PLANT SUCCESSION AND URBAN ECOLOGY FOR STORMWATER MANAGEMENT

CALL FOR APPLICATIONS (Ph.D. OR MASTER'S)

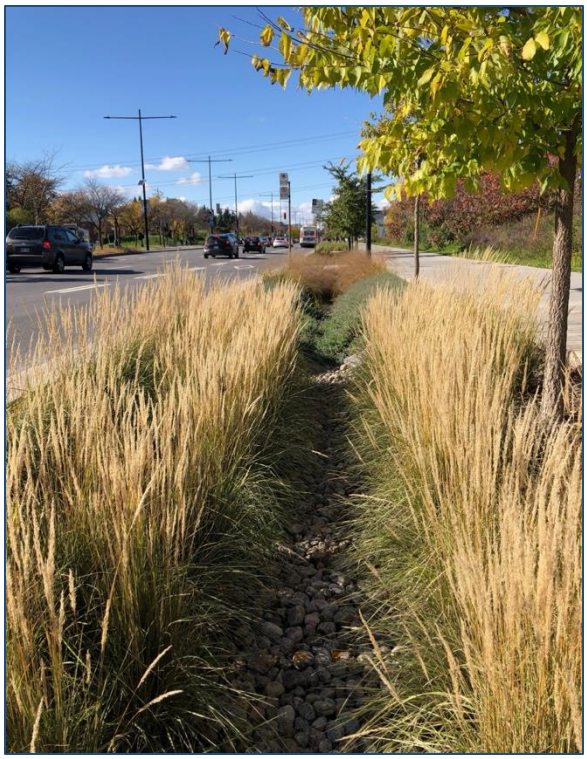

Photo: Patrick Boivin

REQUIRED PROFILE

- Student with a bachelor's or master's degree in biology, ecology, engineering, agronomy, or equivalent
- Writing skills in English and French
- Interest in green infrastructure and climate change adaptation

Assests:

- Knowledge of plant ecology, statistics, and phytotechnology
- Field and/or laboratory experience

Send us your CV and your transcript!

DESCRIPTION

This Ph.D. project will focus on the impact of long-term operation on plant succession and biodiversity in stormwater management phytotechnologiesor Nature-Based Solutions (NBS) in different climate zones. The project is part of the larger project BIORESTORM.

OBJECTIVES OF THE PROJET

- To determining the trajectories of plant succession in phytotechnologies for stormwater management
- To identify the most resistant and resilient species to the conditions of phytotechnologies for stormwater management

START

September 2025 (or earlier)

WHAT WE OFFER

- Competitive funding for a Master's or Doctoral degree
    - 25 000$/year Ph.D
    - 20 000$/ year Master's

  * Registration in Biology or Environmental design at the Université de Montréal
- Paid international conference (NOVATECH)
- International internship opportunity
- Interdisciplinary laboratory between environmental design and plant biology Inclusive, collaborative, and dynamic work environment at the Montreal Botanical Garden (IRBV)
- Leading-edge skills in green infrastructure management

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BIORESTORM PROJECT

Anticipating Biological Succession in Rehabilitation of Long-Term Operated Nature-Based Solutions for Stormwater Treatment in Different Climate Zones

Nature-based solutions (NBS) for stormwater treatment relying on vertical water infiltration and filtration (also known as rain gardens, bioretention filters, etc.) have been increasingly implemented in the last decades. Indeed, concepts such as Sustainable Urban Drainage Systems (SUDS), including such stormwater NBS, became popular given the rising demand for stormwater retention and quality treatment (for flood control, water body protection, bathing water quality, etc.). Plant-covered vertical-flow stormwater NBS are very flexible technologies since sizing can vary from a few square meters for road-side installations to a hectare in end-of-pipe settings. The vegetation plays an important role for their technical functioning (water quality treatment, hydraulics), aesthetic appearance, and support of biodiversity. However, in the long term, plant communities of such systems are modified as initially planted species are replaced due to competition (if not disappear completely), too demanding environmental conditions (extended drought periods alternating with hydraulic and pollutant shock loads, de-icing salts, pollutant accumulation, and nutrient depletion/surplus depending on location within the system), and often neglected maintenance. The resulting appearance of the treatment systems is not always following residents' aesthetic expectations, leading to complaints when installations appear overgrown or are perceived "ugly", and badly managed. Public and rehabilitation measures might become necessary in long-term operated stormwater NBS but we miss research and guidance to undertake such rehabilitation measures.

BioReStorm aims to evaluate (i) the changes in NBS plants and associated microbial communities for stormwater treatment relying on vertical filtration **over time and space**, and (ii) the impact of plants and microorganisms on **technical challenges** concerning hydraulic and treatment processes, as well as their contribution to local biodiversity. The identification of shortcomings in **design, implementation, and maintenance** of such NBS combined with biological succession under the hydraulic, nutrient and pollutant pressure of the systems necessitate developing adequate **rehabilitation concepts** for an effective BiodivNBS: BioReStorm continuous functioning. Rehabilitation also means ensuring a positive public perception of these systems in the long term. To achieve this objective, this project will contribute (iii) to the understanding of the **appreciation of NBS** by citizens both in terms of NBS design or their maintenance and the potential development of positive relational values towards these systems. BioReStorm sits at the intersection of natural sciences, social sciences and engineering. It is led by a international consortium made up of researchers from Canada, France, Sweden and Estonia.

KEY WORDS

Bioretention, citizen involvement, functional traits, green infrastructures, interdisciplinarity, public perception, phytotechnologies, plant communities, urban ecology.

FUNDING

Biodiversa +. European diversity partnership.

Fonds de recherche du Québec. Secteur Nature et technologies.

Université de Montréal
École d'urbanisme et d'architecture de paysage
Faculté de l'aménagement

Institut de recherche en biologie végétale

Fonds de recherche Nature et technologies Québec

Université de Montréal
chaire en paysage et environnement