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Toward natural asset management in the City of Moncton New Brunswick



Summary of inventory results and recommendations September 2021

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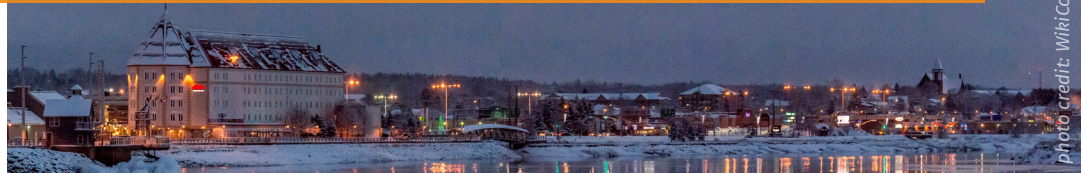
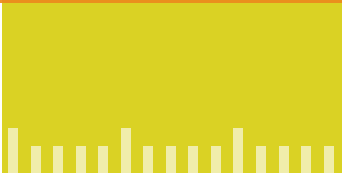


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Municipal Natural Assets Initiative





Invest in Nature

The Municipal Natural Assets Initiative (MNAI) is a Canadian not-for-profit that 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.

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1 Purpose

This document summarizes the results of a project to develop a natural asset inventory in the City of Moncton and documents steps the local government can take to proceed to a full natural asset management initiative.

2 Introduction

What are municipal natural assets

The term *municipal natural assets* refers to the stock of natural resources or ecosystems that a municipality, regional district, or other form of local government could rely upon or manage for the sustainable provision of one or more local government services¹.

Why manage natural assets

A growing number of local governments recognize that it is as important to understand, measure, manage and account for natural assets as it is for engineered ones. Doing so can enable local governments to provide *core* services such as stormwater management, water filtration, and protection from flooding and erosion, as well as *additional* services such as those related to recreation, health and culture. Outcomes of what is becoming known as *municipal natural asset management* can include cost-effective and reliable delivery of services, support for climate change adaptation and mitigation, and enhanced biodiversity.

How to manage natural assets

There are numerous ways for local governments to manage natural assets. The Municipal Natural Assets Initiative (MNAI) uses methodologies and tools rooted in standard asset management and provides a range of advisory services to help local governments implement them. MNAI has developed the methods and tools with significant investments, piloting, refinement, peer review, and documentation of lessons in multiple Canadian provinces. MNAI's mission is to make natural asset management a mainstream practice across Canada, and in support of this, for local governments to accept and use the methodologies and tools in standard ways across the country.

¹ mnai.ca/media/2018/02/finaldesignedsept18mnai.pdf

What is a natural asset inventory?

Natural asset inventories provide details on the types of natural assets a local government relies upon², their condition, and the risks they face. As depicted in Figure 1 and explained in detail in the Annex, a natural asset inventory is the first component of the Assessment phase. The Assessment phase, in turn, is the first of three phases of a full natural asset management project. By itself, an inventory will not give a sense of asset value but is an essential first step in the full natural asset management project.

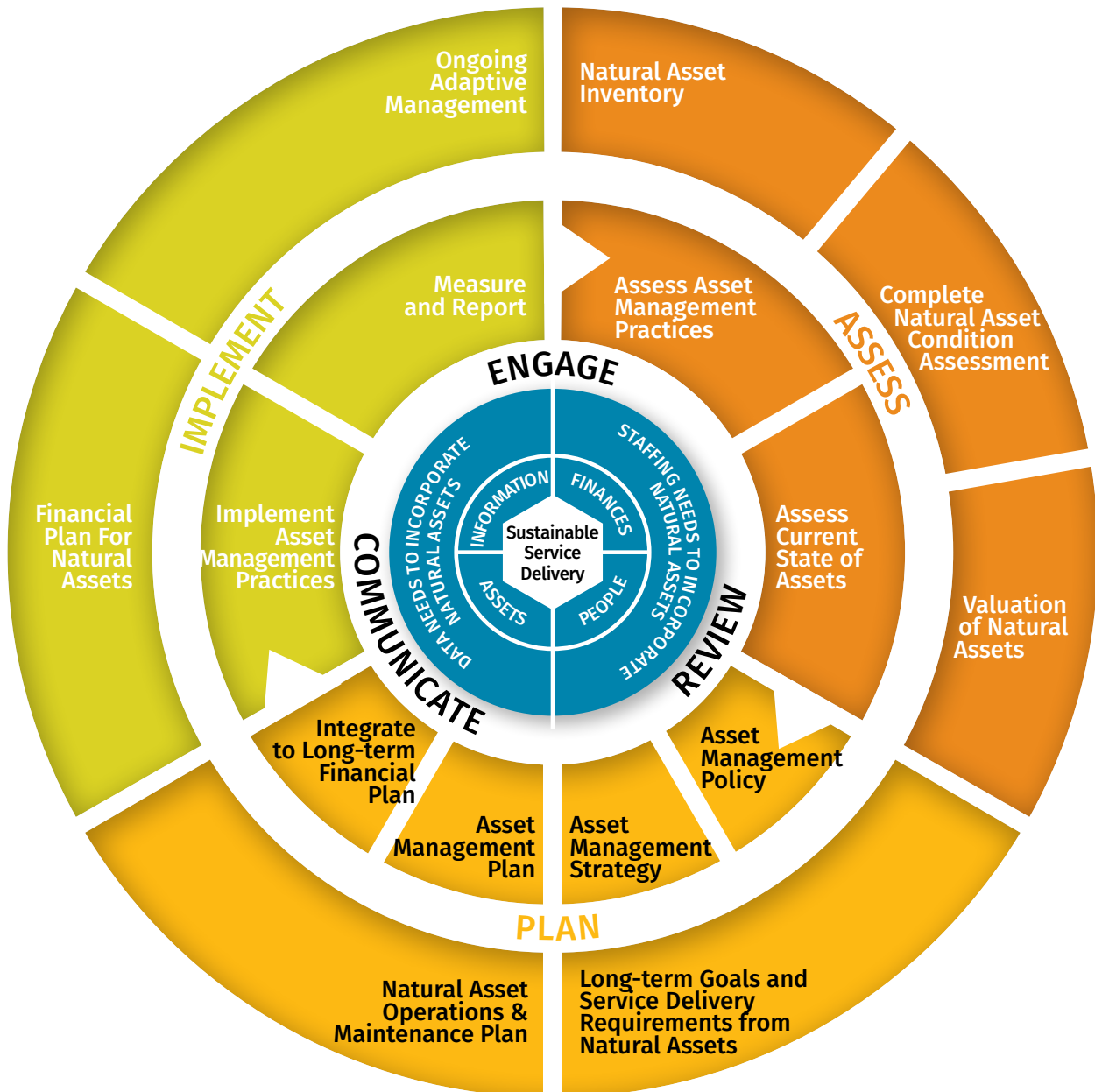


Figure 1: The Asset Management Process. MNAI has adapted this for use with natural assets.

² Note that many local governments rely on services from natural assets they do not own.

3 Local government context

3.1. General

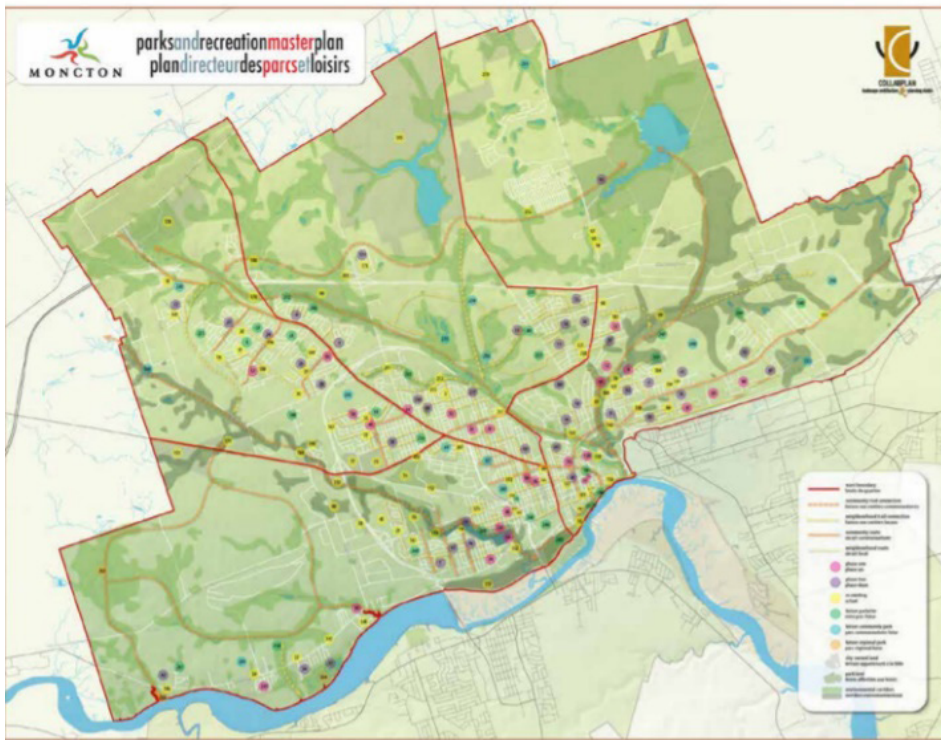


Figure 2: The City of Moncton³.

The City of Moncton (population ~71,800) is the largest urban centre in the province of New Brunswick. It is also known as the Hub City due to its central inland location and history as a railway and land transportation hub for the Maritimes⁴.

Most of the City of Moncton's storm outfalls are in tidal rivers, and thus it identifies erosion and siltation as key risks. The priority class of natural assets for the City of

Moncton is currently creeks and rivers, and it identifies the Petitcodiac River as a natural asset of particular priority in the 2020 Strategic Plan⁵. Priority natural asset services include water supply and stormwater management.

The City of Moncton's interest in natural asset management relates to having a better understanding of the condition and functions of the natural assets upon which they rely, which in turn will improve decision-making.

The City of Moncton would also like to ultimately have condition ratings, valuations and level of service in place for most of their assets, including natural ones.

Achieving these objectives would support the goal of becoming a “green and resilient community” under Pillar I (Environment) of Moncton's 2020 Strategic Plan.

3 Plan Moncton: The City of Moncton Municipal Plan. Retrieved April 2021 from www5.moncton.ca/docs/bylaws/By-law_Z-113_Municipal_Plan.pdf

4 Wikipedia. Retrieved from en.wikipedia.org/wiki/Moncton

5 City of Moncton Strategic Plan. www5.moncton.ca/docs/council/Strategic_plan_2021_Report_card_2020.pdf. Retrieved May 2021.

3.2. Asset management readiness assessment

As part of inventory development, MNAI helps local governments determine their overall state of asset management maturity. To do this, MNAI has adapted the Federation of Canadian Municipalities (FCM)'s asset management readiness assessment tool⁶ to help local governments measure their progress on both asset management and natural asset management in four competency areas, with each area describing outcomes based on five levels of progress or maturity.

The completed readiness assessment helps local governments prioritize actions that increase their effectiveness in managing all assets, including natural ones.

The City of Moncton's readiness assessment shows it is at an intermediate stage of adoption of asset management as an organization, but that progress to-date has focused solely on engineered infrastructure assets. This MNAI project is the City of Moncton's entry point to working on natural asset management, and at the outset of the project it was working on level 1 (initial investigation) in all competency areas.

The City of Moncton has a Council-approved asset management policy that does not yet incorporate natural asset considerations or include natural assets as an asset class. The City of Moncton also has a roadmap in the form of a list of priorities guiding its asset management activities and does have some performance measures to measure progress for most engineered asset classes.

With respect to people and leadership guiding the adoption of asset management, the City of Moncton has formed a cross-functional asset management group; however, this group hasn't been formally recognized, and needs more structure and formal terms of reference. Specific responsibilities have not yet made their way into job descriptions and no one in the group is formally responsible for incorporating natural asset management considerations into the City of Moncton's asset management practices.

Council has demonstrated buy-in and support for asset management, demonstrated by its approval of funding for activities such as the purchasing of asset management decision-making software, condition assessment contracts and other activities. That said, Council and the City of Moncton's senior leadership have not yet been made aware of the role of natural assets in service delivery or their relationship to strengthening asset management as an organization, so they do not yet have a sense of the resourcing that would be required to integrate natural asset management.

The City of Moncton has made progress in strengthening its data and information for engineered assets. It has a detailed GIS inventory for roads, the water system, sewer system, sidewalks and facilities. It has calculated replacement values for all major assets as part of the Public Sector Accounting

⁶ See fcm.ca/sites/default/files/documents/resources/tool/asset-management-readiness-scale-mamp.pdf for details

Board inventory process, and it completes annual updates to capture its capital works projects and donated assets (developments). All major asset classes include condition ratings and defined target levels of service. One identified gap is that the City of Moncton's asset data and financial data are not yet linked in one system.

The City of Moncton's departments follow a similar but informal asset investment planning approach, evaluating investment needs and priorities based on a mix of structured and ad hoc practices and criteria. Most departments aim for a target renewal budget to achieve long-term sustainability and for a percentage of asset renewal as part of their investment plan (for example, 75% renewal and 25% growth). It has developed and presented to Council an asset management plan for most major engineered asset classes. Its asset management plans are based on detailed inventory and condition ratings and include investment forecast recommendations.

4 Natural asset inventory

4.1. Inventory overview

MNAI's natural asset inventories have two main components to express natural asset information: an asset registry (which is a tabular representation of the data) and an online dashboard. MNAI provided the registry to the City of Moncton in an Excel file and the dashboard as a website address. Information on the condition of the assets is a subset of the inventory and is depicted in both the registry and dashboard.

4.2. Inventory data

To establish the inventory, MNAI obtained data from the City of Moncton, the Province of New Brunswick, Service New Brunswick and the federal government. MNAI combined the spatial data layers to establish a comprehensive depiction of natural assets. Table 1 describes the data sources used to develop the inventory and condition assessment.

TABLE 1: SUMMARY OF DATA USED

DATASET NAME	SOURCE	PURPOSE
Moncton Municipal Boundary	City of Moncton	Used to define study area
LANDCOVER	City of Moncton	Used to create a base landcover dataset for identifying natural assets

TABLE 1: SUMMARY OF DATA USED

DATASET NAME	SOURCE	PURPOSE
Non-Forest	Province of New Brunswick	Used to supplement land cover dataset provided by City of Moncton to classify agricultural land and identify land cover within 100 m buffer of study area for adjacent land use intensity condition
Forest	Province of New Brunswick	Used to identify land cover within 100 m buffer of study area for adjacent land use intensity condition
2015 Land Cover of Canada	Government of Canada	Used to identify land cover within 100 m buffer of study area for adjacent land use intensity condition
Waterbodies	City of Moncton	Used to supplement the land cover dataset provided by the City of Moncton to ensure all water represented in natural asset inventory
Wetlands	City of Moncton	Used to supplement the land cover dataset provided by the City of Moncton to ensure all wetlands represented in natural asset inventory
Wards	City of Moncton	Used to summarize natural assets by their associated ward
RoadNetwork	City of Moncton	Used to perform road density condition assessment
CityOwnedLand	City of Moncton	Used to determine area of city-owned natural assets and assign majority usage class to associated asset
Trails	City of Moncton	Used to summarize length of trails within natural assets
Zoning	City of Moncton	Used to assign majority zoning class to associated natural assets
Flood Zone (10.5m)	City of Moncton	Used to determine which natural assets overlap with this flood zone and asset are in flood zone
Parks	City of Moncton	Used to summarize natural asset area in parks and assign relevant park name to asset
Watershed Boundary	City of Moncton	Used to summarize area of assets in these watersheds and assign assets to their associated watershed name
Forest Soils	Service New Brunswick	Used to add soil type and drainage attributes to natural assets using majority area overlap between soil and assets
Peatland	Service New Brunswick	Used to indicate natural asset area considered peatland and to be able to filter for assets considered peatland
LiDAR Digital Elevation Model (1m)	Service New Brunswick	Used to estimate mean elevation in metres for each natural asset

The inventory project defined a total of 1,952 individual assets, covering 8,345 hectares (ha), as noted in Table 2. The majority of this area was forest cover, followed by agriculture and wetlands.

TABLE 2: SUMMARY OF NATURAL ASSETS BY TYPE			
NATURAL ASSET TYPE	NUMBER OF ASSETS	TOTAL AREA (HA)	AVERAGE ASSET AREA (HA)
Agriculture	149	752	5.05
Built-up Pervious*	7	0.05	0.01
Forest	504	6,169	12.24
Shrub/Grassland	451	520	1.15
Water	346	297	0.86
Wetland	495	608	1.23
Total	1,952	8,345	4.28

* Built-up pervious includes manicured lawns and greenspaces (e.g., sports fields)

Figure 3 shows the spatial distribution of the natural assets.

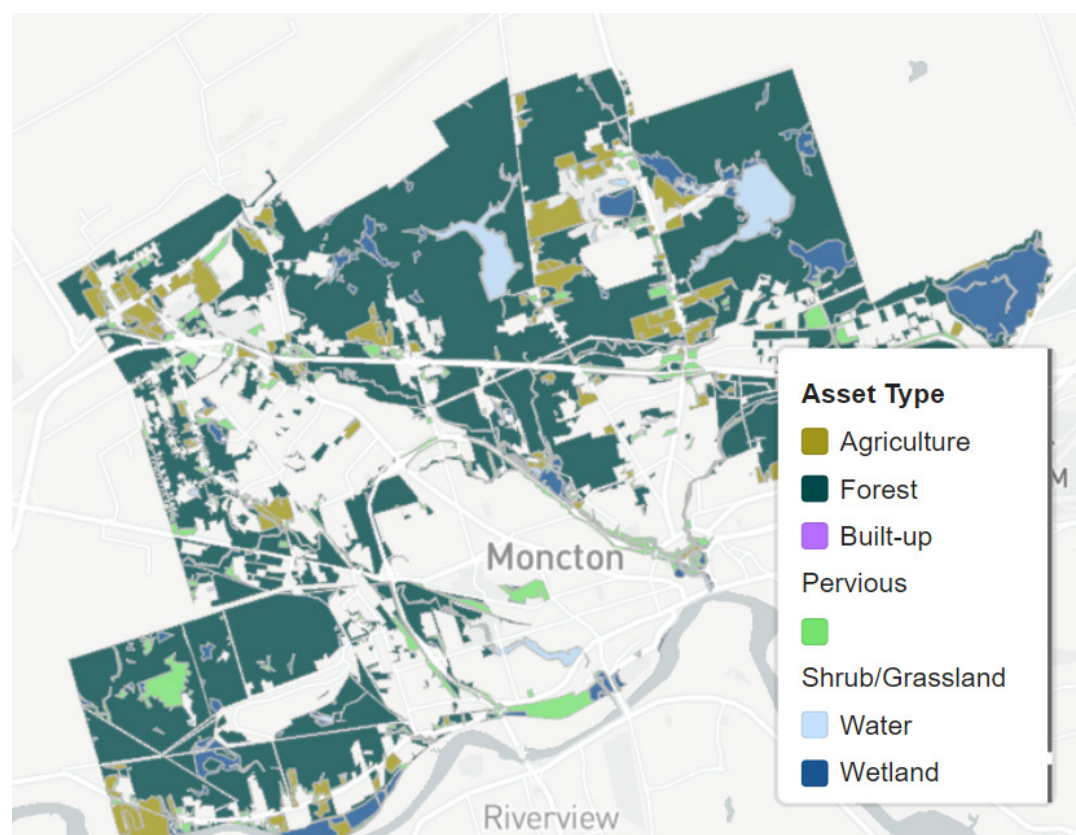


Figure 3: Spatial distribution of natural assets.

4.3. Asset registry

Each asset within the inventory has a unique identification number that allows individual assets to be selected, analyzed, and the corresponding data manipulated as required. For example, changes in condition can be noted for individual assets. Information on each asset is housed in an asset registry.

Table 3 is an excerpt from the City of Moncton's registry showing natural asset characteristics and details.

TABLE 3: EXCERPT FROM THE REGISTRY

Natural Asset Registry																				
Asset ID	Asset Type	Asset Area (ha)	Ward Number	Area in McLaughlin Rd. Reservoir (ha)	City Owned Land (ha)	Majority City Usage	Majority Drainage Type	Trail Length (km)	Majority Zoning Description	Flood Zone Area 10.5m (ha)	Park Area (ha)	Park Name	Peatland Area (ha)	Mean Elevation (m)	Interior Forest %	Adjacent Land Use Score	Permeability Score	Relative Size Score	Road Density Score	Total Score
AGR213	Agriculture	2.34	1	0.00	0.00		7	0.00	Community Use Zone	0.00	0.00		0.05	39.18	0	8	5	1	10	24
FOR1016	Forest	1.20	1	0.00	0.00		7	0.00	Open Space and Conservation Zone	0.00	0.00		1.20	36.96	0	9	10	1	5	25
FOR1020	Forest	1.41	1	0.00	0.00		7	0.00	Rural Residential Zone	0.00	0.00		1.02	38.06	0	8	10	1	1	20
FOR1021	Forest	0.29	1	0.00	0.00		7	0.00	Heavy Industrial Zone	0.00	0.00		0.29	49.59	0	10	10	1	10	31
FOR1032	Forest	14.60	1	0.00	0.00		7	0.00	Community Use Zone	0.00	0.00		3.17	37.79	0	10	10	1	10	31
FOR1035	Forest	0.30	1	0.00	0.00		7	0.00	Integrated Development Zone	0.00	0.00			57.72	0	4	10	1	1	16
FOR240	Forest	0.00	1	0.00	0.00		7	0.00	Open Space and Conservation Zone	0.00	0.00		0.00		0	9	10	1	1	21
FOR498	Forest	0.00	1	0.00	0.00		7	0.00		0.00	0.00				0	9	10	1	10	30
FOR611	Forest	0.00	1	0.00	0.00		7	0.00		0.00	0.00				0	9	10	1	10	30
SHR433	Shrub/Grassland	1.00	1	0.00	0.00		7	0.00	Community Use Zone	0.00	0.00		0.94	36.42	0	9	10	1	10	30
WAT113	Water	0.33	1	0.00	0.00		7	0.00	Community Use Zone	0.00	0.00			36.60	0	10	10	1	10	31
WAT20	Water	0.01	1	0.00	0.00		7	0.00	Integrated Development Zone	0.00	0.00			55.33	0	5	10	1	10	26
WAT230	Water	0.07	1	0.00	0.00		7	0.00	Open Space and Conservation Zone	0.00	0.00		0.07	34.32	0	10	10	1	10	31
WAT290	Water	4.00	1	0.00	0.00		7	0.00	Open Space and Conservation Zone	0.00	0.00		2.57	34.12	0	10	10	1	10	31
WAT315	Water	0.12	1	0.00	0.00		7	0.00	Heavy Industrial Zone	0.00	0.00			48.72	0	10	10	1	10	31
WAT323	Water	0.64	1	0.00	0.00		7	0.00	Integrated Development	0.00	0.00			55.64	0	4	10	1	1	16
Total		8345.33		988.19	2077.25		7792	42.86		306.04	1,061.81		258.55							

4.4. Online dashboard

Inventories may provide more insights when characterized visually in a dashboard, which enables users to explore different aspects of the data. For instance, natural asset information can be quickly summarized by watershed area, or, if users want to dive into the specifics of forest assets, they can quickly filter the data to focus on that particular asset. Figure 4 is a screenshot from the dashboard that MNAI provided to the City of Moncton. The full version can be accessed at go.greenanalytics.ca/Moncton.

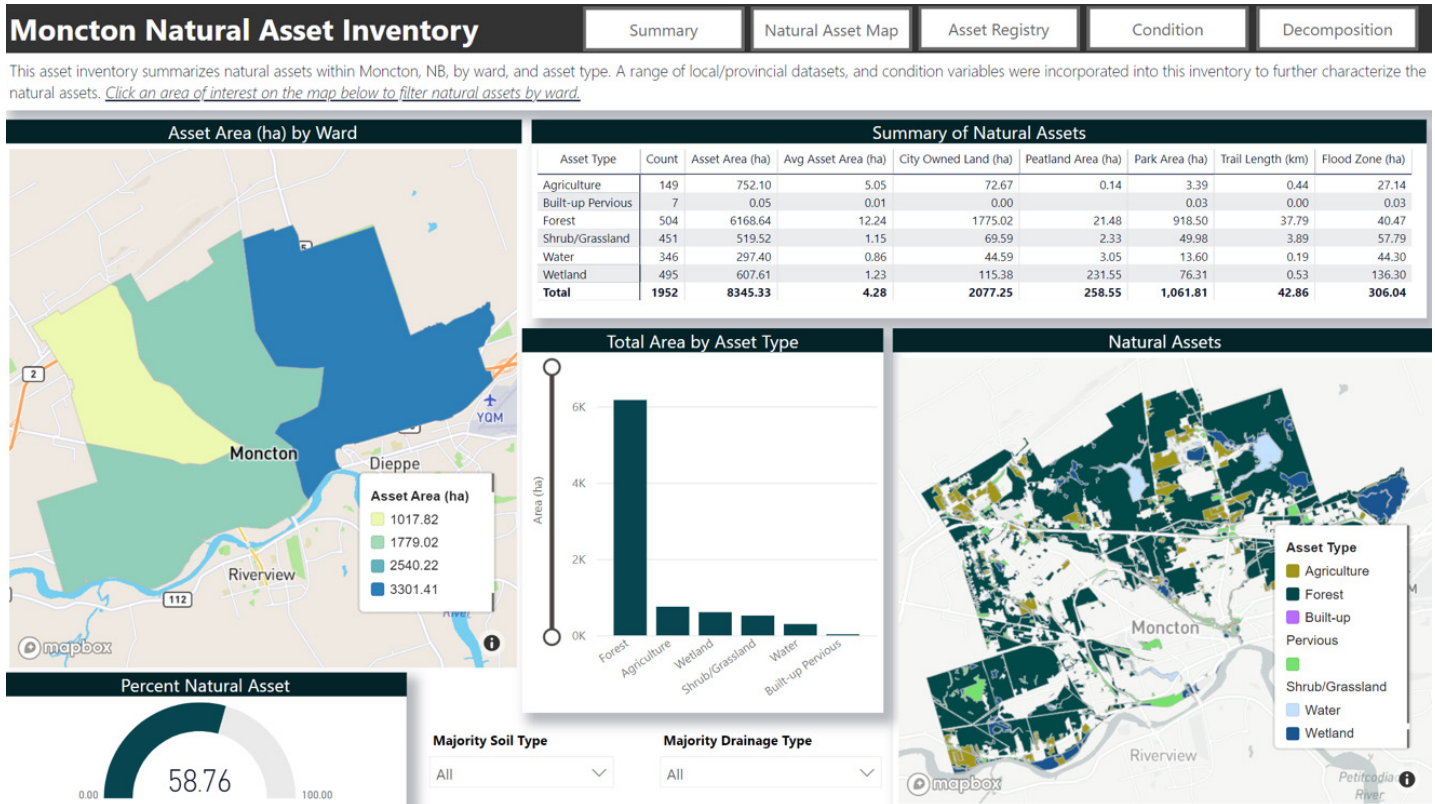


Figure 4: Screenshot of main inventory summary

4.5. Condition of natural assets

Documenting the condition of natural assets is a key aspect of natural asset inventories. A natural asset condition assessment provides an understanding of both the ecological health of natural assets, and the ability of natural assets to provide services. This information, in turn, can support the effective management of natural assets, be reflected in the registry and the dashboard, and updated over time.

MNAI completed a desktop-based condition assessment and built it into the inventory to provide an initial understanding of the status of the natural assets for the City of Moncton. Table 4 summarizes the condition assessment steps and indicators.

TABLE 4: CONDITION ASSESSMENT APPROACH AND INDICATORS

Indicator	Description & Methods for Quantification	Data used to Quantify Indicator
Relative asset size	For each natural and semi-natural asset type, total area is calculated, and a rank is assigned to the assets within each class based on its percentile score. Natural assets within the top third of the ranking (e.g., the largest assets within a class) received a 3, those within the middle third of the ranking received a 2, and those within the bottom third of the ranking received a 1.	Natural asset inventory
Road density	Measures the density of the roads in and around the assets according to high density (assets with more than 2km of roads per km squared), medium density (assets with between 1km and 2km of roads per km squared) and low density (assets with less than 1km of road per km squared).	Natural asset inventory plus spatial representations of roads
Surface permeability	<p>The permeability of surfaces is ranked on a scale of nil to high depending on the type of landcover present.</p> <p>Urban areas, roads and industrial areas are ranked as nil. Assets within impervious surfaces are assigned as low permeability.</p> <p>Agriculture and shrublands are ranked as medium.</p> <p>Wetlands, waterbodies and forests are ranked as high.</p>	<p>Natural asset inventory, spatial representations of land uses and roads, as well as the Global Man-made Impervious Surfaces Dataset from NASA</p> <p>data.nasa.gov/dataset/Global-Man-made-Impervious-Surface-GMIS-Dataset-Fr/dkf4-4bi3</p>
Adjacent land use	Considers the distance to, and the nature of, the area surrounding natural assets. Intense land uses (e.g., airports) in close proximity to natural assets result in a poor rating, while distant land uses that are less intense (e.g., agriculture) result in a good rating. If there are no human land uses within 100 m of the assets, the assets are scored 10. If there are intensive land uses within 100 m of the assets, the score is 0.	Natural asset inventory plus spatial representation of land use as well as intensity rankings of land uses

Once conditions were allocated to each asset, an overall score was derived for the project area. The maximum possible score for an asset was 40, based on a possible 10 points for each of 4 categories:

- Road density as low (10), medium (5) or high (1).
- Surface permeability rated as high (10), medium (5), low (1), or nil (0).
- Adjacent intensive land use (0 for intense land uses, otherwise 10).
- Relative asset size where the largest 3rd areas receive 10, 5 for middle 3rd, and 1 point for the lowest 3rd.

The total condition score was then converted into a rating scale:

- **Good** - assets with a score of 30 or higher
- **Moderate** - assets with a score between 20 to 29
- **Poor** - assets with a score between 10 to 19
- **Very Poor** - assets with a score lower than 10
- **No Rating**

Figure 5 summarizes the natural asset condition assessment results as per the online dashboard.

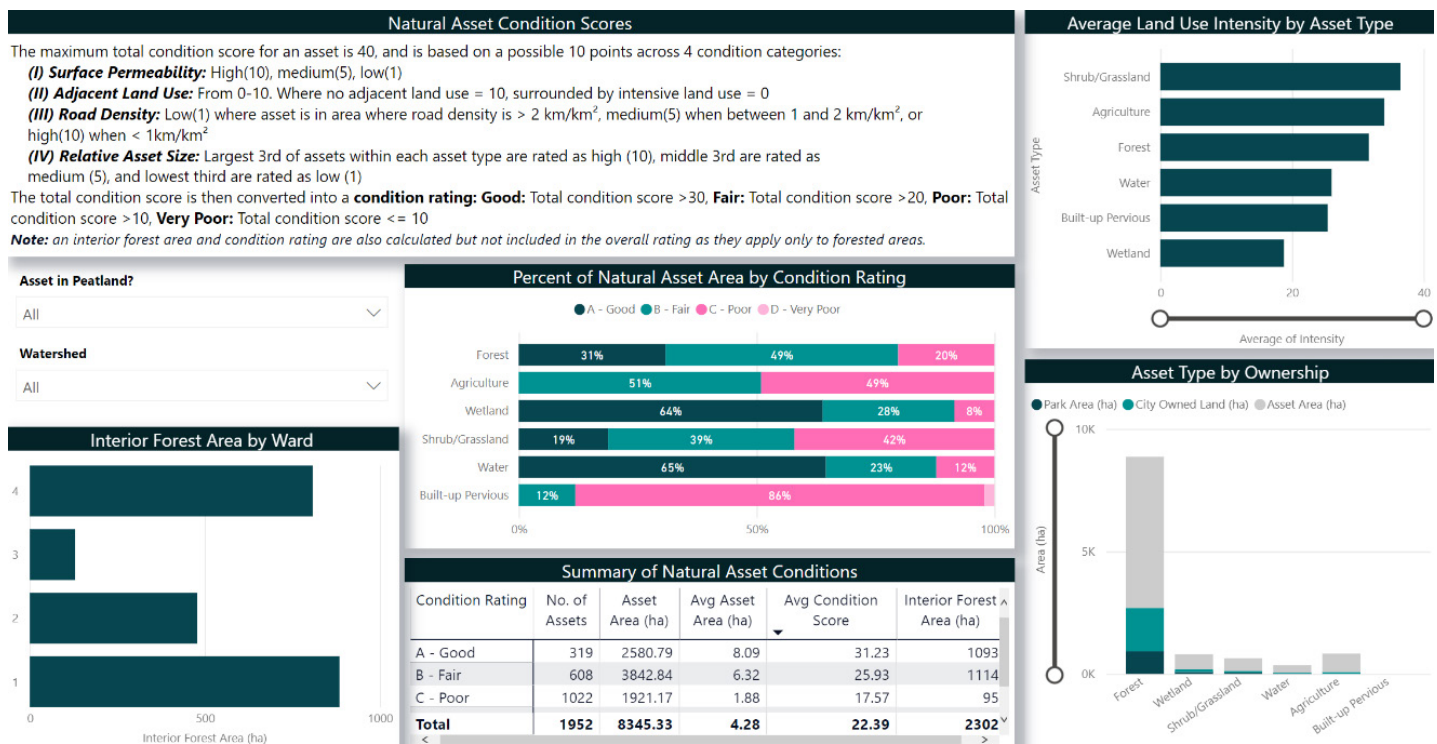


Figure 5: Screenshot of condition assessment details

Overall, about 2,581 ha (or 31 per cent) of natural assets were assessed in good condition and 3,843 ha (or 46 per cent) were assessed in fair condition. Forest, wetland and water assets all ranked largely good and fair.

Table 5 summarizes condition ratings and Figure 6 summarizes condition by natural asset type.

TABLE 5: SUMMARY OF NATURAL ASSET CONDITION RATINGS
MNAI desktop approach

Condition Rating	Number of Assets	Total Area (ha)	Average Condition Score
Good	319	2,581	31.23
Fair	608	3,842	25.93
Poor	1,022	1,921	17.57
Very poor	3	0.54	10.00
Total	1,952	8,345	22.39

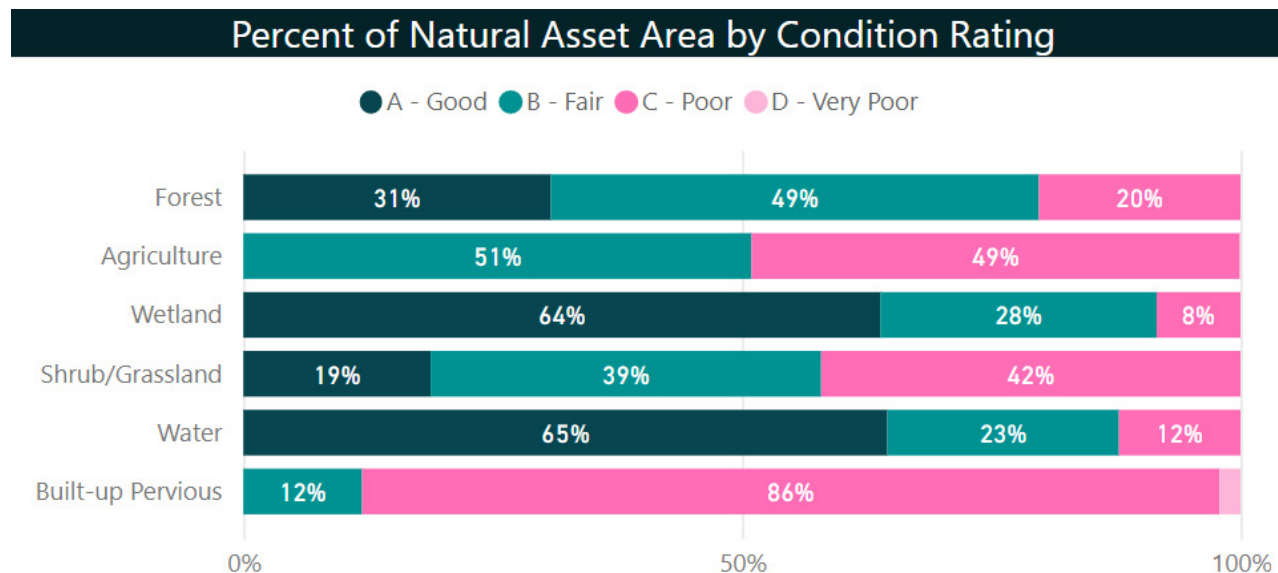


Figure 6: Summary of condition rating by natural asset type (MNAI desktop approach)

4.6. Maintaining the inventory

Inventories are not static. Both the registry and the dashboard can be expanded as new information becomes available. For example, asset condition might improve as a result of restoration efforts, or new studies may add insights on the condition of the assets. New data can be reflected in the asset registry and subsequently in the online dashboard as it becomes available. Furthermore, the level of desired detail may evolve as asset management readiness increases or as areas of natural management focus emerge. However, inventories should grow in detail and sophistication only insofar as they remain aligned with the capacity of the communities to maintain them, and the uses to which they will be put. Their evolution and development should be a function of the monitoring, reporting and lessons of the asset management cycle and be driven by the imperative of ensuring sustainable, cost-effective delivery of services to the community, which is the core of asset management.

5 Risk identification

5.1. Risk identification tool overview

Identifying risks facing natural assets can help local governments prioritize their management of natural assets. To this end, MNAI provides local governments with a tool entitled *Risk Identification Process in the Development of Natural Asset Inventories* and guidance in self-administering it.

Risk management is a four-stage process that includes risk identification, analysis of probability and consequence, development of risk mitigation strategies, and control and documentation. The use of the risk identification tool informs the first and second stages of risk management through the identification of top risks to natural assets and their associated services, and a high-level analysis of impacts and consequences.

Risk types relevant to natural asset management typically include:

- **Service risk:** the risk of an asset failure that directly affects service delivery.
- **Strategic risk:** the risk of an event occurring that impacts the ability to achieve organizational goals.
- **Operations and maintenance risk:** risks related to poor asset controls and oversight, which can lead to poor record-keeping and poor monitoring of asset.
- **Financial risk:** risks related to the financial capacity of the City of Moncton to maintain municipal services.
- **Political risk:** risks related to the nature of municipal politics.

5.2. Using the risk identification tool

Using the risk tool, the City of Moncton considered possible risks that the loss of natural asset functions could pose to built infrastructure, personal health and safety, and private property, including:

- Illegal dumping
- Flooding/ erosion
- Forest fire
- Invasive species
- Development pressure
- Pollutant (agricultural, industrial, etc.)
- Drought
- Freezing rain
- Extreme high tides
- High winds
- Homelessness

Each risk was then ranked low, medium or high according to the probability of an impact occurring, and the relative magnitude of its negative consequences. To assess impact and consequence, the City of Moncton considered four questions:

- 1/ what impact is likely to happen?
- 2/ what is the consequence of that impact happening?
- 3/ what can be done to mitigate the probability of impact and/or consequence?
- 4/ what cues will signal the need for mitigation?

5.3. Results of the risk identification process

The risk identification process revealed:

- 1 high-level risks (flooding/erosion)
- 1 medium-high level risk (drought)
- 5 medium-level risks (invasive species, development pressure, extreme high tides, high winds, and homelessness)
- 4 low-level risks (illegal dumping, forest fires, pollutants, and freezing rain)

In terms of scope, the identified risks affect natural assets across the City of Moncton, with numerous risks potentially affecting watercourses, wetlands, city parks, and the surface water reservoir. The identified risks also have the potential to negatively impact engineered assets (both city-owned and non-city-owned), property, and personal health and safety.

Risk Matrix

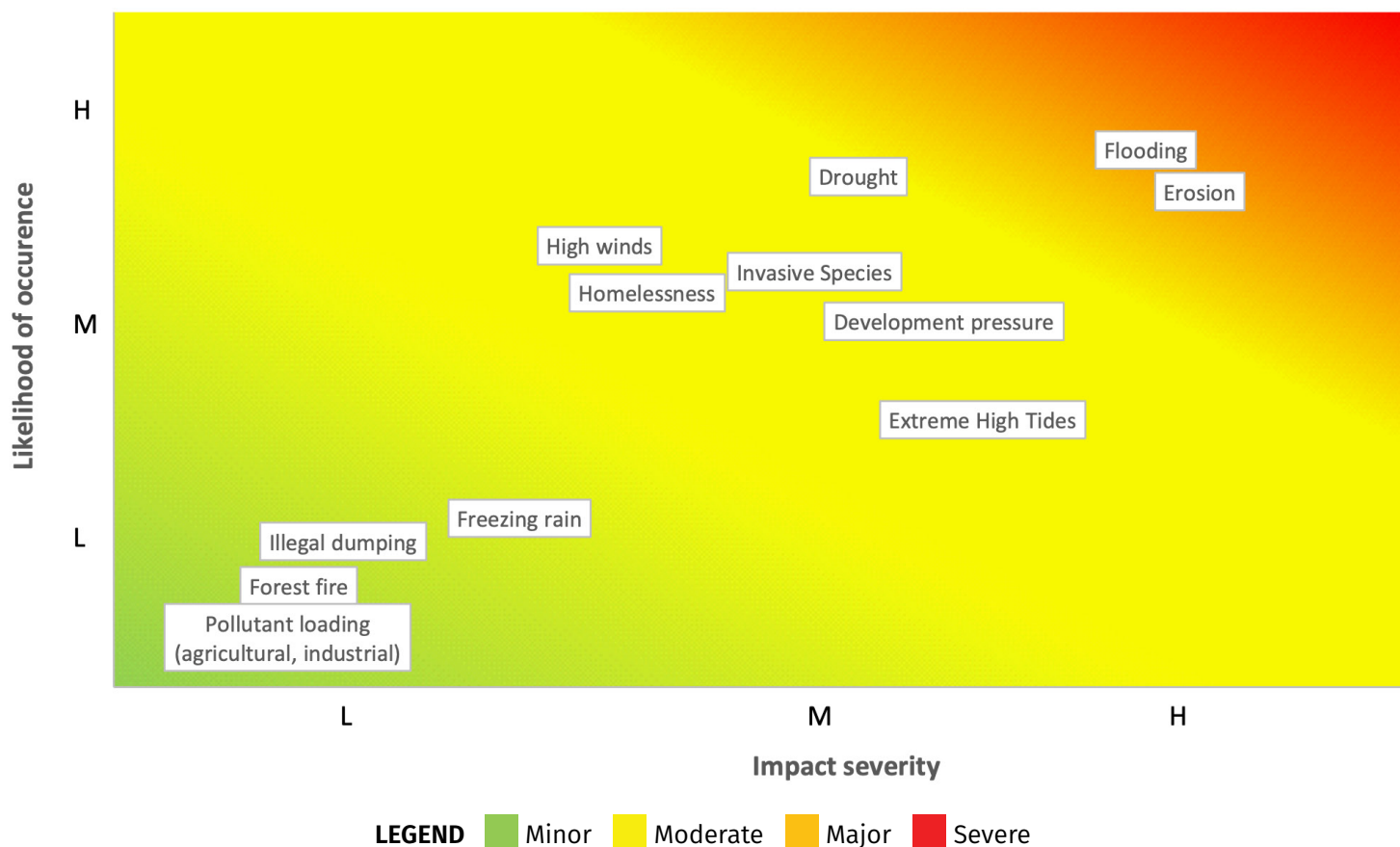


Figure 7: Results of risk management process

6 Recommendations

This section provides insights that can be gained from considering both the inventory - including the condition and risk assessments - and the asset management readiness assessment. It is divided into (a) potential priorities for the local government (b) possible actions for the further development of the inventory, and (c) steps the City of Moncton can consider to advance to a full natural asset management initiative.

6.1. Potential priorities for the City of Moncton

Combining the results of the condition assessment with the outcomes of the risk identification highlights potential priorities that the City of Moncton could focus their natural asset management efforts. These are:

- **Flooding/erosion:** The City of Moncton identified flooding/erosion as a high-level risk with potential impacts to watercourses, wetlands, the surface water reservoir, and city parks. Increased incidents of coastal and overland flooding are associated with rising sea levels, heightened risk of hurricanes, and extreme precipitation events due to climate change⁷. In turn, flooding associated with increased run-off, storm outfalls in tidal rivers, and hurricanes can lead to erosion and further impacts to natural assets, built infrastructure, property, local economy, and personal health and safety. The City of Moncton has implemented environmental monitoring, adopted a Climate Change Adaptation and Flood Management Strategy in 2013, and initiated a Flood Mitigation Study for Two Residential Areas in 2018.⁸
- **Drought:** The City of Moncton identified drought as an unmanageable medium-high level risk that impacts watercourses, wetlands, the surface water reservoir, city parks, forests and street trees. Warmer summers and heat waves can lower water levels in wetlands, creeks, streams and reservoirs and contribute to the loss of trees and fish habitat, threaten species, and increase disease outbreaks. While a number of water conservation measures have been implemented⁹, including remote automated meter reading, educational outreach, and a water use by-law, the 2013 Climate Change Adaptation and Flood Management Study identified an additional set of proposed solutions. These include weather/environmental monitoring for drought and fire management planning that takes drought into account.¹⁰ MNAI recommends that the City of Moncton revisit any actions not implemented following the 2013 study and include the role of natural assets in mitigating drought.

⁷ City of Moncton, 2020.

⁸ City of Moncton, 2013.

⁹ City of Moncton, 2021.

¹⁰ City of Moncton, 2020.

TABLE 6: RISK MITIGATION STRATEGIES

Accept	Risk may be acceptable if probability and consequences are small
Minimize	Risk under local government's control that warrants exposure reduction
Share	Partners in a project permit the sharing of larger risks to reduce it for each
Transfer	Insurance, fixed price contracts, and other risk transfer tools

Table 6 lists and provides brief descriptions of risk mitigation strategies.

Opportunities to strengthen natural asset management at an organization-wide level

The City of Moncton would benefit from updating its asset management policy to explicitly recognize the role of natural assets in service delivery and treat natural assets like other core infrastructure. Staff also noted they could strengthen the linkage of their policy with other processes such as the annual Capital Works and Operational budgets to ensure that budgets reflect the principles of the policy.

Staff noted that to make progress, its asset management team should meet more regularly to review and update its list of priority actions. While the City of Moncton has identified champions for asset management, they are not yet officially recognized. Therefore, it is recommended that the champions group be formalized with terms of reference, defined roles, and job descriptions. Staff suggested the City of Moncton could consider creating an asset management division, which has been done by similar-sized municipalities. As any changes are made, the group should ensure they assign responsibilities for incorporating natural asset management into the city's asset management practices.

Staff noted the need to link asset management data and financial data in one system. As well, because asset investment planning is not done consistently across departments using the same criteria, staff suggested that the City of Moncton would benefit from adding structure to asset investment planning to ensure common guidelines and metrics are used throughout the organization. Staff also noted that its asset management plans were completed in 2018, and that the City of Moncton needs to establish a time frame for updates. Once that timeframe is determined, MNAI recommends the City of Moncton includes natural asset management-related activities. Staff also suggested that while the City of Moncton has five-year plans for engineered assets, they could be better integrated if they were brought together into an overall plan (e.g., for engineered assets, park assets, facilities). Related to this, staff also noted that performance measures should be better structured across the organization; should this proceed, natural asset management considerations should be included.

Through this project, the City of Moncton has begun to address what staff believes is its top priority for natural asset management: developing its inventory. They noted education will be required among staff and elected officials regarding the concept of natural assets and their benefits. A recommended step is therefore to develop a communications plan related to this inventory project to share results and potential next steps.

6.2. Possible actions for the further development of the inventory

Based on the inventory, the City of Moncton could consider the following, regardless of whether or not it pursues a full natural asset management process. These are mostly incremental measures.

- Expand the risk identification to include field verification of results.
- Determine acceptable levels of risk to the City of Moncton's risk mitigation strategies (see Table 6).
- Further develop the condition assessment and risk assessment for creeks and rivers (the identified priority assets) using local climate projections, land use modelling, and other data already at their disposal.
- Identify linkages between services and assets and assess the condition of, and risks to, the assets from the perspective of their ability to deliver services. From a water supply and stormwater management perspective, watercourses, wetlands and forested areas in the watersheds will be key.
- Share the inventory with adjacent local governments to stimulate collaboration within the watershed.
- Initiate or enhance monitoring - for example, using gauges, water level sensors, and loggers to improve understanding of trends, feed into condition ratings of assets, and gather information for modelling.
- Schedule regular updates (e.g., every 3-5 years) of the inventory, condition assessment and risk identification to understand trends.
- Maintain interest and momentum in natural asset management to move towards a full natural asset management project.

6.3. Steps to a full natural asset management project

If the City of Moncton wishes to proceed with a full natural asset management project, including implementation, it will need to consider the following steps:

- 1/ Confirm scope, roles and responsibilities.** Undertake a meeting or workshop to confirm (a) assumptions [for example, that water management and development pressure are the primary services of concern] (b) roles, responsibilities, and capacities (c) community capacity to undertake a larger project.
- 2/ Fill essential knowledge gaps.** If discussions on scope and certainty and related data needs for modelling indicate the need for additional data, these could be filled.
- 3/ Modelling.** Modelling the levels of service that natural assets currently provide and the levels of service under different potential management, local climate change projections, and rehabilitation or restoration scenarios, is central to natural asset management as it gives communities the ability to explore how different actions will affect the health and corresponding performance of natural assets.
- 4/ Economic assessment.** The economic assessment component provides a market-based indication of (a) the current value of the services from natural assets if they had to be provided by an engineered means, and (b) the costs and values of different interventions in terms of service delivery.
- 5/ Planning.** This step allows local governments to explore different scenarios such as “what happens to the services provided by the wetland if there is significant building upstream?” or “what happens to the services if the forest is restored?” Using modelling, changes in service levels can be understood and quantified. Corresponding values can also be determined through continued economic assessment. Based on the foregoing, local governments can begin to consider and prioritize actions ranging from status quo to planning, regulatory, financial operations, maintenance, acquisition, and monitoring interventions.
- 6/ Implementation.** MNAI can provide ongoing advice / guidance on policy pieces and integration of the above information for 12-18 months. After that, the local government, together with local partners and service providers, would ideally have the capacity to continue these efforts on their own.
- 7/ Ongoing monitoring.** It is essential to continue monitoring the project to learn whether interventions are working and to share lessons and learnings from other communities undertaking natural asset management. MNAI would typically stay involved with the community for three years through a monitoring arrangement to be established with the communities.

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Annex: Results of the City of Moncton's risk identification

This Annex contains the results of the City of Moncton's use of MNAI's risk identification tool, which they self-administered with guidance from MNAI. Table 1 was the main product that personnel developed from the exercise.

Step 1: Identification of risks

Common Risks to Natural Assets:

- Overuse of trails/dumping
- Flooding (current and future)
- Forest fire
- Invasive species
- Development pressure
- Pollutant loading from urban, agricultural, or industrial sources (e.g., overuse of salt on roads)
- Drought (current and future)
- Erosion
- Ice jams
- Storm surge
- Lack of flood hazard mapping
- Lack of land management plans
- Lack of monitoring reports
- Construction activity
- Political policy change

Step 2: Complete survey

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
1. Illegal dumping	L	Watercourses, wetland, surface water reservoir, City parks, forest	City-wide with an emphasis along trails, end of access roads, etc.	*manageable to an extent
2. Flooding/Erosion	H	Watercourses, wetland, surface water reservoir, City parks	City-wide with an emphasis along watercourses	*can become unmanageable without flood protection
3. Forest fire	L	City parks, forest, street trees	City-wide	Risk is currently low. Could be higher in the future due to climate change. *unmanageable
4. Invasive species	M	Watercourses, wetland, surface water reservoir, City parks, forest, street trees	City-wide with an emphasis on Irishtown Park and Turtle Creek Reservoirs	Currently experiencing Blue Green Algae in some lakes and surface water reservoirs. *Could become unmanageable
5. Development pressure	M	Watercourses, wetland, forest	Undeveloped areas within the Urban Boundary that are not parkland	*manageable
6. Pollutant (agricultural, industrial, etc.)	L	Watercourses, wetland, surface water reservoir, forest	City-wide with an emphasis near industrial zones and on roadways (salt usage in winter)	Not a lot of agricultural or industrial pollution sources. *manageable
7. Drought	M-H	Watercourses, wetland, surface water reservoir, City parks, forest, street trees	City-wide	*unmanageable
8. Freezing rain	L	City parks, forest, street trees	City-wide	*unmanageable

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
9. Extreme high tides	M	Watercourses, wetland, City parks	Areas adjacent to Petitcodiac River, Hall's Creek, and Humphrey's Brook. Watercourses mentioned above are all tidal.	Some areas in the City are lower than extreme high tide elevation, which makes them vulnerable to flooding and erosion.
10. High winds	M	City parks, forest, street trees	City-wide	*unmanageable
11. Homelessness	M	Watercourses, wetland, City parks, forest	City-wide with and emphasis within the Business Improvement Area (St-George to Assumption and Vaughan Harvey to King)	Homelessness is increasing in the City, which also reflects increased amount of debris and trash in forest, city parks, and along various watercourses. *manageable to an extent

Municipal Natural Assets Initiative

