Climate Change Impacts

Physical and Mental Health

Floods and Heavy Rainfall

Extreme Weather Events

Ecological Footprint

Droughts

Water

Heat Waves

Preservation of Biodiversity

Identifying Vulnerable Populations

Homeless & low-income groups

In a 2019 head count of the homeless population of Montreal, 3,149 individuals were counted, an increase of more than 100 in 2015. The lack of shelter, food and water security that arises amongst the homeless creates a barrier for them to stay safe and healthy in both cool and warm weather conditions, increasing their susceptibility to climate change and the environment.

Montreal experiences extremely high temperatures and draughts during warmer seasons and heavy rainfalls, snowfalls and flooding in cooler seasons. Their response to heat has been to inform and educate the public, especially the groups most vulnerable, on ways to mitigate possible impacts. Major heat waves effect human health in terms of heat-related illnesses, and during cooler temperatures, they may experience hypothermia and cold-related illnesses affecting their physical and mental well-being.

Another area of impact prompting increased susceptibility to vulnerable groups in Montreal is water. The homeless and low-income populations deal with a lack of accessibility to water forcing them to find other resources harmful to their health. These resources, taken from unmonitored streams, brooks and ponds are the main causes of waterborne infections and contamination.

Lastly, mental & physical health impacts affect the social world due to climate change-related income insecurity, food and water insecurity, and conflict and displacement, resulting in psychological and social wellness issues. All aspects of food security are potentially affected by climate change, including food production, access, use and price stability.

First Nation Peoples and Inuits

In 2006, Statistics Canada counted 17,870 indigenous people in Montreal. Based on their cultural practices, many concerns have risen for the indigenous populations and their growing lack of accessibility to resources. It is said that the inclusion of the indigenous in adaptation climate change policies will benefit them as well as the Montreal region in the future to come. Allowing for them to express their own concerns for food, water and shelter security will aid in the decision-making process for future impact assessments.

The indigenous population, living in more rural areas along water bodies, tend to rely on natural resources for food and shelter. Rapid weather change forces them to constantly adapt to new ways of hunting and gathering which may not always be consistent, especially during cooler seasons.

Accessibility to natural water sources has created a barrier for the indigenous. They have had to transition from a semi-nomadic to a permanent settlement lifestyle due to water usage patterns, public health perceptions, and wastewater management issues.

Lastly, the indigenous population were known to preserve their mental and physical health through land-based activities such as gardening and attending to their greenhouses. With the lack of accessibility to water amongst other resources, they will no longer be able to partake in activities that preserved this well-being.

Elderly, Pregnant Women and Children

In 2016, Sante Montreal counted 323,660 Montrealers aged 65 or over and has said over 100,000 more will be counted in 2036. In terms of extreme weather events, the elderly are susceptible to increased exposure of heat-related illnesses, airborne and waterborne illnesses and respiratory diseases from air pollution causing increased chances of heat stroke and heart attacks.

According to the Montreal CMA census in 2016, a total of 305,306 children under the age of 14 occupied Montreal. Like the elderly, children are also susceptible to increased exposure of heat-related illnesses, airborne and waterborne illnesses and respiratory diseases from air pollution. Younger children and infants face greater risks of asthma and heat-related illnesses due to biological sensitivity. Air pollution may cause increased hospital visits, asthma symptoms, respiratory problems, lung cancer and early death. Furthermore, pregnant women face unfavourable pregnancy outcomes such as low birth weight and preterm birth which have been linked to extreme heat events, airborne and waterborne illnesses and floods.

Lastly, an increased duration of allergy season and the prolonging of mosquitoes, will lead to vector-borne diseases if the City doesn't ensure the maintenance of biodiversity.

People with Disabilities

Extreme weather events are unfavorable scenarios for people with disabilities since they may be unable to physically leave their homes.

In terms of mental and physical health, people with disabilities experience heat-related illnesses, increased susceptibility to allergies and exposure to waterborne and vector borne illnesses. This may lead to food insecurity, stress, anxiety and depression symptoms.

Climate change will also impact community health in terms of increased aggression, violence and crime, social instability and a decreased community cohesion.

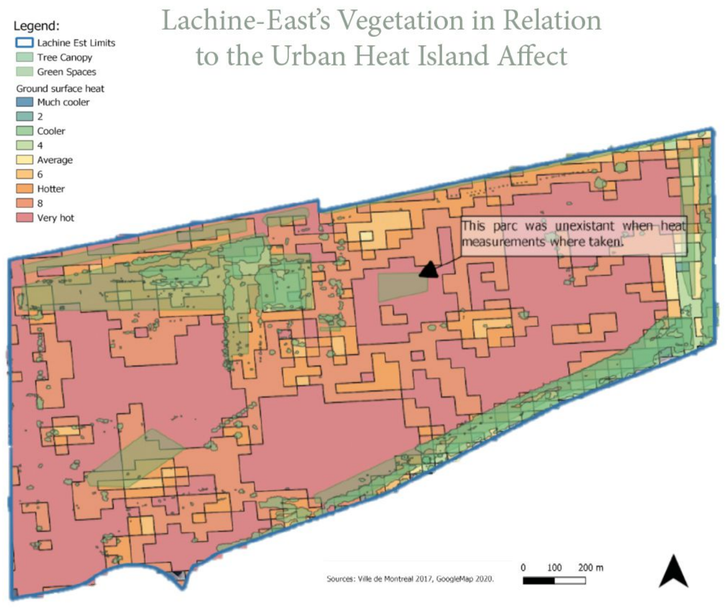
ASSESSING CLIMATE VULNERABILITIES

Development Recommendations for Lachine-Est

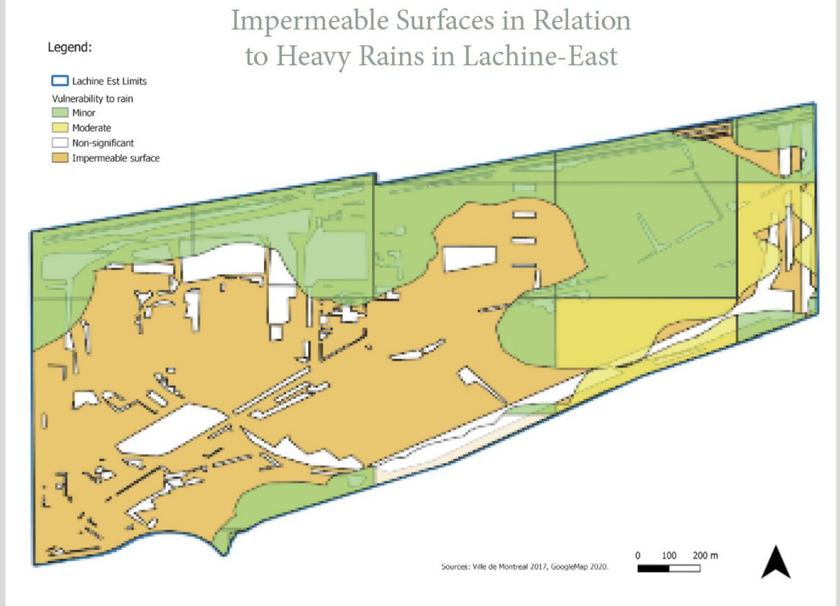
Lachine-East

Lachine-Est is a former industrial site developed along the Lachine canal towards the end of the 19th century as the area transformed into the economic center of the region (Ville de Montréal, n.d.). Today, this large area covering more than 60 hectares is mainly underutilized. Due to its proximity to the canal, the location makes for a prime redevelopment site that could integrate between 3,400 to 4,800 new housing units (Labo Climat Montreal, 2020a). The historical presence of industries complicates the transformation of the sector, which is now faced with various challenges of soil contamination, water infrastructures deficiency and lack of public infrastructures (LCM, 2020a).

Lachine-East's Vegetation in Relation to the Urban Heat Island Affect



Impermeable Surfaces in Relation to Heavy Rains in Lachine-East



Recommendations

Community Advice and Resource Centres

As Vodanovic has advocated, Lachine-Est would benefit well from the inclusion of a Community Centre in its development. Aside from the wealth of opportunities for social interaction a community centre can offer, it can too be used to introduce the Barcelona advising strategy to spread knowledge and information on climate resilience on an individual and community-scale. They can act as the intermediate between citizens and governance bodies by helping to identify issues faced by individuals in the area, particularly those exacerbated by the effects of climate change such as energy poverty, food - and water insecurities and address them through prioritizing development in those pockets; For example, introducing greenspace and climate shelters, local farmers markets, urban agriculture opportunities and food and/or meal distribution.

A Network of Greenspace and Tree Canopies

Aligned with the vision for green development, in the eyes of the mayor and the public, introducing a network of green spaces and increasing the tree canopy across the region will greatly aid in mitigating the UHI effect and its associated health impacts on current and incoming residents in the region. Trees in general provide a great number of benefits for the environment. They are able to remove pollutants from the air, soil and water as well as intercept rainfall and stormwater runoff, limiting flooding and the costs associated with infrastructure maintenance. Urban heat island effects can be mitigated due to the shade provided by the trees, which can be highly effective in the borough of Lachine-East. As mentioned above, the borough suffers from a high degree of UHI. With the implementation of tree canopies, the UHI will be reduced to a level that is beneficial for the health of both the environment itself as well as the population of the borough (Edmond, 2017).

Water Squares

Water squares are commonly used in dense urban areas with limited space for proper rainwater retention systems. They are often linked to public spaces and other urban functions, creating a more playful and green atmosphere. This system is highly beneficial to Lachine-East since it can provide cooling in the summer in order to mitigate an increase in heat-related illnesses. They also offer opportunities for snow dumping and sledding in the winter, slowing down the infiltration process into rainwater catchment infrastructures. Water squares also provide the opportunity to separate rainwater run-off systems and sewer systems, preventing overflow of water into the Lachine Canal and other rivers. A minor downfall of water squares in their maintenance. Since they do retain rainwater, it is not purified and can lead to pollutants such as mud, litter, leaves and branches. These pollutants must be removed in order to ensure the squares maintain its usability (Urban Green-Blue Grids, 2011).

Mixed-Use

The provision of services and amenities in the area is of utmost importance to increase accessibility to grocery stores, community gardens and local farmers markets, amongst others. In a recent public consultation, residents of the borough were concerned with the development of 4,800 residential units and stated that the mayor needs to focus more on providing amenities such as a cinema, cafes and local shops (Shupilov, 2018). Increasing the citizens' access to services and amenities within Lachine-East will limit them from traveling to other boroughs and in turn, reduce greater greenhouse gas emissions. Greater accessibility to these services and amenities will also increase active transportation amongst residents, improving their physical and mental well-being.

Promote Active Transportation

Active transportation promotes physical activity such as walking and cycling and can be coordinated with other modes of public transportation. The benefits associated with active transportation are advantageous as they promote a healthy lifestyle, allowing citizens' to be more physically active, which in the latter, increases their well-being. Staying physically active will also strengthen their resilience to heat-related illnesses as well as airborne, waterborne and vector-borne illnesses. Furthermore, active transportation also limits the increase in greenhouse gas emissions since less automobiles would occupy the streets. In order for Lachine-East to promote this method of travel, they must ensure walkable streets and bike lanes are adequately provided. With the addition of tree canopies and greenspace networks along new and existing streets and bike lanes, citizens' will be more inclined to use them. Lachine-East is also in the midst of implementing the pink metro line which will connect the borough through Downtown Montreal and to Montreal-North. The construction of the pink line will enable residents to travel by public transit, diminishing the use of automobiles as well as reducing overall greenhouse gas emissions.

In 2016, Lachine was a Borough of 44489 people, while Lachine East had a population of approximately 1200 people. It has already been 4 years since the last census so the following portrait is certainly not an accurate representation of the current situation in the borough. Based on the 2016 census data, a socio-economic analysis was conducted to determine the prevalence of vulnerable populations. These demographic vulnerability indicators are based on indicators mentioned in the city's climate change plan and from other academic sources. The main socio-economic indicators which were examined were eldery populations, children below the age of 15, low income households, people who speak neither french or english, visible minorities, indigenous populations and refugees. Lachine Est had 14.5% of its population over the age of 65, of this segment of the population 32.4% were considered to be part of low income households. In comparison Lachine Est, the rest of Lachine has 17% of the population being over the age of 65 and on average 25.5% of elderly citizens living on a low income. When compared to the remainder of the borough, Lachine Est also had a relatively average percentage of its population being below the age of 15. Lachine Est had a 14% share of its population age 15 and lower compared to Lachine with a 17% share of its population being below the age of 15. 6% of Lachine's population live in a single parent household. In Lachine Est, 7% of the borough's population lived within single parent households. Lachine Est also has 22.8% of its population living in a low income household. This is average for Lachine's census tracts with some census tracts recording rates of 56% and with rates averaging at 22.3%. Lachine Is a diverse borough with 23% percent of its population being a visible minority. For the census tract of Lachine Est, visible minorities make up 10% of its population. Aboriginal people makeup 1.4% of Lachine's population. For the area of study, 2.9% of the population are aboriginal peoples, the highest census population per census tract in Lachine. Lachine is also made up of recent Immigrants who arrived within 5 years prior to when the census was conducted. This segment of the population makes up 4% of the total population of Lachine. 2.5% of Lachine Est's population are immigrants having immigrated within the 5 past years before the census was taken. Furthermore, 3% of Lachine"s population are refugees. Lachine Est also has a similar percentage with 2.9% of its population being refugees. When it comes to the use of official languages 1% of Lachine's population is not able to communicate in either French or English. Only 0.41% of the population of Lachine Est were unable to communicate in any of the official languages.

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