EXECUTIVE SUMMARY

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DEVELOPING A DECISION-SUPPORT TOOL FOR

GREENING POTENTIALLY CONTAMINATED VACANT LOTS IN URBAN AREAS

DAVID SUZUKI FOUNDATION
One nature.

Background

Urban vegetation and the ecological services it provides are key to supporting sustainable development, habitat restoration and enhanced urban resilience to climate change. According to a number of experts, municipalities must include urban greening in their flagship initiatives to cope with a changing climate. In its new Climate Plan, the City of Montreal reaffirmed its commitment to increase coverage of protected areas to 10 per cent and announced that it would plant, maintain and protect 500,000 trees throughout the city. What's more, to address social, economic and environmental inequalities, Montreal wants to prioritize areas prone to heat island effects and consider vulnerable groups when implementing actions. The prevalence of hard surfaces, however, makes strategic, equitable greening initiatives difficult to achieve across the city.

The prevalence of hard surfaces in cities is a major obstacle to urban greening. That's why it is crucial that we leverage the ecological potential of all public and private spaces — including contaminated, vacant sites — to make our cities greener and more resilient to climate change.

MORE TREES, A BETTER TOMORROW

Trees and plants are a city's best ally in the fight against climate change. They provide shade, block heat from the sun, filter the air and absorb rainwater, making them a natural, cost-effective solution for mitigating the harmful effects of climate change, such as floods and heat waves. Vegetation can also be used to clean up contaminated soil in a process called phytoremediation.

Virtually every Canadian municipality has to deal with contaminated lands that remain vacant and unoccupied, sometimes for decades, until they are given a new purpose. This counterproductive practice is an obstacle to economic development and is largely at odds with a number of collective targets intended to help build climate-resilient cities through various initiatives, including sustained urban greening. Given the magnitude of the problem, there is an urgent need to consider the ecological potential of all public and private spaces — including contaminated, vacant lots.

This document summarizes a study conducted by Maxime Fortin Faubert as part of the 2018–19 David Suzuki Foundation Fellowship program focusing on climate change adaptation and sustainable cities. The full report is **available here**.

Study outline

The study focuses on a decision-support mapping tool that identifies and prioritizes greening projects for potentially contaminated vacant lots to assist municipal decision-makers, organizations and residents in planning and building green spaces in their cities. The study area covers 119.62 km^2 in Montreal and Montréal-Est (Quebec, Canada), and the proposed methodology involves integrating multi-criteria analysis with geographical information systems. Ten assessment criteria focusing on equity and climate change adaptation were selected to meet Montreal's greening targets. The criteria were then assessed using the analytic hierarchy process and weighted based on their importance. Once weighted, the different criteria were overlaid using the weighted linear combination method, making it possible to generate a composite map that shows the location of potentially contaminated vacant lots along with their greening priority levels (i.e., no priority, low priority, medium priority, priority and high priority). The full report of the study details the proposed methodology so that it can be improved and applied across Montreal and other cities.

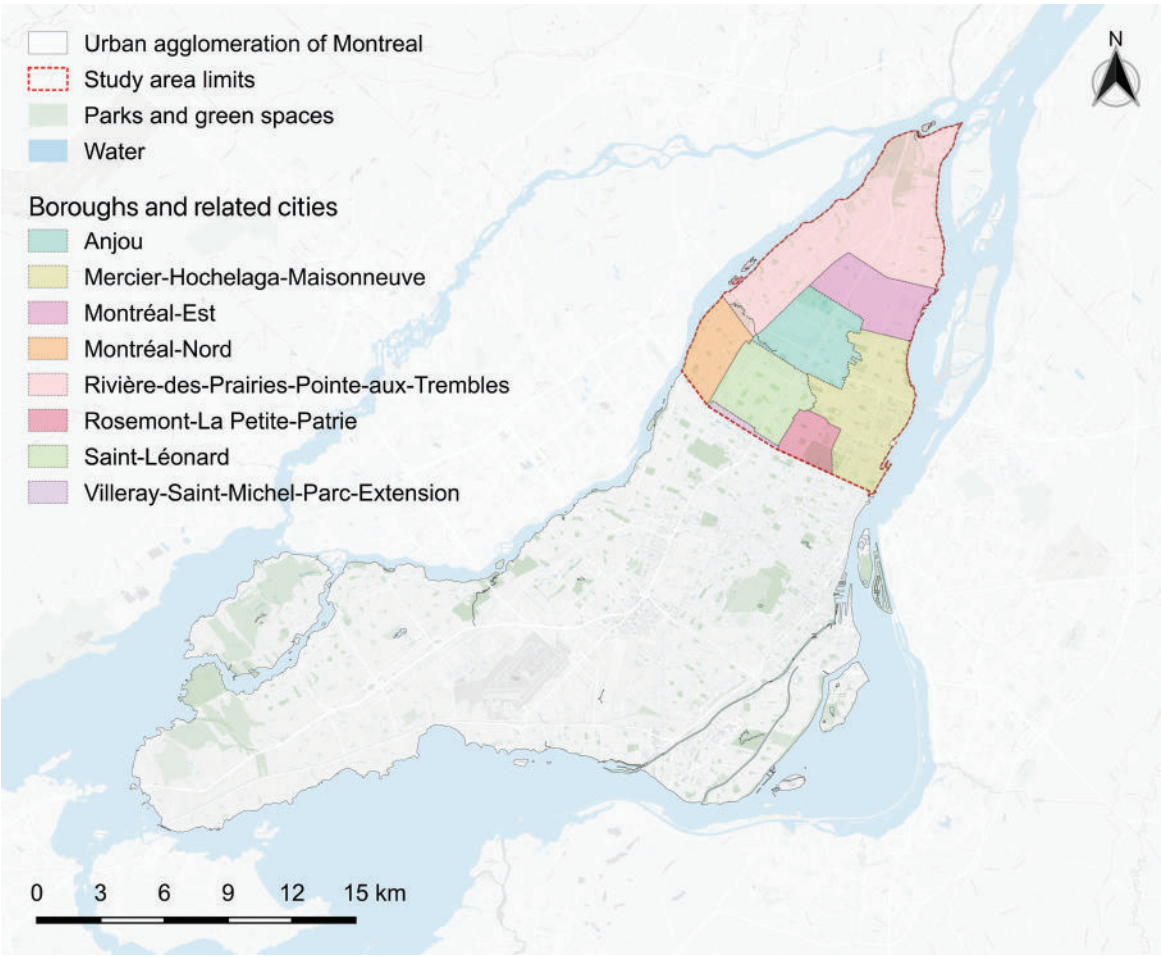

Figure 1 : Study area

Findings

In all, 6.6 km^2 of potentially contaminated vacant lots (5.5 per cent of the study area) were identified and categorized based on greening priority levels to enhance urban resilience to climate change. The findings show that nearly one-third of the identified areas (2 km^2) belong to municipal or provincial governments, and that greening should be considered a priority or high priority in 19 per cent of municipal areas (0.4 km^2). Those findings are preliminary, however, since various physical, regulatory, social and economic parameters were not taken into consideration. Nevertheless, the study reveals that there is great potential for cities to build green spaces on potentially contaminated vacant lots to meet their greening targets. It demonstrates that such a decision-support mapping tool would help cities identify priority areas and guide greening efforts on potentially contaminated vacant lots.

The findings show that there is great potential for cities to green contaminated vacant lots, enabling them to meet their greening and climate change adaptation targets.

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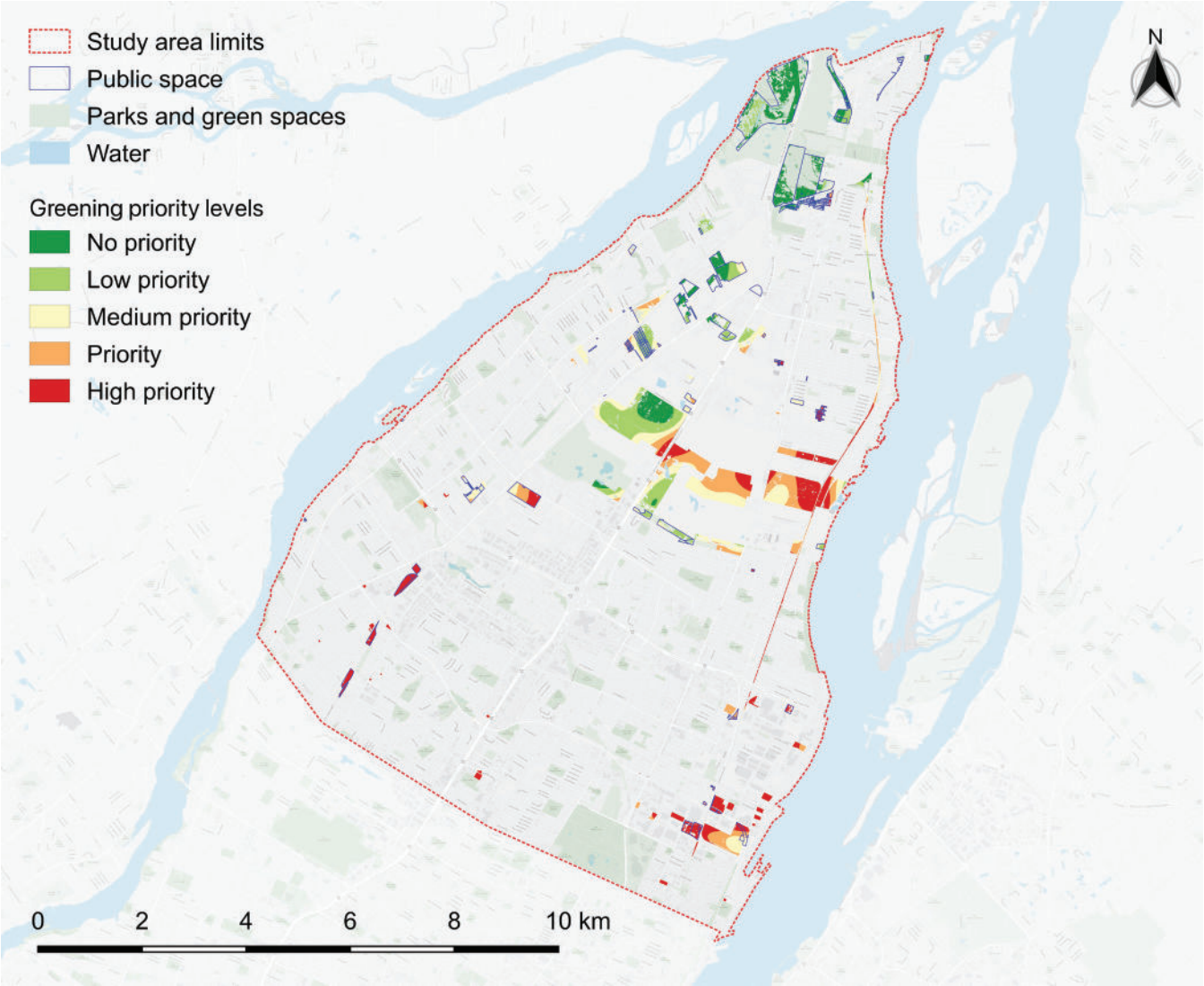
LOTS CONSIDERED IN THE ANALYSIS:

Vacant lots with high contamination potential that are covered with flat, hard surfaces (e.g., asphalt, concrete, gravel, soil and sand) or are covered with low-growing vegetation (e.g. crops, sod and shrubs).

FACTORS THAT INCREASE GREENING PRIORITY:

- High average temperatures in the area.
- Properties at high risk of flooding in the area.
- Lack of tall vegetation (e.g., trees) in the area.
- Density of population groups vulnerable to climate-related hazards in the area (including children aged 0 to 15, seniors aged 65 and older and socially or economically disadvantaged people).

Figure 2 : Breakdown of potentially contaminated vacant lots by greening priority level



Note : Blue areas belong to municipal or provincial governments.

Recommendations

The following recommendations are intended to help refine the methodology, increase transparency and knowledge of the area and promote greening efforts on contaminated vacant lots.

RECOMMENDATIONS WITH REGARD TO METHODOLOGY

1. Talk to various local experts and professionals to identify the best assessment criteria for each target.
2. Talk to various local experts and professionals to adjust weighting of the assessment criteria based on relative importance or preference.
3. Conduct sensitivity analyses to measure the impact of the different criteria and their respective weightings on the findings.
4. Visually assess vacant spaces to confirm the validity of available data.
5. Perform a correlation analysis between known levels of soil contamination and land-use history data for different sites to estimate the contamination potential of all vacant sites for which information is not available.
6. Enhance the tool so it can identify priority areas based on additional land-use planning goals (e.g., temporary greening, permanent greening or conservation).

FULL REPORT CITATION:

Fortin Faubert, M.; Hénault-Ethier, L.; Hallmich, C. 2022. Climate Change Adaptation and Sustainable Cities: Developing a Decision-Support Tool for Greening Potentially Contaminated Vacant Lots in Urban Areas. David Suzuki Foundation.

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RECOMMENDATIONS TO VARIOUS LEVELS OF GOVERNMENT

1. Soil contamination data should be publicly available for all types of sites, even for privately owned lots.
2. Any site characterization study certified by an expert authorized under section 31.65 of the Environment Quality Act should be brought to the attention of the *Ministère de l'Environnement et de la Lutte contre les changements climatiques* (MELCC) and made available publicly through an open database.
3. Given the limited and disparate availability of soil quality data, MELCC should work with cities to centralize information into a single open database. The information should be presented in the same format and should include geographic location data and chemical analysis results for each sample. Researchers could use that information to conduct territory-wide studies.
4. Any cleared land that has been vacant for more than two years should be required by law or regulation to undergo site characterization.
5. Federal and provincial governments should consider the potential of contaminated vacant sites when undertaking land-use planning.
6. Municipal governments should introduce greening incentives for vacant lots within their jurisdictions (e.g., an additional tax for vacant lots with little or no vegetation).