

RESEARCH CONNECTION

Effectiveness of nature-based solutions in flood risk management

By Sheika Henry, PhD, & Balfour Spence, PhD



2011 Flooding along Highway 1A, CTV News.

Why this research is important

Nature-based solutions are increasingly being advocated as relatively inexpensive and cost-effective interventions for flood risk reduction in urban and peri-urban environments such as the City of Brandon. In addition, these solutions contribute to the protection, restoration, and sustainable management of natural ecosystems, and, in doing so, they contribute to human well-being and generate biodiversity benefits. In that regard, the City of Brandon has bought into the project and has been an invaluable collaborator/partner in the execution of the project. Not only will the output of this project contribute to flood

What you need to know

In recent years, the City of Brandon has experienced recurrent and costly flood events resulting from the combination of increased precipitation intensity in the Assiniboine Watershed due to climate change and land-use change associated with expansions in residential and commercial developments. Furthermore, the inability to invest in capital storm-water management projects to keep pace with increased demands due to budgetary constraints intensifies flood risk. Given that the aforementioned nature-based solutions are increasingly being promoted as a cost-effective and sustainable strategy for precipitation-runoff reduction, enhanced infiltration, and, by extension, reduced flood occurrence in the built environment. In addition, nature-based solutions generate environmental co-benefits such as urban carbon sequestration, wildlife habitat preservation, and aesthetics. However, the effectiveness of these solutions will vary from one landscape to another, and as such, utilization of these interventions for flood risk reduction needs to be informed by rigorous scenario analyses and simulation modeling. This research project utilizes stakeholder-informed scenario-based analyses of nature-based solutions (with and without) to determine their effectiveness on precipitation-runoff volume and, by extension, flood reduction in the Assiniboine Watershed and, specifically, the City of Brandon.

management policy and decision-making for the City of Brandon, but it could also provide a cost-effective option/alternative for flood management.

How this research was conducted

The research uses an interdisciplinary approach to assess the effectiveness of various nature-based solutions to reduce precipitation runoff in the context of parameters and scenarios to provide information about runoff potential and intensity in the Assiniboine Watershed in Manitoba, Canada. Data requirements for scenario design and modeling were informed by a literature review as well as through multi-sectoral stakeholder consultations. These consultations were instrumental in the selection of scenario-based approaches for the assessment and for the identification of related co-benefits. Regarding the modeling process, the research utilizes PCSWMM to determine the effectiveness of different nature-based solutions and related runoff scenarios.

What the researchers found

While the research is still ongoing, particularly as this relates to the design and modeling of event scenarios for flooding using different nature-based solutions, a number of preliminary findings have been generated. Throughout the Assiniboine Watershed and particularly in the City of Brandon, various initiatives utilizing nature-based solutions for flood risk reduction have been observed from consultation with stakeholders. More common initiatives include retention ponds. However, in the absence of scenario-based modeling, the effectiveness of these initiatives has not been ascertained.

How this research can be used

The City of Brandon and other public and private sector entities and NGOs have expressed interest in the anticipated utility of the research. The obtained results will

enhance the capacity of these stakeholders to select and apply the most suitable and cost-effective nature-based solutions for flood risk management in terms of effectiveness and co-benefits generated. In addition, the community engagement approach of the research has established a platform for knowledge-sharing among stakeholders, thereby enhancing the capacity for integrated flood risk management.

About the researchers

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Keywords

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