



Cohort 2 National Project Summary Report

City of Courtenay, British Columbia

February 2020

Municipal Natural Assets Initiative

Full technical report available at MNAI.ca



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The Municipal Natural Assets Initiative (MNAI) is changing the way municipalities deliver everyday services, increasing the quality and resilience of infrastructure at lower costs and reduced risk. The MNAI team provides scientific, economic and municipal expertise to support and guide local governments in identifying, valuing and accounting for natural assets in their financial planning and asset management programs and developing leading-edge, sustainable and climate resilient infrastructure.

Acknowledgements

This report is a summary of MNAI Technical Reports prepared by the MNAI Technical Team and Project communities.

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Convening Organizations



Convening organizations: Smart Prosperity Institute, David Suzuki Foundation, Town of Gibsons, BC, and Roy Brooke and Associates were the original convening partners for the Municipal Natural Assets Initiative and the Cohort 2 project leading to this report was initiated by them.

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Summary

Communities like the City of Courtenay recognize it is as important to understand, measure, manage and account for natural assets as it is for engineered ones.

The City of Courtenay lies on the east coast of Vancouver Island in British Columbia within the traditional lands of the K’ómoks First Nation. The Tsolum and Puntledge Rivers converge into the Courtenay River, which flows into an estuary where the City is located. The low-lying areas near the rivers and estuary comprise the flood plain, which is subject to flooding. Historically, much of the development of the City occurred in the flood plain and the City has been experiencing increasingly frequent and intense flooding that impacts transportation corridors, businesses, and public and private properties.

The City of Courtenay applied to take part in this project with the Municipal Natural Assets Initiative (MNAI) to understand how natural assets in the Courtenay River corridor could help mitigate flood risks, especially in the downtown core, and to see how they compare to engineered alternatives in terms of costs and benefits.

The project developed four scenarios to determine how natural assets could mitigate flooding: widening the Courtenay river, naturalizing a former sawmill site, re-instating natural flow paths in the Courtenay river, and removing at-risk buildings from the flood plain. The project modelled these options individually and in combination.

The results showed that natural asset improvements would reduce flood damages by between \$723,000 to \$2.4 million and that relocating at-risk buildings would cost approximately \$6.8 million. The results also showed that, in Courtenay, natural asset solutions need to be considered as part of a more comprehensive and phased flood management strategy that includes the entire community.

Natural asset improvements would reduce flood damages by between \$723,000 to \$2.4 million.

Introduction

The term municipal natural assets refers to the stock of natural resources or ecosystems that is relied upon, managed, or could be managed by a municipality, regional district, or other form of local government for the sustainable provision of one or more local government services.

A variety of scenarios cause the City to flood, including high tides / storm surges coming inland, high water flows coming downstream after it rains, and river flows influenced by BC Hydro dams. These events can happen individually or simultaneously during winter months.

The City of Courtenay has been building a strong asset management program for several years already. In 2013, it assessed how three engineered infrastructure options (dikes) could protect the Ryan Road commercial area from flooding. Building on that study, the City then wanted to explore how natural assets could protect their downtown core and minimize damages and losses.

Project

The project area includes the parts of the Courtenay River that run through the City’s downtown core. An ad-hoc mix of privately and publicly owned dikes, berms, seawalls and two sets of bridge abutments channel various areas of the river.



Frequent and severe flooding severely impacts downtown Courtenay

Asset management strategies require a multi-disciplinary, team-based approach. In addition to community engagement sessions, the MNAI team modeling approach included developing a natural asset inventory, condition assessment, stormwater modelling, economic assessment, and initial planning considerations.

The project used existing models and isolated two flood events to study in-depth. Flood event A is based on the 2009 flood conditions and flood event B is based on 1-in-200-year flood events in the Tsolum, Browns, and Puntledge rivers, and medium-water-high-tide conditions. This project was undertaken in parallel with a number of other initiatives at the City, including a flood management and mitigation project, an integrated rainwater management plan, and master plans for sewer, water, transportation, recreation and culture. The MNAI technical team worked closely with Urban Systems, the company completing modelling for some of these initiatives.

The project identified four options that assessed how natural assets could mitigate flooding within the two simulated flood events:

- 1. Widening the Courtenay river: removing the existing sheet pile dikes and sloping the banks of the Courtenay River to widen and naturalize it would potentially allow the estuary to hold more water before flooding.
- 2. Kus Kus Sum: converting a sawmill site to a natural foreshore and water flow paths could allow the site to hold and convey more water, but to this time, no modeling of the flood mitigation benefits had been completed.
- 3. Reinstate natural flow paths: orthographic information suggests that the flow of the river has been constrained and diverted from its historical trajectory, so re-instating natural flow paths or connecting new flow paths could allow the estuary to hold more water.
- 4. Managed retreat: gradually removing properties from the flood plain and allowing only land uses that are compatible with flooding in the flood plain would mitigate undesirable impacts of flooding, but would require extensive land acquisition and remediation.

SIMULATED FLOOD DAMAGES FROM FLOOD EVENT A		
	All properties including KFN properties	Properties excluding KFN properties
Estimated Damage for Current Conditions	\$1,896,000	\$1,519,000
Estimated Damage With Natural Asset Improvements	\$1,173,000	\$796,000
Contribution of Natural Asset Improvements	\$723,000	\$723,000

SIMULATED FLOOD DAMAGES FROM FLOOD EVENT B		
	All properties including KFN properties	Properties excluding KFN properties
Estimated Damage for Current Conditions	\$11,735,000	\$9,740,000
Estimated Damage With Natural Asset Improvements	\$9,319,000	\$8,110,000
Contribution of Natural Asset Improvements	\$2,416,000	\$1,630,000

Natural asset improvements could reduce damage to properties

The modelling results of the flood damage assessment revealed that under the 2009 flood conditions, natural asset improvements would reduce flood damages by \$723,000. Considering a larger, more extensive flood event, natural asset improvements would reduce flood damages by \$2.4 million.

Time and capacity restrictions did not allow the City to identify relevant co-benefits for the natural assets under consideration, but such co-benefits likely include access to green and recreational space for residents, hydraulic detention, and water quality functions. The full technical report details the other important benefits that rivers and riparian buffers provide.

Next steps and recommendations

While natural assets can play a role in flood management, the MNAI project team recommends the City considers a hybrid approach of engineered and natural infrastructure to manage the flood events considered in this project. The team also recommends the City develops a natural asset policy and management road map, and identifies areas to duplicate the project.

A hybrid approach of engineered and natural infrastructure.

About Municipal Natural Assets Initiative

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