepdf?idDoc=150&typeDoc=1) also imposes constraints on interventions.

In the fall of 2016, a document was created to frame the protection of Mount Royal and is the Mount Royal Enhancement Document (http://ville.montreal.qc.ca/pls/portal/docs/PAGE/BUREAU_MTROYAL_FR/MEDIA/DOCUMENTS/POINT%2010-PLAN%20D'ACTION%20PPMVMR-9D%C9C16_VFINALE%20_1_.PDF).

Table 2: Summary of the various laws and regulations in effect in relation to biodiversity interventions on the UdeM's main worksites

Project number	Projects	Sub-projects	SD Policy-UdeM	SD Act Quebec (principles)	Laws and regulations	Prior authorizations and permits
Bdv 1	Ash	Tree cuttings treatment protocol research protocol training treatment Suivi state of health Action Plan	4,7	c, g, h, i, j, l	CDB UICN MEA AICHI: Participate in joint programs with the City to control species invasive	Permis à Rounding for felling Compensatory planting
Bdv 2	Urban agriculture	Market garden production Beekeeping Greenhouse Tree production Mycoproduction Research Education Management of green waste Islandsà pollinators Nurturing forest	4,7	e, f, g, k, l, m, n	CDB : agriculture and biodiversity Declaration Tailloires 2011 UNU MEA CDB Environment Canada (apis)	DI authorization for spaces (operations) #90013

Bdv 3	Plantation	Nurturing forest Canopy Action Plan	4,7	a, c, e, i, l, m	CDB file Kettles	Permis à rounding

		375e anniversary Mtl Boisé Édouard-Montpetit Green casting				t for plantation
Bdv 4	Protection avifauna	Nesting boxes Nests location and protection Display	1,4,7	a, c, e, f, i, l,	The espèces in peril (COSEWIC) Loi of cash designated endangered or vulnerable in Quebec L.C.O.M. IUCN Kettles	Parking Wharf (Store)
Bdv 5	Arboretum	Identification of 75 remarkable ornamental trees	7	f, k	Kettles	D.I. (operation)
Bdv 6	Replaces grassed areas	Choice of zones Weeding Seeding Follow-up	4	d, l		D.I. (operations)
Bdv 7	Update maps	Identification areas intervention Distribution auprès of students	7	d, f		CCRT D.I.
Bdv 8	Day Camp Biodiversity	Development content	7	e, f, k		CEPSUM

		Hiring te Training Follow-up an d improvement				
Bdv 9	Project Outremont	Relations partners VRCO relationship Greening temporary	1,4,7	c, d, e, f, l, m	Requirement City Outremont 1 point LEED AICHI: Build pools of retention landscaping, for allow a best infiltration of water	VRCO City Outremont (Compost Montreal)
Bdv 10	Compost Montreal	Recovery and valorization of the compost produced in the cafés students		d	CDB	
Bdv 11	Partnershi p Biodome an d amis th fro e m mountain	Education Project fro m search Volunteering	7	e, f,		
Bdv 12		Relation community Water Management Internships AT Biodiversity	1,4,7	c, e, i, k, l, m	AICHI: Build pools of retention landscaping, for allow a	

	Project Darlington	Memory (OCPM)			better infiltration of water PMAD	

Bdv 13	ProjectSt-Hyacinthe	Forest Corridor Plantation Biodiversity Community Internal relationship	4	a, c, l	Aichi	
Bdv 14	Soil Contaminants	Research (garden, Outremont) Greening Relationship Community	1,7	d, l, p		
Bdv 15	Puddle analysis	Research Scientific Publication Internal relationship	1	i		
Bdv 16		Water catchment of rain Traitement from water Infiltration Development Introduction biodiversity	1,4	a, c, h, i, l, m	The espèces in peril (COSEWIC) Loi of cash designated threatened or vulnerable in Quebec AICHI: Build pools of retention landscaping, for allow a best	Office of rounding nt CdN NDG Polytechniques Ville from m Montreal

	Media Wet				infiltration of water PMAD	

Bdv 17	Photo exhibition	Community Communication Internal relationship	4,7	f		Communications
Bdv 18	Wildlife Trees	Geopositioning Tracking Protection Wooded security	4	c, i, l	Kettles	
Bdv 19	Mushrooms	Research in mycoremediation Communication Training Identification	7	l, n		
Bdv 20	Walnut Cendré	Geopositioning Suivi état from health Documentation Wooded security	1	c, i, l	Nature Action Conservation of Nature Friends of the Tailloires mountain COSEWIC	
Bdv 21	Inventories	Follow-up in the field reddition from accounts Recommendations ns	4	c, f, i, l	IUCN MEA CDB	
Bdv 22	Supervision of internships	Knowledge sharing Training Aide file current		d, e,		CégepSt-Laurent

Each time we wish to intervene in the woods, a prior request to the Arkéos office is necessary since we are in an area with archaeological potential.

Figure 7: Map showing the zones recognized for their archaeological potential

DESCRIPTION OF THE INTERVENTIONS

Wildlife

Birds

Feeders have been installed to promote the survival of urban birds during the winter. An awareness program is being developed in collaboration with UdeM food services to allow live images of some of the feeders on campus. The objective is to expose cafeteria users to the campus' winged fauna.

Falcons

Observed for the first time in 2007, a pair of peregrine falcons, an endangered species, nests at the top of the tower of the Roger-Gaudry pavilion. A nesting box has been installed specifically for them. Since then, 22 falcons have been born on the Roger-Gaudry tower. High-definition cameras have been installed in order to be able to take superb images of these birds of prey (http://durable.umontreal.ca/biodiversite/faucons/).

Amphibians

In 2016, we completed our documentation of the site by awarding a contract to the firm Biodiversité Conseil, which carried out a study of the potential for reintroducing the wood frog in this woodland. This study outlines the potential for a successful reintroduction of anurans on the Université de Montréal woodland site. The undersigned recommends the implementation of a monitoring program to evaluate the quality of the water that will be present in the developed wetlands, changes in actual water levels and also the possibility of putting containment fences on the site to prevent road mortality. Other issues to be anticipated regarding the impacts of the developments on the Grey salamander could limit the project. Furthermore, the small size of the site and the landlocked nature of the site, which does not allow for exchanges between the two species, could limit the project.

with other populations and the proximity of the street are factors that greatly limit the possibility of reintroducing a population of wood frog into the woods of the University of Montreal. It would be wiser to work on the migration conditions and connectivity (e.g., barriers to movement) of amphibians and reptiles already present on Mount Royal in order to promote the dispersal of populations to increase their viability and reduce the risk of disease introduction.

An awareness program should also be considered to improve the chances of success of this program and thus promote the presence of amphibians and reptiles in the area.

An internship is currently under way, integrating all the studies and regulations surrounding this specific project. The objective of this internship is to evaluate the feasibility of a concrete rainwater management project on the campus of the Université de Montréal. It integrates the main issues of sustainable development and the use of phytotechnologies.

The issue of wetland development is currently at the stage of regulatory assessment and comparative studies with other similar projects. Completion of these latter stages will allow a decision to be made as to whether or not to proceed with wetland development.

Insects

Pollinators

Several honey meadows have been developed to provide quality habitats for native pollinators as well as to increase the potential for honey production, thus benefiting the various apiaries set up nearby as part of urban beekeeping initiatives. The plots dedicated to urban agriculture also have a portion dedicated to native plants with high melliferous potential. Finally, pollinator huts have been set up at various locations on campus to create optimal conditions for the survival of eggs.

Reptiles

Neck snake

In order to encourage the presence of ring-necked snakes, hibernacula are planned, which serves the dual purpose of facilitating monitoring and improving winter survival rates. However, we have not yet chosen the implantation period. In the summer of 2018, we will visit the one created par Denis Fournier, agent technique en aménagement de la faune, dans l'Ouest de l'île, et tenterons de nous en inspirer et d'y apporter les correctifs que ce dernier nous suggèrera. Une première historical observation was made in the summer of 2017. The main issue will probably be administrative, since the area of interest overlaps UdeM and City lands. We will therefore have to coordinate a bipartite response.

Figure 8: Snake hibernacle, image from www.biopolis.ca/.

Figure 9: First occurrence of ring-necked snake on the UdeM grounds, summer 2017

Mammals

Micromammals

An inventory of small mammals was carried out during the 2013 Bioblitz (see EDUCATION section).

Bats

Bats are affected by the White Snout Syndrome, which is causing a significant decline in populations. In cities, bats are finding it increasingly difficult to find places to spend long periods of time, especially in winter. Bat nesting boxes have therefore been installed. The device installed makes it possible to heat the nesting boxes in question during the winter. Unfortunately, in the winter of 2016, the nesting boxes were unplugged as part of the installation of the temporary shelter during the period when the mobile ramp was closed for repairs. To date, the nesting boxes remain unoccupied.

Indicators

- Occupancy rate of the nesting boxes/hibernacles.
- Number and quality of inventories carried out
- Area dedicated to pollinators (gardens and honey meadows)
- Area of wetlands created

Flore

In 2004, the cartographic inventory of plants in the developed areas of the campus de l'Université de Montréal" developed by the School of Landscape Architecture in 2004 was realized. It was used in the calculation of carbon sequestration of trees at the UdeM. According to the IPCC (2003) and the Forest and Urban Tree Carbon Projects Canada (2009) protocol, allometric equations for specific tree species can be used to estimate biomass from sampled estimates of merchantable volumes. The University's trees contain approximately 874.83 tC, i.e. these trees have removed 3,207.69 tCO2 from the atmosphere since they were planted. The CO_2 emissions removed by the University's trees are equivalent to 800 cars[3] and the 0.02% of GHG emissions (14,090 kt eq) of the Montreal community in 2009 (published in June 2013)[4].

[3] A car that travels 20,000 km annually emits about 4 tons of CO_2. Natural Resources Canada (2009).

[4] City of Montreal (2013)

	tC	tCO2
Ash	43,07	157,92
Campus trees (Dagenais, 2004)	830,90	3 046,62
Planting of 300 trees	0,84	3,06
Wooded Consolidation 2014	0,0269	0,0987
Total	**874,83**	**3 207,69**

Table 3: Carbon content in Campus trees

In 2012, we conducted transect inventories of spring woodland flora. White trillium, American erythrone, cluster smilacin, bloodroot of Canada, dioecious pigamon, small preacher, rosaceae, Canadian elderberry the officinal ally, anthrix (invasive), wild raspberries, wild strawberries, some sedges and asteraceae mainly constitute the early season plant cover.

Inventories

In 2012, we conducted transect inventories of spring woodland flora. White trillium, American erythrone, cluster smilacin, bloodroot, dioecious pigamon, small preacher, rosaceae, Canadian elderberry the common ally, anthrix (invasive), wild raspberries, wild strawberries, some sedges and asteraceae mainly constitute the early season plant cover. However, the inventory was conducted without georeferencing, which complicates the use of the data collected. In the summer of 2017, the inventory effort was repeated, this time with georeferencing.

Trees

Economic Importance of Urban Trees

A special study conducted by the TD Friends of the Environment Foundation supported the presence of trees in the city by valuing the ecosystem services they provide. Their study concluded that for the City of Toronto, one tree provided the equivalent of $700 worth of ecosystem services over its lifetime. The table below shows the various services and their relative importance:

Tableau 1 – Bienfaits annuels procurés par la forêt urbaine de Toronto

Bienfait	Description	Bienfait concret	Valeur (en millions de $)	$/arbre
Débits par temps pluvieux	Diminution de la pression sur les infrastructures de transport et de traitement grâce aux débits par temps pluvieux interceptés	25 112 500 mètres cubes	53.95 $	5.28 $
Qualité de l'air	Élimination et diminution de la quantité des polluants atmosphériques grâce aux arbres en bordure de rue	1 905 tonnes	19.09 $	1.87 $
Économie d'énergie	Économies d'énergies réalisées grâce à l'ombre et à l'effet modérateur sur les conditions climatologiques	749 900 millions de BTU de gaz naturel et 41 200 MWh d'électricité	6.42 $	0.63 $
Séquestration du carbone	Séquestration du carbone présent dans l'atmosphère et diminution des émissions grâce aux économies d'énergie réalisées*	36 500 tonnes	1.24 $	0.12 $
Réduction des émissions liées à la consommation d'énergie	Émissions de carbone provenant de sources d'énergies fossiles évitées grâce à l'effet modérateur sur les conditions climatiques	17 000 tonnes	0.58 $	0.06 $
Total des bienfaits	Somme des bienfaits économiques procurés par les forêts urbaines	-	81.29 $	7.95 $
Ratio coûts/bienfaits	Bienfaits pour les citoyens pour chaque dollar d'entretien	-	-	1,35 $ - 3,20 $

* Les chiffres pour les émissions de carbone évitées et le carbone séquestré ne tiennent pas compte de la décomposition et de l'entretien des arbres.
Sources : Toronto Parks, Forestry & Recreation; Services économiques TD.

Table 4: Excerpt from the TD FEF Tree Study

Carbon Sequestration

Carbon dioxide (CO_2) is one of the greenhouse gases that currently contributes to global warming. Carbon, which is one of the components of this gas, is subject to numerous exchanges between the various terrestrial, atmospheric and oceanic constituents that form the global carbon cycle (Campagna, 1996). All chlorophyllous plants, including trees, absorb this CO_2 to make carbohydrates to produce energy and grow. This reaction is called photosynthesis (see Figure101).

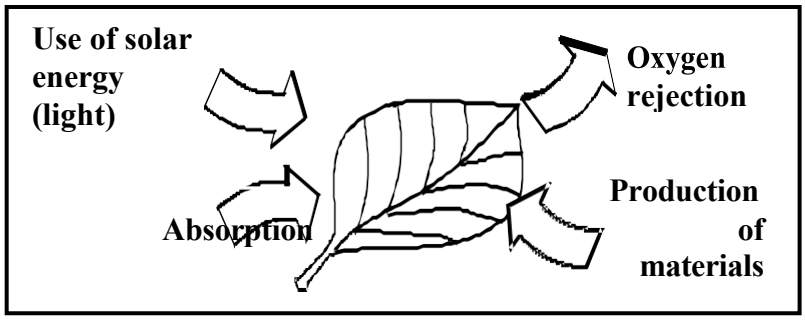

Figure 101. : photosynthesis

According to Tree Canada (2016), approximately one-third of emissions from human sources are covered by this process. Since trees are the major source of sequestration of these emissions, the impacts of climate change would be much more severe without trees. Given this fact, carbon sequestration using trees is an obvious way to combat global warming.

How to estimate the amount of CO_2 removed by trees?

The carbon sequestration of a given species is intrinsically linked to its growth, size and components (trunk, branches, leaves and roots). This is why the modeling of carbon sequestration is possible through the modeling of the growth and shape of each species. In general, the estimation of biomass and carbon content in a forest ecosystem requires an inventory of living trees. If there are biomass equations for the whole tree (or its components), it is possible to estimate the biomass from the measurement of tree diameter and/or height.

For the estimation of the carbon content of all trees at the Université de Montréal, a forest inventory carried out in 2004 was the main source of information. The data taken from these reports was the diameter of each individual, as this is the independent variable in the biomass equations found in various literature sources. In addition, the projection of tree growth in order to know the diameter of each individual today was necessary. For the estimation of the carbon content of the trees presented in this book, the diameter of each individual was measured.

Carbon is stored in the four tree reservoirs or basins (Above-ground living biomass, Below-ground biomass, Dead organic matter and Soil organic carbon). However, for this exercise we have only included the above-ground living biomass and the below-ground biomass.

To estimate the above-ground biomass of the trees inventoried in (2004) and the trees described in this book, we used the biomass allometric model reported by the IPCC (2003) and the biomass allometric model presented in the Chojnacky report (2013). On the other hand, the underground biomass is estimated on the basis of a proportion of the above-ground biomass. For this purpose, an IPCC table (Table 3ª.1.8; 2003) contains the values of ton of dry matter per hectare (t*m*s*ha-1) for the calculation of this ratio according to ecozone, type of vegetation and amount of above-ground biomass.

Finally, the total biomass is calculated (above-ground biomass + underground biomass) to know the carbon content and the quantity of CO_2 emissions removed by the trees since the year of their planting. The formula to determine the CO_2 emissions up to the year of the inventory is :

$$\text{Total forest stock } (tCO2) = [BA\ (t) + BS\ (t)]x \quad \frac{0.5\ tC}{tbiomass} \text{ x } 3{,}6667\ \frac{tC02}{tC}$$

BA = Above-ground biomass in tonnes (t) BS = Below-ground biomass in tonnes (t)

Plantation

In 2010 :

International Year of Biodiversity.

In 2011 :

We followed up on the trees planted under contract by the Centre Écologique du Grand Montréal firm. Five plots had been designated to plant these trees in August as compensation for the Belligham Reservoir work that forced the felling of certain specimens. However, at that time, the UdeM did not have any criteria or procedures for monitoring the plantations.

In 2012 :

We therefore monitor these plantations. Not having received any care, nor compost, some plots have a very high mortality rate.

Demonstrating the low success of these interventions, the management of small and medium sized tree plantations in the field is handed over to the UDD. As for municipal by-laws dealing with trees on lawns, these are still the responsibility of the building management and are being inventoried externally (Firme Nadeau).

In 2013 :

In partnership with *Les amis de la montagne* and neighbouring elementary school, we are planting 300 small trees. This operation required 2 authorizations #311 (urbanism office) and MCCF. At that time we increased the size of the Édouard-Montpetit woodlot on the west side, consolidating the buffer zone at the same time. This plantation has an exceptional survival rate.

Figure 11: : Alexandre Beaudoin, biodiversity advisor, and Claude Drolet, project manager in conservation at Les amis de la montagne during the 2013 planting.

Figure 12: Planting carried out by children from nearby elementary schools, in this photo the Notre-Dame-des-Neiges school.

Figure 13: Honorary photo of Sylvie Guilbault (Amis de la montagne), Guy Breton (UdeM) and Pierre Bélec (Soverdi).

In 2014 :

We plant our first nurse forest in one place, and a few more specimens are then planted in the green coulee.

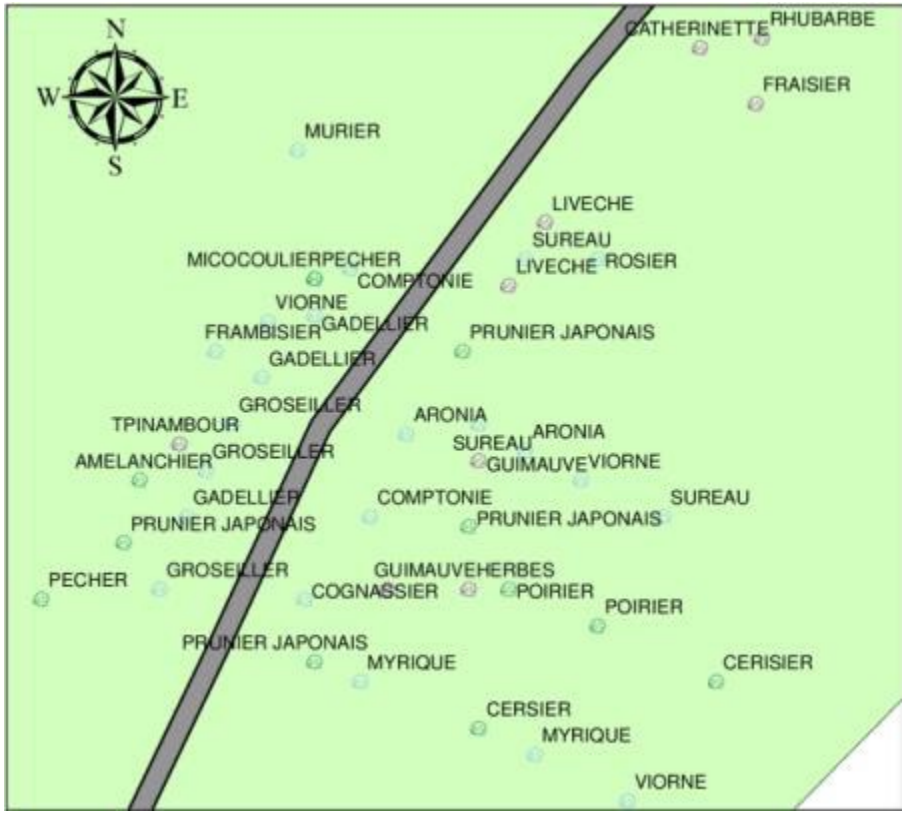

Figure 14 2: Location of the various plants in our food forest

130 trees were also planted at that time in the woods and elsewhere on campus.

October 17: 60 trees are planted in the woods and behind the Roger-Gaudry Pavilion, during the cultural re-entry organized by the SAÉ.

November 14: 156 trees are planted in the woods and behind the Roger-Gaudry Pavilion.

November 22: 35 trees are planted west of the CEPSUM.

2014-2015 :

During the summer of 2014, we will be monitoring the health of the woodland ash trees. This is alarming because of our 55 ash trees, many of them are show signs of the borer. We are therefore starting a special project with the firm *Bioceres* and assisted by researcher Sébastien Sauvé. Faced with the scope of the problem, the University preferred to refuse this experimental project and delegated its entire management to the firm Nadeau.

Figure 15: Emerald Ash Borer (Photo credit: Espace pour la vie Montréal)

Of the 55 tree sites or clusters of trees, only 12 are considered to be in good condition.

In 2015 :

Dreaming Tree Project - Music pavilion

A special project was born, the Dreaming Tree Project, executed by Tree Canada and funded by Dave Matthew's Band. This activity consists of planting about fifteen trees near the Vincent-d'Indy Faculty of Music and installing a bench.

Fall 2015: 204 trees are planted in the Édouard-Montpetit woodland thanks to a contribution from SOVERDI and a colossal effort by UdeM volunteers (Students).

2016 :

375 trees are planted by *Les amis de la montagne* thanks to funding from the *Institutional Biodiversity Enhancement and Maintenance Program*. Trail closures, etc.

2017 :

Plantations in 2017 were aimed at replacing ash trees felled due to EAB and consolidating the Green Flow. A total of 241 trees were planted.

Description of planting procedures

In order to ensure a greater survival rate of our planted trees, we have created a planting guide inspired by the technique proposed by the forestry engineer Denis Marcil and enhanced by the internship of Marcela Vela in the summer of 2016.

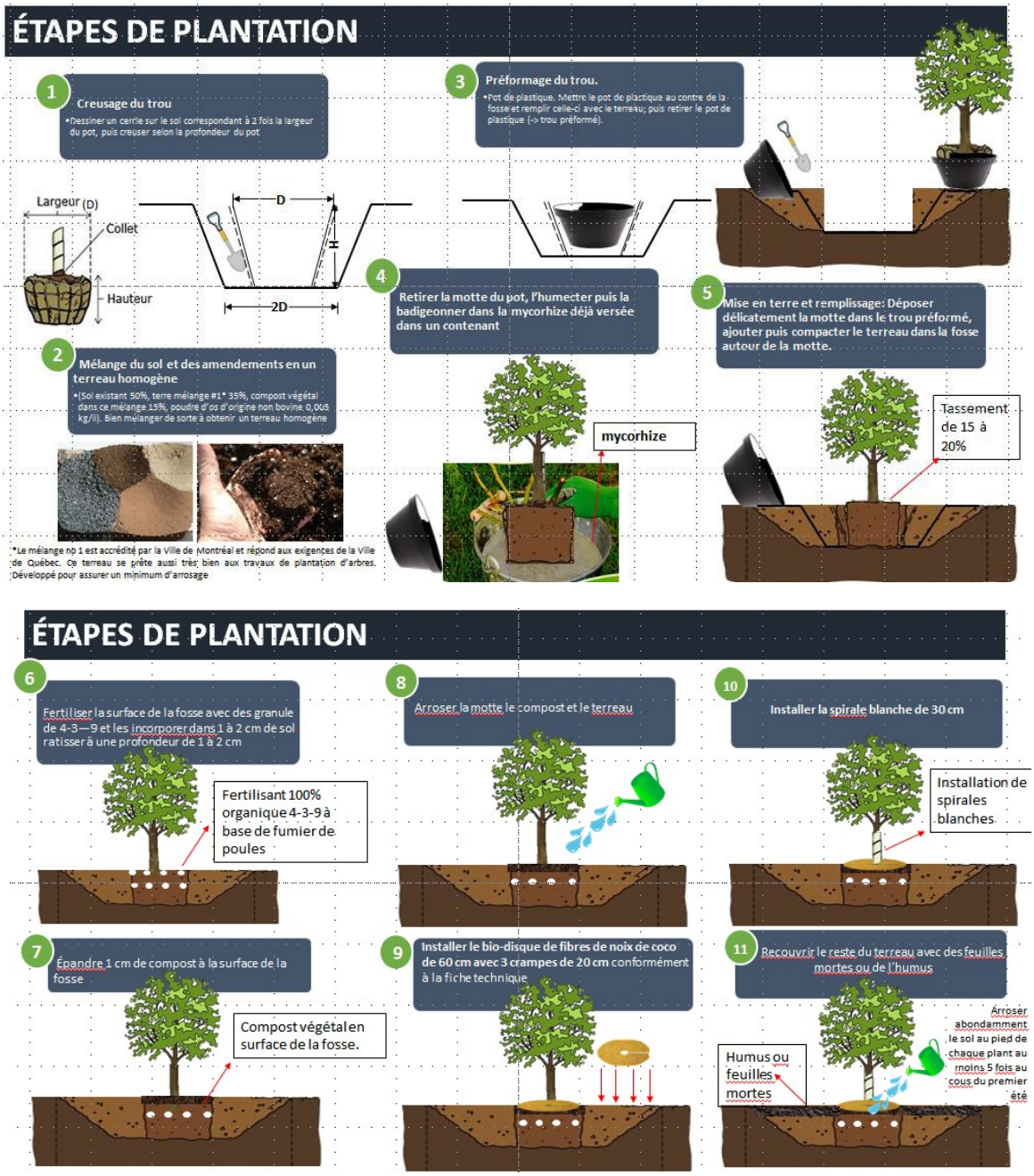

Figure 16: Planting protocol

Urban Forest Alliance

The Urban Forest Alliance is a consultation group set up by SOVERDI (Société de verdissement du Montréal métropolitain) in support of the Canopy Action Plan which aims to plant 180,000 trees within 10 years (Urban Forest Alliance, n.d.).

The Université de Montréal is one of the partners of the Alliance, which is working together to increase Montreal's forest cover.

Emerald Ash Borer

Despite the testing of various treatments to save the ash trees, the EAB invasion led to the felling of a large number of ash trees on the campus of the Université de Montréal, creating gaps in the woodlands and a sudden absence of trees in some areas. This loss of trees has led to more targeted planting than before. Following the felling of 240 ash trees in 2017, about 100 are expected to suffer the same fate in 2018. These will also be replaced.

Sugar bush

Sugar maples from the Édouard-Montpetit woodland have been tapped a few times. This made it possible to hold a "sugar shack" day where a few taps were made and maple taffy was offered at a low cost. The experiment could be repeated in the coming years.

Interventions in the woodland

As it was possible to see in the previous assessment, the woodlot on Édouard-Montpetit had not undergone any intervention since the 2008 plantations, which had not themselves been monitored. Thanks to the Mount Royal Institutional Land Enhancement Program, a fund was paid to the UdeM to take care of its spaces.

Invasive alien species

In the City of Montreal's woodlands, the increase in invasive plant populations has been felt for several decades now. The increase in the number of people and the opening of trails often provide the necessary opportunity for these exotic (but very resistant) species to spread more and more and threaten the

survival of native plants. It is therefore important to control invasive species to preserve native biodiversity. During the species inventory conducted at the beginning of the mandate, we also evaluated the presence of invasive species in the woodlands in order to properly plan and prioritize the interventions that can be carried out in the fall of 2016. We walked through the woodlot and estimated the number of individuals of each class observable per area. Although a follow-up was done annually, our inventory shows a strong presence of invasive species including buckthorn (Rhamnus cathartica), Norway maple (Acer platanoides), Manitoba maple (Acernegundo), robinia pseudoacacia (Robinia pseudoacacia) and one herbaceous species, wood buckthorn (Anthriscus sylvestris). We discovered the presence of a few individuals of buckthorn (Frangula alnus) and common reed (Phragmites australis). The management plan was determined according to the priority species to be controlled, the time of execution, the tools and means available. Priority was given to the eradication of buckthorn in the woodlands. Considering that buckthorn is found in all areas and in high densities in some places, control interventions for the other species were decided once the buckthorn cut had been completed. Norway and Giguère maples often accompany buckthorn areas in university woodlands. These three invasive species occupy potential successional strata. Eradication of all these species at the same time would not be effective since regeneration would promote the growth of invasive species. In order to strengthen the recovery of the forest by native species, the eradication of invasive species had to be accompanied by the reintroduction of native species. The program includes the planting of 375 native trees and shrubs in the fall of 2016. Since the number of invasive trees, all species combined, is estimated at 230 and the number of Gauls at nearly 1000, it is clear that the eradication of all invaders cannot be substituted by an equivalent number of native plants. The eradication of all invaders without replacement to occupy the space created would cause large canopy openings and ground gaps throughout the woodlands, favouring the growth of undesirable species. Section III of this document summarizes the interventions carried out for the control of invasive species on the institutional lands of Mount Royal and presents the actions recommended in the coming year to ensure the success of the control.

Recommendations for the management of invasive species

- Repeat annual monitoring of buckthorn growth and add native trees or shrubs in high-density areas (re-cutting saplings or uprooting seedlings if necessary).
- Remove the geotextiles laid in the fall of 2016.
- To monitor Norway maple seedlings and saplings in the areas and to follow up the methods recommended by the project manager for eradication.
- Plan to plant enough native trees to replace the 50 mature Norway maples in the woodlot and the 100 or so Giguère maples before beginning eradication.
- Girdle individual Norway maple trees in the woodlot (Table 9 except Zone 10) while maintaining an average of 10-15 snags per hectare.
- For zone 10, complete the eradication of buckthorn before starting the ringing process. Norway maples.
- Include management of the Norway maple stand in the MH1 wetland management plan. Consult with Ms. Kim Marineau of Biodiversity Council (see Appendix 1) on the impacts of the presence, girdling or cutting of this species.
  species for the future and development of the wetland.
- We recommend monitoring the success of this year's eradication operations and ensuring that the succession of native species is
  strong before proceeding with the eradication of the maple tree in Giguère (start these procedures in 2018).
- Monitor the regrowth of Common Reed in Zone B and plan for the eradication procedures.
- Monitor the spread of wild parsley and develop an action plan if it is found to be a problem. proliferation becomes problematic to the survival of native species.

Trails

Three recommendations emerged from the project submitted by Denis Marcil for the Enhancement Program. They are as follows:

- *Closure of 1170 m of useless trails*
- *Consolidation of 420 m of trails to be preserved*
- *Installation of signage in the woods*

This closure of 1170 m of disordered trails open all over the woodland is intended to reduce the erosion process that results from it. This closure will be reinforced by the revegetation of the areas concerned. Thus, 505 native trees and shrubs including fruit trees have already been planted in 2014 and 2016 (see Appendix 1). These plantings have allowed the closure of 963 meters of trails in 2016, but they have also favored

the improvement of the floristic diversity at the level of the undergrowth which is one of the major problems at the site level.

Also in this logic of reducing the effects of erosion on the site, 420 m of useful trails will be consolidated. With a 1.4 m right-of-way and a walking area limited to 0.9 m, this area will be stabilized with 15 cm thick gravel and the installation of a cedar cage in the lowest part of this alignment and the construction of a 30 cm culvert.

All of these interventions are currently underway and we hope to complete them by the fall of 2017.

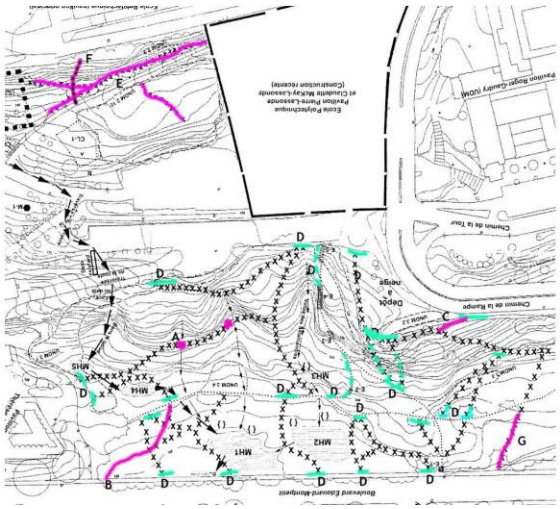

Figure 17: Map showing the interventions carried out to consolidate and close the pathways

Species with special status

These are vulnerable species whose survival is deemed precarious even if extinction is not foreseen in the short or medium term and threatened species whose extinction is foreseen (MDDELCC, 2017). Through the 2011 emphyteutic lease, we lost from our territory the head sedge that was in the small oak grove behind the buildings management. On the remaining site, it is particularly:

- Cork elm (*Ulmus thomassi*) whose Dutch disease often leads to the mortality of old trees. As a result, it has been designated a threatened species in Quebec since 2005;

- Butternut (*Juglans cinerea*), also likely to be designated vulnerable or threatened in Quebec. The latter is mainly decimated by white walnut canker disease.

Other floristic plants remain vulnerable to harvesting on site. These are species whose harvesting puts pressure on their survival because of their commercial value in the food and horticultural markets (MDDELCC, 2017). These two herbaceous species are the bloodroot (*Sanguinaria canadensis*) and the white *trillium* (*Trillium grandiflorum*). Delinquent harvesting, undirected traffic and trampling of these species contribute to their progressive extinction.

Sem'ail Project

Wild garlic is a perennial herbaceous plant that has been vulnerable in Quebec since 1995 (Dion, 2015). Urban and agricultural development as well as the collection of bulbs in large quantities have been responsible for the significant decrease in the species' numbers in Quebec (MDDELCC, 2001). Despite the law prohibiting the modification of its habitat and the restriction of its harvest to 50 bulbs per person, this species is still in decline in the area. Thus, its reintroduction would contribute to improving the biodiversity of the site, while helping a species with a vulnerable status. The Sém'Ail project is a program aimed at restoring wild leek to its natural habitat. The slow progress of the Sém'ail project and questions about its effects on global biodiversity and its relevance in a context such as that of the UdeM (small areas, heavy traffic, risk of illegal harvesting) have led to the suspension of the project in order to concentrate efforts on consolidating and carrying out more effective and adapted enhancement projects. However, participation in the program should be reassessed in the coming years.

Indicators

- Number of trees planted and survival rate.
- Number and abundance of invasive alien species
- Total length and width of trails
- Health status of special-status species
- Number and quality (precision, georeferencing, seasons...) of the inventories carried out

Mushrooms

Mycorrhizae has been and will continue to be incorporated in tree planting to promote healthy trees through interspecific interactions that allow for better nutrient uptake by plants. In addition, the production of fungi (especially oyster mushrooms) has been integrated into P.A.U.S.E. activities. (Sustainable and Ecological Urban Agricultural Production) in 2017, thus allowing a more diversified production and food service supply. Different cultivation parameters were tested in order to identify optimal parameters.

Urban Mycology

In 2017, elm oyster mushrooms were planted in the shade garden near the P.A.U.S.E. headquarters. (behind the residences). Various cultivation parameters were tested in order to identify the optimal parameters for the production of this mushroom intended for the UdeM Food Services, among others.

Figure 18: The technical assistant in urban agriculture at PAUSE explains the development of mushrooms to a group of volunteer gardeners.

Indicators

- Number of mushroom species listed/used
- Total production of edible mushrooms

Education

Biodiversity Day Camp - Les amis de la nature

A new day camp on the theme of biodiversity has been set up, offering a rich experience in discovering biodiversity on the campus of the Université de Montréal. This day camp will be improved in the coming years.

Figure 19: Youth at the Friends of Nature Biodiversity Day Camp during a workshop on pollination.

Employee Engagement

A training program on invasive alien species and tree planting for employees could be set up to make every employee a factor in the success of biodiversity interventions. Indeed, the inability of some employees to recognize a planted tree sometimes jeopardizes the survival of the trees and the inability of many employees to distinguish an invasive alien plant from a native plant makes us miss a strong potential for monitoring invasive alien species. In addition, the Université de Montréal will attempt to participate in the Riverkeeper participatory science program developed by the MMDELCC (student internship presented earlier). This program provides a mobile application for reporting geo-referenced observations of invasive alien species. This program could prove to be an effective detection tool to better target interventions.

Primary School Partnership

Notre-Dame-des-Neiges

A partnership has been developed between the Université de Montréal and Notre-Dame-des-Neiges Elementary School in Montreal.

Biodiversity Summer School

The 1st Université de Montréal Biodiversity Summer School was held on May 12, 2017. The day's schedule included a bird walk, a panel discussion and conferences on the theme of biodiversity.

Interface Project (EDDEC)

The Interface project is a project of the Institut Environnement, Développement Durable et Économie Circulaire (EDDEC). It aims to encourage students from different disciplines to carry out credited academic work on an ESDDEC theme, thus enriching academic learning through interdisciplinary input. The Darlington Ecological Corridor was the first interface subject that mobilized students in Communication, Landscape Architecture and Environment and Sustainable Development (http://instituteddec.org/formation/#1481659946354-000268db-369a).

Bioblitz

A Bioblitz is an ecological inventory carried out on a well-delimited and intensive territory. The Université de Montréal has organized Bioblitzes in 2011, 2013 and 2017.

Rivière-aux-Brochets (2011)

Targeting the agricultural territory of the Rivière-aux-Brochets watershed, this Bioblitz led to an inventory of the flora, snakes, anurans, urodels, turtles, herpetofauna, macro-invertebrates, insects, birds and small mammals.

Mount Royal - UdeM Campus and St-Jean-Baptiste Woods (2013)

Aimed at the territory of the Parc du Troisième sommet du mont Royal and the Université de Montréal grounds, this Bioblitz was an initiative of the Forum jeunesse de l'île de Montréal.

Montréal in collaboration with numerous partners (Conférence régionale des élus de Montréal, L'île du savoir, Les Amis de la montagne, the City of Montréal, the Ministère des Ressources naturelles, GUEPE, Espace pour la vie, Héritage Laurentien and the Université de Montréal). The inventory of birds, insects and flora was carried out there.

Cap-Saint-Jacques (2017)

Targeting the territory of the Parc-nature du Cap-Saint-Jacques in the West Island of Montreal, this Bioblitz was carried out in 2 stages, i.e. there was an early inventory and a late inventory. The inventory of birds, mammals and trees was carried out. It allowed to highlight the effects of the degree of urbanization on biodiversity in a context where development projects on this territory are under study.

Remarkable Trees Trail

The Remarkable Trees program provides access to descriptive sheets of trees identified on campus. A pamphlet guiding the walker on campus to move from one remarkable tree to another is available free of charge online (Consult: http://durable.umontreal.ca/fileadmin/durable/images/BIODIVERSITE/Milieu_de_vie/Arboretum/Arboretum_parchemin_final_Go2.pdfis in a way the realization of the wish expressed by botanist André Bouchard who dreamed of "the day when new students will be given a map of the campus forests along with their identity card".

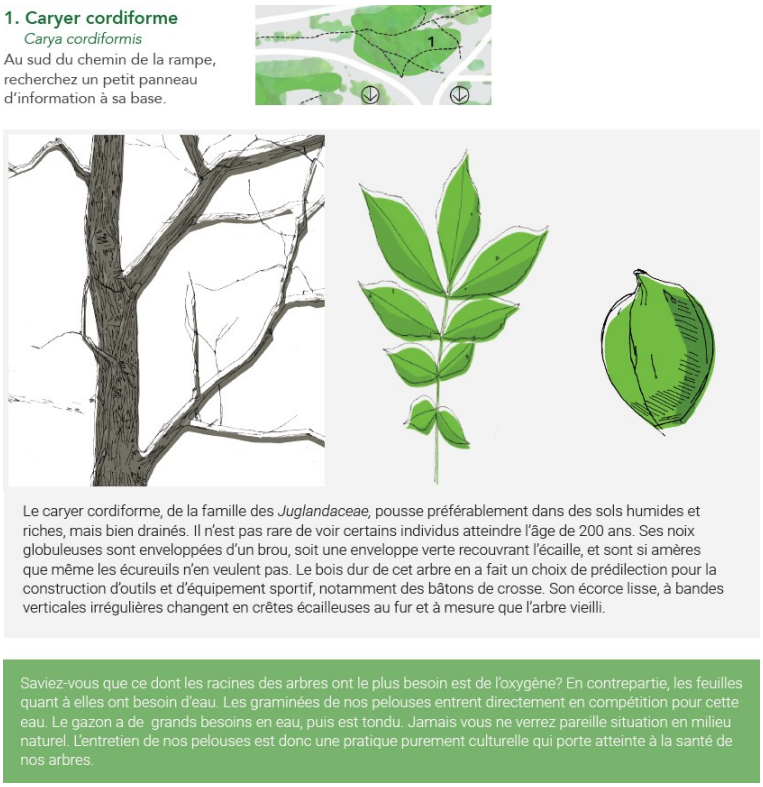

Figure 20: Example of a form that can be found in the UdeM arboretum.

Environment Forum

The Environment Forum is an annual event that aims to promote environmental research and initiatives by graduate students of the Faculty of Arts and Sciences in an interdisciplinary framework and to foster the popularization and transmission of knowledge. The event contributes to the mobilization of the student community around environmental issues such as biodiversity.

School of the sea

L'école de la mer is a 10-day course on marine invertebrates taking place on the North Shore. It provides a very enriching field experience in Quebec for the students who participate.

Indicators

- Number and educational benefits of partnerships
- Reach of awareness activities (number of people reached)
- Level of interdisciplinarity (number of disciplines involved in the projects)

Facilities

Darlington Ecological Corridor

A regional finalist for the David Suzuki Action Award and presented as part of Je vois Montréal, the Darlington Project aims to establish an ecological corridor linking Mount Royal, the future Outremont campus and the Bertrand Creek ecoterritory to promote biodiversity by improving ecological connectivity. It is named after the street the corridor will take, Darlington Street, which corresponds to the former Raimbault River. Thanks to the borough's collaboration, the corridor has benefited from the installation of signage along Darlington Street and the installation of large pots where local communities are encouraged to garden (http://durable.umontreal.ca/biodiversite/milieux-de-vie/projet-darlington/).

Indicators

- Citizen involvement (number of participants in greening initiatives)
- Number of bins installed

Human

Mount Royal chores

Since 2011, Mount Royal's chores are organized in collaboration with Les amis de la Montagne. The Université de Montréal is mobilizing the student community to clean up the woodlands located on its institutional grounds. About twenty bags of garbage are collected for each chore. A major change in the composition of garbage was observed following the ban on the sale of disposable water bottles on the Université de Montréal campus, with water bottles going from being an omnipresent waste to almost absent.

Aboriginal

As a symbolic gesture, a white pine (*Pinus strobus*) was planted near the residences. The white pine, known as the Tree of Peace, is a symbol of unity for the nations of the Iroquois Confederacy and has an important place in Iroquois traditions (Schroeder, 1992).

Biopolis

Biopolis is a pole of excellence in urban biodiversity in Montreal, bringing together actors of change from the citizen, scientific and institutional spheres. Its role is to promote the sharing of knowledge between these different spheres. The Université de Montréal is well represented through various professors and students, as well as the biodiversity advisor. Notably, the ephemeral projects of the MIL Campus, the Darlington Ecological Corridor and P.A.U.S.E. are among the projects presented at Biopolis.

Urban Agriculture (AU) at UdeM

In 2011, UdeM started its first agricultural project through the PAUSE initiative (Ecological Sustainable Urban Agricultural Production). In 2014, Geo-vert also launched its campus garden initiative. In 2015, it was the turn of the Faculty of Urban Planning to launch its own project, SAUFA (Société d'Agriculture Urbaine Faculté d'Aménagement).

Despite ambitions to increase the production area to provide campus food aid networks, P.A.U.S.E. has instead seen a loss of vegetable acreage in the 2016 season. However, other developments have been made to promote biodiversity and provide nectar for the bees in the apiary managed by Miel Montréal.

An inventory of the medicinal plants present on the campus was carried out by herbalists on an oral basis.

Loss of gardens

The year 2016 was marked by the closure of three gardens. During work at the Mobile ramp, the garden that was there was buried under the excavation soil. The

Gardeners were warned that the site would be inaccessible, but not that it would be destroyed, so green manures were planted in the spring and perennials left in place. Likewise, the garden maintained by IRIC employees between the André-Aisenstadt and Paul

G. Desmarais, had to be moved during the renovations to the siding of these buildings; the plants were repatriated to the garden of the Escalier du Géant, in a dozen bins located in the Louis-Colin parking lot. The remaining fifty or so bins were emptied and moved to close the parking lot garden at the request of the Direction des Immeubles; some were donated to temporary projects on the site of the future Outremont campus, others were thrown away because of their deterioration and the rest were stored in the Cabanon garden.

Creation of new gardens

The garden on the façade of the Marie-Victorin Pavilion, also destroyed the previous fall during the renovation of the paver, was replaced in 2016 by four rectangular concrete bins. At the request of the employees of the DGTIC, a plot of rosebushes could be enlarged and other perennials interspersed between the shrubs already present. This ornamental garden was started late and poorly maintained in 2016, but the soil was amended at its creation and should allow for a more elaborate layout next year.

<u>At the end of the 2016 season, the following gardens remain:</u>

-The Giant Staircase, place de la Laurentienne

-the garden of the Cabanon, thermal power plant

-the "Garden of Nations", residences

-the Nutrition garden, Marguerite-d'Youville

-ICTB employee ornamental plot, Claire-McNicoll

-the containers in front of the Marie-Victorin pavilion

-the CPE-2 garden, behind Marie-Victorin

-Geovert Gardens, at the Strathcona Pavilion

-the SAUFA bins, Faculty of Planning and Design

A job in AU

In 2013, PAUSE obtained funding to hire a first technical assistant in urban agriculture, Olivier Demers-Dubé. His involvement in the CIBL radio station has been beneficial to the initiative, which is regularly featured in the media. Thanks to Olivier's work the small community of 5 gardeners in 2012 reaches 135 volunteers and allows the arrival of 8 new gardening sites on the campus, including a satellite project at the Pavillon du Parc with the employees of the Human Resources Department. This is the same year that hops make their appearance on the campus. This success was then used to promote an initiative called *Je Vois Montréal* Houblonnière (*I See Montreal* Hops), with the UdeM being featured as the carrier of this project in the media.

In 2014, the project is being consolidated. No employees are hired at this time. However, there are still as many garden areas. This situation has made it possible to highlight the involvement of certain volunteers, such as David Ligne (DGTIC employee) and François-Xavier Dessureault (biology student).

In 2015 and 2016, this same student obtains a job as a technical assistant.
in AU.

In 2017, Kevin Lajoie will take over the position, but part of the duties are assumed by Anne-Marie Smith, an intern working on PAUSE empowerment.

CALENDRIER DES TÂCHES ET ATELIERS

MOIS	TÂCHES	ATELIERS
Septembre	*Récolte de fruits, légumes, fines herbes* *Récolte de semences* *Fabrication de serres froides* *Semis d'engrais verts*	· Visites du campus · Transformation alimentaire : mise en conserve à chaud · Cultiver hors saison
Octobre	*Récolte de fruits, légumes, fines herbes* *Récolte de semences* *Fête des Récoltes* *Récolte du houblon* *Semis d'engrais verts (non-gélifs)* *Propagation: bouturage, marcottage, semis*	· Visites du campus · Repas-potluck · Transformation alimentaire : lactofermentations et brassage · Propagation automnale : bouturage, marcottage et semis
Novembre	*Dernières récoltes extérieures* *Tri et inventaire des semences* *Plantation d'ail, bulbes etc.* *Fermeture des jardins; nettoyage, paillage* *Propagation: bouturage/ marcottage de ligneux, semis* *Entrevues avec les jardiniers* *Ménage et inventaire du cabanon*	· Visites du campus · Transformation alimentaire: lactofermentations · Cultiver hors saison
Décembre	*Dernières récoltes des serres froides* *Stratification des semences à dormance* *Faire approuver les sites de l'an prochain avec la DI*	
Janvier	*Début de la planification et mobilisation* *Stratification de semences rustiques* *Faire approuver les sites à la DI*	· L'agriculture urbaine dans le monde
Février	*Planification des jardins* *Commandes de semences et de matériel* *Premiers semis sous lampe* *Mobilisation*	· Planifier un jardin écologique

Mars	*Semis sous lampe et entretien* *Mobilisation* *Mise en place du châssis froid*	· Planifier un jardin écologique · Démarrer ses semis sous lampe
Avril	*Analyses de sol* *Premiers semis extérieurs* *Entretien des semis sous lampe* *Attribution des sites aux jardiniers* *Nettoyage et aménagement des jardins* *Semis d'engrais verts hâtifs*	· Démarrer ses semis sur rebord de fenêtre · Troque ta pelouse
Mai	*Semis extérieurs* *Premières transplantations* *Entretien des semis sous lampe* *Premières récoltes*	· Bouturage de printemps Santé des sols, compostage et fertilisation · Visites du campus · Horticulture 101
Juin	*Semis extérieurs et transplantations* *Entretien* *Récoltes*	· Contrôle biologique des ravageurs (purins et potions) · Randonnées-biodiversité sur le campus · Visites des jardins
Juillet	*Ateliers d'été* *Récoltes* *Entretien*	· Randonnées-biodiversité sur le campus · Visites des jardins
Août	*Ateliers d'été* *Récoltes* *Entretien*	· Visites des jardins

Table 3: Typical P.A.U.S.E. Task Schedule and Workshops

Training 2016

-Sowing start
-urban herbalism
-conservation of seeds
-cutting
-grafting course at the Bord-du-Lac orchard-nursery
-Urban agriculture
-Mushroom cultivation
-preparation of "lasagna-beds".
-Manufacturing of seed bombs
-introduction to beekeeping

Urban Agriculture and Research

Thanks to the agricultural activities on the campus, it was possible to achieve some linkages with research:

1. Analysis of sugars present in honey with the laboratory of Alexandre Furtos

2. Soil analysis with the Wilkinson laboratory, this analysis will lead us to close the soil garden next to the Marie-Victorin pavilion and explain the mortality of many plants near our nurse forest.
3. Oral inventory of the medicinal plants present on campus by herbalists.

The ephemeral projects of the MIL campus

In 2015, new agricultural activities will begin, but this time on the site of the future UdeM science campus, the MIL campus. These initiatives bring together a few local organizations (Coop Miel Montréal, Coop Bioma, éco-quartier VRAC environnement, Héritage Laurentien and Soverdi). *The birth of a campus* will bring to

Figure 21: View of the Outremont site and its ephemeral projects

UdeM was awarded first prize to the institutional sector at the City of Montreal's Gala Environnement et Développement Durable, organized by the CRE (Conseil Régional de l'Environnement).

In 2016, the family expanded to include 11 projects covering an area of 5000 sq. ft.

List of partners 2016 :

1. Coop Bioma
2. Coop Place Commune
3. Coop Miel Montréal
4. Laurentian Heritage
5. Montreal Hops
6. BULK
7. fruit trees (UdeM)
8. SOVERDI
9. Les amis de la montagne
10. Urban Catalyst
11. Institute of Biomimicry

These greening interventions on the site will guarantee UdeM a LEED point for the construction of its new campus. To obtain a second point, we would have to reach a food production area of 15,000 sq. ft.

Back to the objectives

Embellish the site

- Well-kept gardens
- Mulch Trails
- Removal of the orange fence on the north side
- Virage/CIU brings an attractive visual aspect, making people want to come and visit the site.

Maintaining access to the community

- Much easier pedestrian access and less water accumulation
- Very accessible site for the partners, except for exceptions related to construction sites.
- Challenge to improve signage around and within the site to promote access

Integrate local citizens into the site

- Dozens of local residents were made aware of the development and future vocation of the site when they landed at the site by chance.
- The harvest festival attracted a good number of local residents to come and discover the site.
- Information session organized by UdeM held in September or October

Developing new partnerships

- Integration of 6 new partners: Montréal Houblonnière, Projet Arbres fruitiers, Jardins communautaires d'Outremont, Institut de biomimétisme, Catalyst of urban imaginations, Place commune
- Regular partner meetings to ensure communication

Create links with organizations and companies in the sector

- Numerous visits: elementary and Jewish schools, day camps at the YMCA du Parc, francization groups at Parc-Extension, UQAM's Summer School of Urban Agriculture, Urban Agriculture Organizations, etc.

Promote good media coverage

- Relatively limited media coverage of community projects
- Very good media coverage of Le Virage

Creating links with the university context (research)

- The Laurentian Legacy Project may eventually be useful for research purposes.
- Biomimicry is a way of presenting how projects such as the ephemeral project can stimulate research and discoveries.

Consolidate existing projects

- Eventful relocation of garden and honey Montreal projects, but all the same, all the projects have grown in size.

Integrate the Outremont Community Gardens into the site

- Integration of the partner and creation of a storage space for the tools of shared gardening (container-shed)

Include historical elements

- The turn has enhanced the historical elements of the site by the nature of its facilities, built in rail containers, in addition to partially realizing the concept of the Rotunda, recalling the former vocation of the site, i.e. the Montreal marshalling yard.

Valuing a train container

- The Institute of Biomimicry realized the concept of the exhibition on the biomimicry and finalized the "Biomimetic association game" part. Ready to be installed in the container next year.

Enlarge the productive area

- Achieved for both Coop Bioma and BULK collective gardens.

Make the site more accessible to the public

- Widely used bike racks and better pedestrian access

Enhance the value of the built heritage located in the surrounding area.

- (not in 2016)

Demonstrate the link with the past through the *technological innovation* aspect, such as *the rotunda.* of the time

- The integration of the Institute of Biomimicry as a partner this year has helped raise awareness of new ways of doing things to develop technological and green innovations that will change tomorrow's world.
- All urban agriculture projects (Bioma, Vrac Environnement, Place Commune, Miel Montréal) are innovative in their nature of initiating change in relation to current practices in society.
- Héritage-Laurentian for the innovative character of its activities, finding a more sustainable alternative to textiles and insulation
- Montréal-Houblonnière for their special processes and innovative products
- Turn/CIA for the practical and economical adoption of rail containers as modules for the creation of architectural spaces

Valuing science and multidisciplinarity

- The Institute of Biomimicry has brought through its various activities this summer (chronicles *The Geniuses of Life,* workshops-discovery and introduction to biomimicry, interactive exhibition ...), tracks of resolutions to large
  human challenges thanks to the multidisciplinary approach based on biology and other natural sciences that is biomimicry,
- The scientific and multidisciplinary aspect is also well valued by the research carried out by different partners in the development of new knowledge on the species they grow on the site and strategies
  to improve the performance of their projects: Miel Montréal, Héritage-Laurentian, Montréal-Houblonnière, Bioma, etc.

Indicators

- Number of participants in cleaning/planting chores
- Number of gardens and volunteers involved
- Number of ephemeral projects (MIL campus)
- Level of Aboriginal representation (number of occurrences at Aboriginal symbols/knowledge)

Internships and tutorials

Numerous internships and tutorials have been carried out since 2012 (see APPENDIX I). These have not only been rich learning experiences, but have also enabled the advancement of concrete biodiversity projects.

Indicators

- Number of internships/directed work in biodiversity
- Diversity of disciplinary backgrounds (number of disciplines)

GENERAL CONCLUSION

As a result of all the efforts and initiatives undertaken since 2012, almost half (32) of the outstanding recommendations (65) have now been completed and 9 others are in progress. This is encouraging, but also underscores the fact that much work remains to be done on biodiversity. The Université de Montréal is at the dawn of a great transformation with the imminent opening of the MIL campus, a transformation that comes with its share of challenges and opportunities. Initiatives to protect, enhance and promote biodiversity will therefore have to be adapted to this new reality and demonstrate creativity in order to reaffirm the leadership of the Université de Montréal in a context of rather widespread disengagement from political structures and actors.

Recommendations

- Give greater importance to monetizing the ecosystem services of our needs and have them recognized for their contribution to the environment.
- Forge better links between the presence of trees in cities and human health. (health, climate and environment).
- Integrate the concept of zero deficit (no loss of species).
- Develop the recognition and networking of traditional and citizen knowledge.
- Set up more research projects related to biodiversity and the various departments of the University.
- Institutionalize the Bioblitz.
- Aim for interdisciplinarity for a holistic understanding of biodiversity issues.

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APPENDICES

APPENDIX I: Internships and Tutorials

2012

1. Viviane Loranger (Techniques en bioécologie; Cégep de Saint-Laurent) :
   This intern was tasked with carrying out a broad inventory of the biodiversity present on the campus as well as characterizing the environment.
2. Pascal Priori: Opportunity study on urban beekeeping, financed by the CRÉ

2013

3. Vanessa Maisonneuve (Techniques en bioécologie; Cégep de Saint-Laurent):
   This intern participated in the implementation of various measures to support biodiversity on campus. She also collaborated in the completion of certain studies on this ecosystem.
4. Olivier Demers Dubé: Urban Agriculture
5. Caroline Yelle: Law student
6. Sandrine Mayrérie :

2014

7. Karine Lapensée (Individualized master's degree in environment and sustainable development; UdeM) :
   Intern from February to May 2014, this student was involved in many projects. Among others, she was involved in the urban agriculture project P.A.U.S.E., from recruiting at the beginning of the season to monitoring the gardens; conducted research on animal production in the city, e.g. aquaponics; worked on signage in the woods; and collaborated with Les amis de la montagne for educational activities and the *Corvée du mont royal*.
8. Magdalena Wiltos (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :
   As part of her internship, she worked to further anchor the P.A.U.S.E. urban agriculture project in the community. To do so, she looked at the group's past achievements; similar initiatives internationally; and the fit between the group's objectives and the needs of the Udemmian community.
9. Kevin Caron (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :

As part of his internship, this student produced an assessment of the social, economic and land impacts of the *Darlington Food and Ecological Corridor Project*.

10. Jonathan Lachance (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :
    The work of this intern consisted of assessing potentially contaminated areas on the proposed ecological corridor site, i.e. Darlington Avenue. He also made recommendations to ensure the bioremediation of sites identified as being at risk.
11. Marie Le Mélédo (Master 2 in Environment, Development, Territories, Societies; AgroParisTech-Le Muséum national d'Histoire naturelle) :
    Produced, in the winter of 2014, a reflection on the *Darlington Ecological and Food Corridor Project and* promoted it to stakeholders and interested parties.
12. Marie-Anne Rioux (Techniques in bioecology; Cégep de Saint-Laurent) :
    This intern was involved in the implementation of various measures to support biodiversity on campus. She also collaborated in the completion of certain studies on this ecosystem.

2015

13. Tania Charrette (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :
    This intern conducted a feasibility study to create a new college program, an ACS (Attestation of Collegial Studies) in Urban Agriculture and Greening of Cities at Collège André-Grasset.
14. Théo Galichet (Master in Social Sciences Applied to Food; University of Toulouse II - Jean Jaures):
    This student focused his activities around the *Darlington Ecological and Food Corridor Project*. From the perspective of the sociology of food, he analyzed the integration of different actors in the project, thus highlighting, through this case study, the process of response to "environmental and food controversies". The objective was, after exposing the dynamics between the actors associated with the implementation of such a project, to provide them with the tools to facilitate the improvement of the *Darlington Ecological and Food Corridor Project*.
15. Sophie LO (Master 1 in Environment and Sustainable Development; University of the Sorbonne Panthéon - Paris 1) :
    This intern was responsible for the completion of Phase 3 of Phase 2015 of the *Darlington Food and Ecological Corridor Project*. The latter consisted of creating a consultation table for the various institutions in the vicinity of the project, namely HEC, UdeM, Dominican Pastoral Institute, CHU Ste-Justine,

Collège Jean-de-Brébeuf, École Félix-Leclerc, and the Gingras-Lindsay-de-Montréal Rehabilitation Institute.

16. Anne Rousseau (Techniques en bioécologie; Cégep de Saint-Laurent) :
    This intern has been involved in the implementation of various measures to support biodiversity on campus as well as on the *Darlington Ecological Corridor and Food Corridor Project*. She also collaborated in the completion of certain studies on these ecosystems.
17. Anne-Lise Pierre (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :
    This student worked, during her internship, on developing a sustainability performance grid for the *Darlington Ecological Corridor and Food Corridor Project*. This tool was designed to ensure better monitoring of the project's progress in addition to assessing its social, economic and environmental impacts.
18. François-Xavier Dessureault: Urban Agriculture

2016

19. Clement Badra : *Darlington Ecological and Food Corridor*

20. Marie-Pierre Coulombe (Techniques en bioécologie; Cégep de Saint-Laurent):
    This intern participated in the implementation of various measures to support biodiversity on campus. She has also collaborated in the completion of certain studies on this ecosystem.
21. Marcela Vela (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :
    As part of her internship, she developed a protocol for assessing carbon sequestration by woody species on the campus of the Université de Montréal. The objective was to provide the tools to evaluate the real carbon cost of the institution.
22. Maude Chicoine :

2017

23. Dairou Diallo (Individualized master's degree in environment and sustainable development; UdeM) :
    As part of his internship, this student worked to articulate the steps taken in the realization of the *Darlington Ecological Corridor and Food Corridor Project* with the biodiversity restoration and enhancement program.
24. Anne-Marie Smith (Individualized Master's Degree in Environment and Sustainable Development; UdeM) :
    This student worked, as part of her internship, on the structural analysis of the urban agriculture project P.A.U.S.E. (Production Agricole, Urbaine,

Sustainable and Ecological). The objective was to produce recommendations that, when implemented, would increase the project's autonomy and sustainability.

ANNEX II: Non-exhaustive list of partners

PARTNERS

- Les amis de la montagne
- AQPERE
- TD Friends of the Environment Foundation (TD FEF)
- Tree Canada
- City of Montreal
- Arkéos
- MCCCF
- MDDELCC
- SOVERDI
- P.A.U.S.E., Géovert and S.A.U.F.A.
- Cégep St-Laurent
- Cégep Gérald-Godin
- Violin & Mushrooms
- Honey Montreal
- City in Green
- Jean-de-Brébeuf College
- EDDEC Institute
- Vinci Consultants
- Biodiversity Council
- Amec Foster Wheeler
- Notre-Dame-des-Neiges Elementary School
- UdeM's Okapi Circle
- Biopolis