

Preparing
**Northwest New Brunswick
Communities**
for a Natural Asset Management Initiative

Initial Project Results and Roadmap
April 2020

Municipal Natural Assets Initiative



INVEST IN NATURE

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.

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CONVENING ORGANIZATIONS



Commission de services
régionaux Nord-Ouest



Northwest Regional
Service Commission



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OVERVIEW



Historically, many communities in New Brunswick settled in areas along the rivers, which has made them vulnerable to periodic inland and coastal flooding. The flooding has substantially increased the number of disaster financial assistance programs triggered in the province, leading to a growing urgency to address the challenge (Province of New Brunswick, 2014).

The Municipal Natural Assets Initiative (MNAI) and others have documented growing evidence that numerous interventions at different scales can reduce flooding risks, and that municipal natural asset management is one of them. For example, natural assets such as wetlands, green spaces and forests can store rain water and slow its release, thus supporting stormwater management and flood mitigation. Healthy, well-managed natural assets can also be resilient and adaptable, provide reliable services in a changing climate, and provide levels of service that meet or exceed regulatory standards (MNAI 2017a, 2020).

Within this context, elected officials, municipal employees, representatives from First Nation communities, and organizations from Northwest Regional New Brunswick began meeting in 2019

to determine the role that natural assets such as forests, wetlands and green spaces could play in mitigating inland flooding and increasing resilience to climate change [CSRNO 2019].

These discussions led the communities of Saint-André and Drummond, together with the Northwest Regional Service Commission (CSRNO), to work with MNAI between January – April 2020 to develop an inventory of their natural assets, which is the first step towards a more comprehensive natural asset program (CSRNO 2019).

Inventory results are summarized here together with a roadmap so the communities of Saint-André and Drummond can use them as the basis for full natural asset management efforts that, in turn, can support flood mitigation.

Saint-André and Drummond, together with the Northwest Regional Service Commission, are now in possession of the full inventory and data registry along with the means to update it as required.

BACKGROUND

GENERAL

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 services (MNAI 2018).

There are numerous ways local governments can manage the natural assets that provide sustainable municipal services and also protect their co-benefits, including directly through asset management and shared natural asset management, and indirectly through supporting policies, bylaws, plans and guidelines (MNAI 2018).

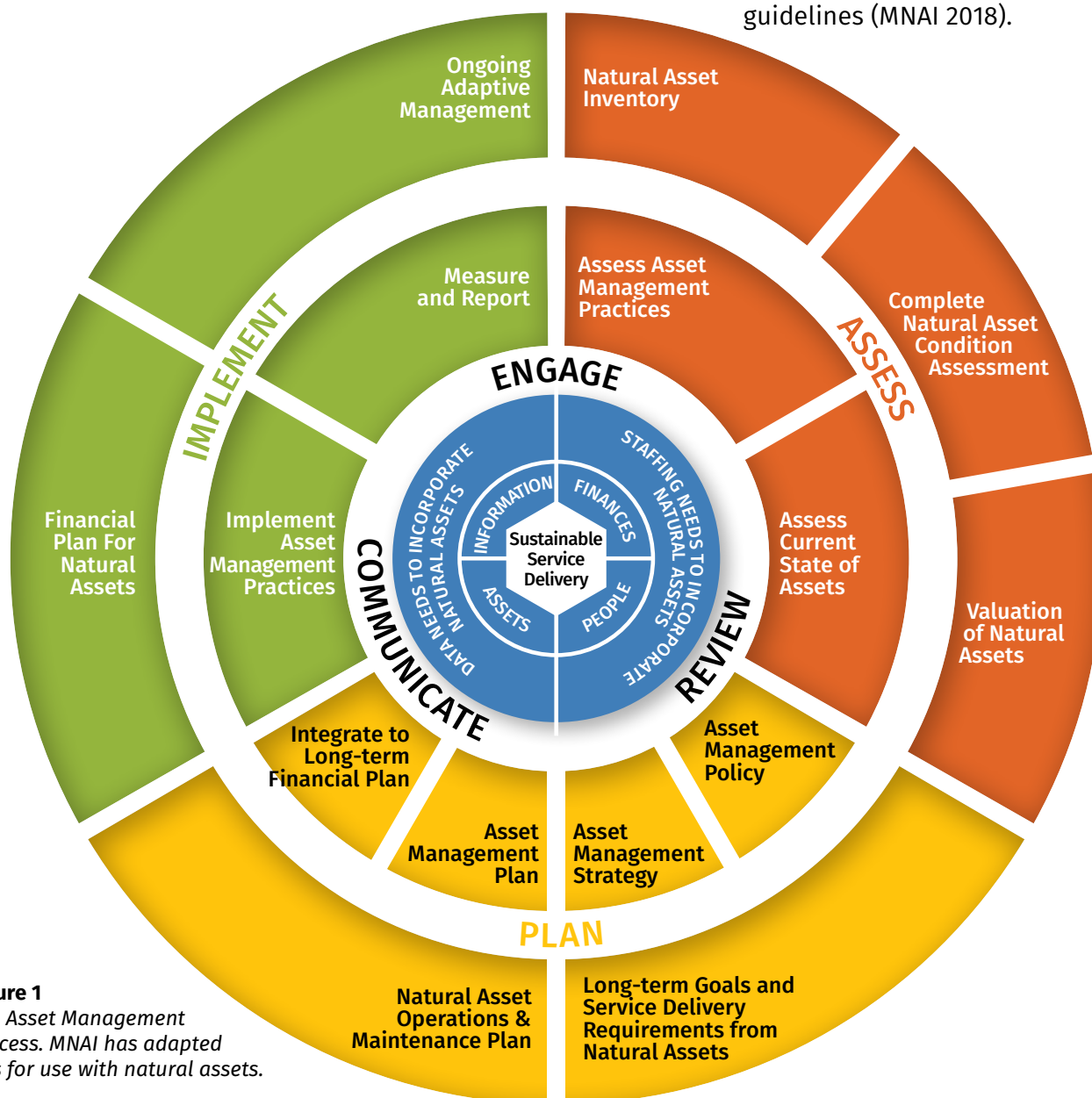


Figure 1
The Asset Management Process. MNAI has adapted this for use with natural assets.

BACKGROUND

Asset management for both natural and engineered assets generally follows the assess, plan and implement steps depicted above.

MNAI has methodology that is rooted in standard asset management, which, together with a range of supporting tools and technical advisory services, enables local governments to undertake the process of natural asset management. Some of these tools relate to the development of inventories, as described in more detail below.

INVENTORIES

A first step in the natural asset management process is the development of a **natural asset inventory**.

This inventory includes a list of the natural assets that provide services to a local government, an understanding of the services they provide, the physical boundaries of those natural assets, and should also encompass an understanding of the assets' condition and an identification of risks. A robust inventory can support all subsequent stages of natural asset management (MNAI 2019).

To ensure that local governments can integrate natural asset management into their asset management processes, natural asset inventories should:

- Share the same characteristics and structure as inventories used for engineered infrastructure assets.

- Be built into the same asset management system the local government is using, whether that is a basic spreadsheet or a more sophisticated software platform.
- Be developed within the context of the service delivery goals, objectives and capacities of the local government undertaking the work to ensure they are appropriate and beneficial.

As a subset of its overarching natural asset management methodology, MNAI has guidance, tools and templates for developing natural asset inventories. MNAI developed these from its experiences in the approximately 20 local governments with which MNAI has worked. As such, they are based on solid experience and have strong practical applicability, and this experience was used to support the efforts of Saint-André and Drummond. At the same time, the guidance, tools and templates remain far from exhaustive and continue to evolve, as does the nascent field of natural asset management more generally. Therefore, the lessons and feedback from this project will support further improvements to the method and tools.

MNAI's long-term objective is to elaborate all of its guidance, tools and templates to a point where it is an authoritative norm across Canada and thus enable natural asset management, including inventories, to be comparable, replicable and effective across local governments, regions and provinces.

PROJECT



COMMUNITY CONTEXT

Saint-André is a rural community in Madawaska County, and **Drummond**, approximately 12 km away, is a village in Victoria County, both in northwest New Brunswick. Their chief service delivery concerns relate to overland flooding, as opposed to riverine flooding from the adjacent St. John River.

CSRNO provides services to 10 municipalities, 13 service districts, and has partnerships with First Nations. It is not responsible for asset management, but does provide asset management mapping and management tools to communities within its local service branch. Saint-André and Drummond are not currently members of this service.

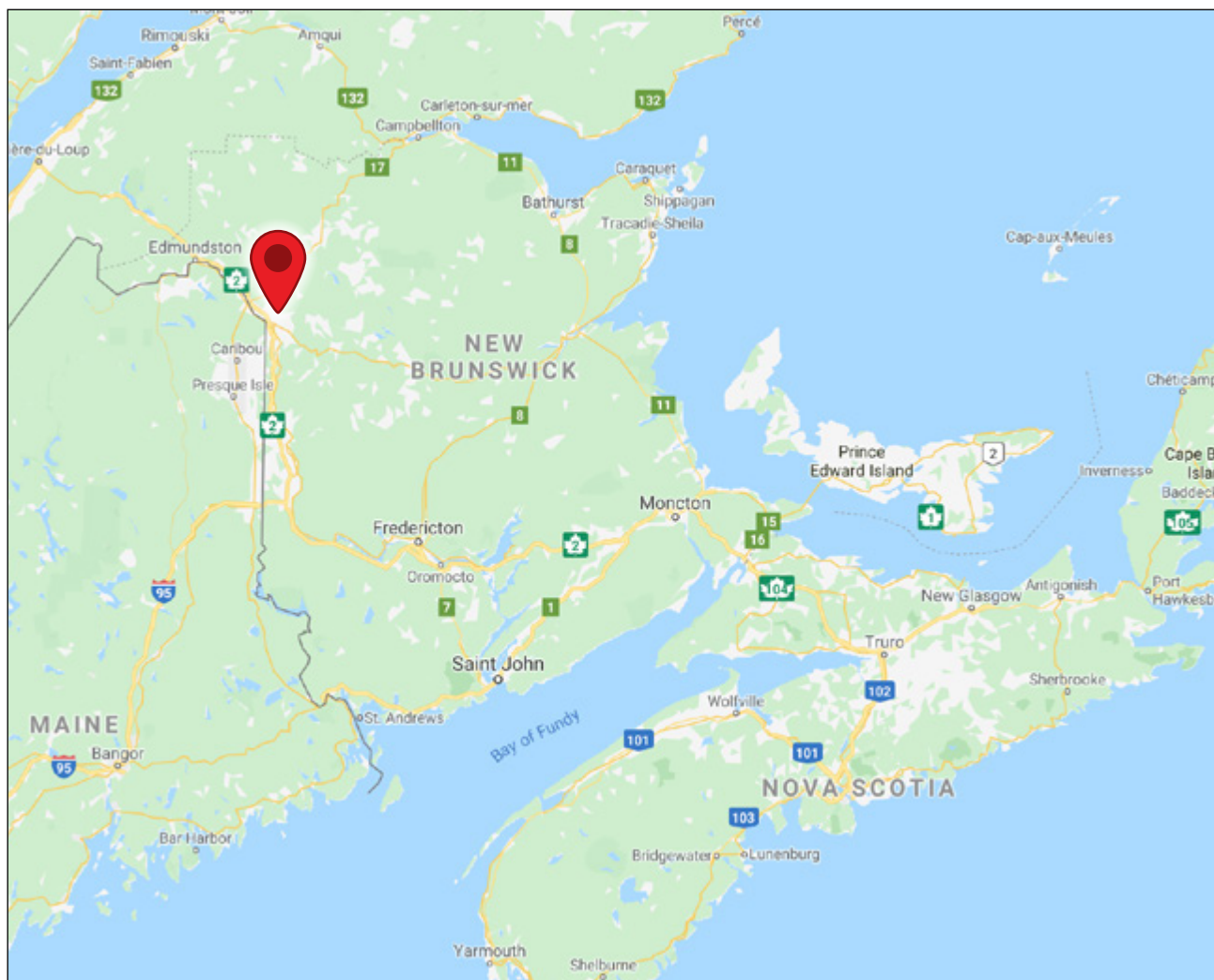


Figure 2
Saint-André and Drummond are located in northwest New Brunswick.

PROJECT

Points of particular interest in terms of flooding impact are in the immediate vicinity of communities, specifically Rue de L'Eglise in Saint-André, and Tobique Road in Drummond. Run-off related to heavy agricultural use is also a consideration for the communities.

Based on an asset management readiness assessment conducted by MNAI, overall, the communities of Drummond and St. André are at a very early stage of their asset management journey. More specifically:

- Both communities have engineered asset data in spreadsheets that conform to Canada's Public Sector Accounting Board reporting requirements.
- Drummond Village (population 737) has an asset management policy and committee, but has done only limited asset management and related financial management planning to-date. They do not have an engineer on staff and the larger community of Grand Falls takes on their planning responsibilities.
- St. André Rural Community (population 1,970) does not have an asset management policy or committee. They do not have an engineer on staff and do not undertake financial planning for asset management. The project with MNAI represents a first step toward asset management for the community.

INVENTORY DEVELOPMENT PROCESS

The key steps to developing the natural asset management inventory included:

STEP 1: MNAI provided its Technical Guidance document and a Technical Compendium, together with recent lessons in their use, to the communities for initial review.

STEP 2: CSRNO, Drummond Village, Saint-André Rural Community and MNAI collectively defined data needs for the project with the objective of addressing overland flooding.

STEP 3: MNAI guided Drummond Village and Saint-André Rural Community through an adapted version of the Federation of Canadian Municipalities Asset Management Readiness Scale to determine their level of capacity and readiness to undertake natural asset management.

STEP 4: Data were gathered, assessed for relevance, sorted and cleaned for use in the inventory.

STEP 5: CSRNO, Drummond Village, Saint-André Rural Community and MNAI convened in a webinar to discuss municipal services and future scenarios of greatest interest in the watershed, and to determine an approach for assessing the condition of natural assets and identifying potential risks to the natural assets.

STEP 6: MNAI added a characterization of natural asset condition and potential risks to the data.

STEP 7: MNAI then compiled the data into a registry and dashboard, as described in more detail below.

STEP 8: MNAI made a final presentation of the data management and visualization framework to the communities; made all of the compiled data, inventories and dashboards available; and held an initial discussion about next steps.

INVENTORY RESULTS

The inventory that resulted from the project has three main elements: **an underlying asset registry**; a **dashboard-style expression of the data**; and a **data management framework**, as follows.

UNDERLYING ASSET REGISTRY

As noted, data were gathered from numerous different sources and then sorted and analyzed for relevance. The table below lists the main sources used.

However, not all the information in these sources is relevant to the inventory, or presented in a format useful in asset management. Accordingly, MNAI extracted data of greatest use to the community such as land-cover type, area, and governance, as illustrated below, and placed it into the same asset management data structure used for engineered assets. This helps ensure that the natural asset inventory can be used within a single asset management system. The use of asset identification numbers allows individual assets to be selected, analyzed, and the corresponding data manipulated as required.

DATA
Land cover
Forest composition (age, species)
Forest canopy
Forest management plans and forest harvest data
Wetlands (type) and waterbodies
Watershed boundaries
Subwatersheds
Road networks
Parks and protected areas
Land ownership
Emergency Service Zones
Zoning
Crown Lands
Protected Watersheds
AAFC Data
Open Street Maps, Roads and Trails
Global Man-made Impervious Surface (GMIS)
Slope of watersheds
Northwest Erodibility
Climate modelling results
Soil classification

 Reviewed  Future Work

Figure 3
Data sources reviewed for the inventory.

PROJECT

ASSET ID	SUBWATERSHED	LANDCOVER	AREA (ha)	GOVERNANCE
26	Boutot Brook Composite	Urban / Residential	0.37	Crown Lands
27	Boutot Brook Composite	Urban / Residential	0.03	Crown Lands
42	Boutot Brook Composite	Agricultural	0.13	Crown Lands
46	Boutot Brook Composite	Urban / Residential	0.00	Crown Lands
51	Boutot Brook Composite	Recreational	2.90	Crown Lands
85	Boutot Brook Composite	Recreational	0.23	Crown Lands
93	Boutot Brook Composite	Recreational	0.17	Crown Lands
154	Boutot Brook Composite	Agricultural	0.93	Crown Lands
229	Boutot Brook Composite	Agricultural	0.05	Crown Lands
237	Boutot Brook Composite	Agricultural	0.40	Crown Lands
267	Boutot Brook Composite	Transportation / Utility	0.67	Crown Lands
330	Boutot Brook Composite	Transportation / Utility	9.96	Crown Lands
335	Boutot Brook Composite	Urban / Residential	0.00	Crown Lands
352	Boutot Brook Composite	Urban / Residential	0.00	Crown Lands
361	Boutot Brook Composite	Urban / Residential	1.14	Crown Lands
363	Boutot Brook Composite	Transportation / Utility	0.05	Crown Lands
...
TOTAL			62,380.51	

Figure 4

Part of the asset registry extracted from the data sources.

DASHBOARD-STYLE EXPRESSIONS OF DATA

Data can be expressed in a simple list form as above, but it provides more insights when characterised in meaningful, visual ways.

Accordingly, MNAI used the data in the underlying asset registry to represent the data in different ways that correspond to community needs.

For example, the Asset Diversity Ranking (Figure 5) diagram shows species diversity of landcover in sub-watershed within the project area and Figure 6 shows permeability, with both variables being proxies for natural asset health.

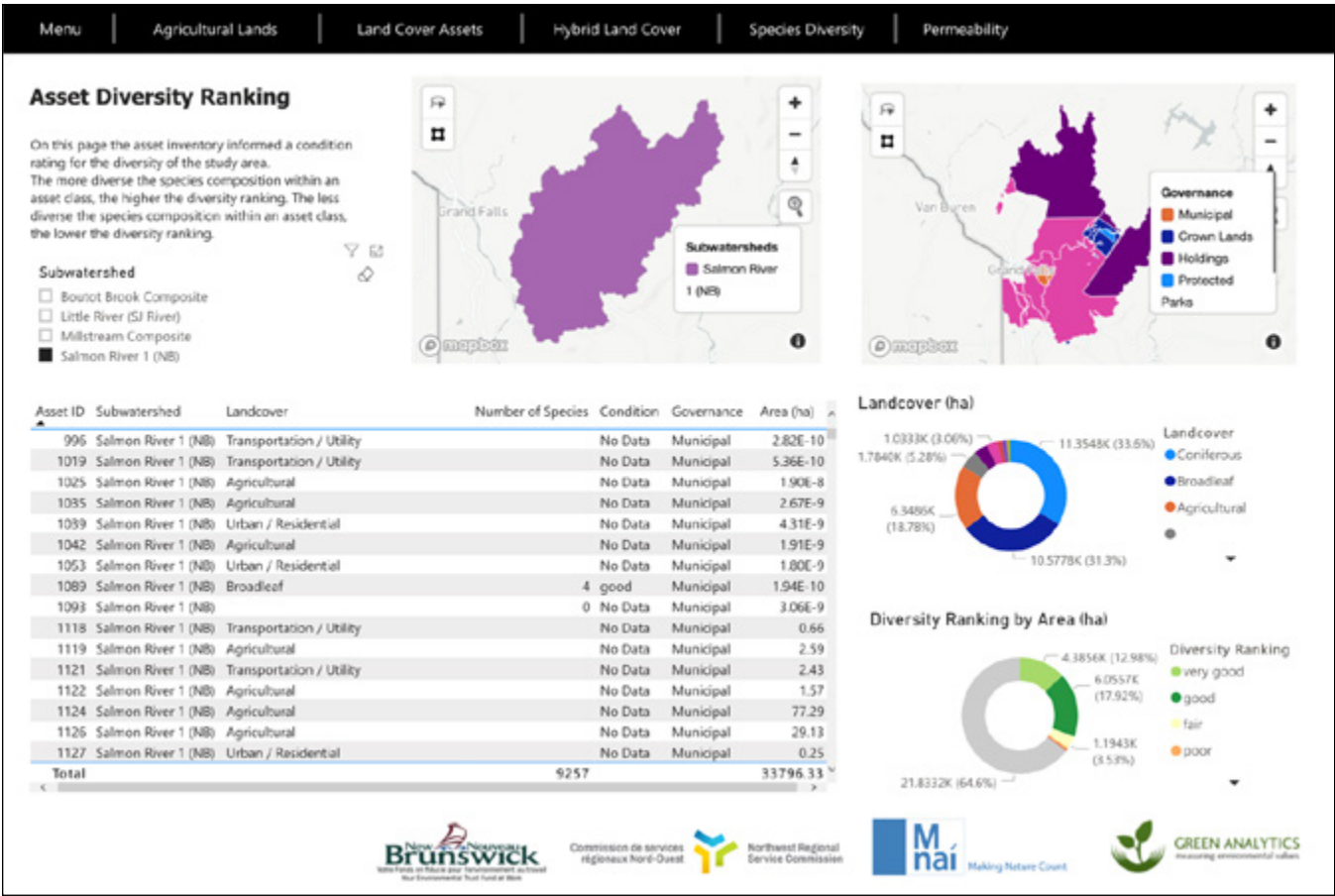


Figure 5
Species diversity depicted in the dashboard as one way to understand asset health.

PROJECT

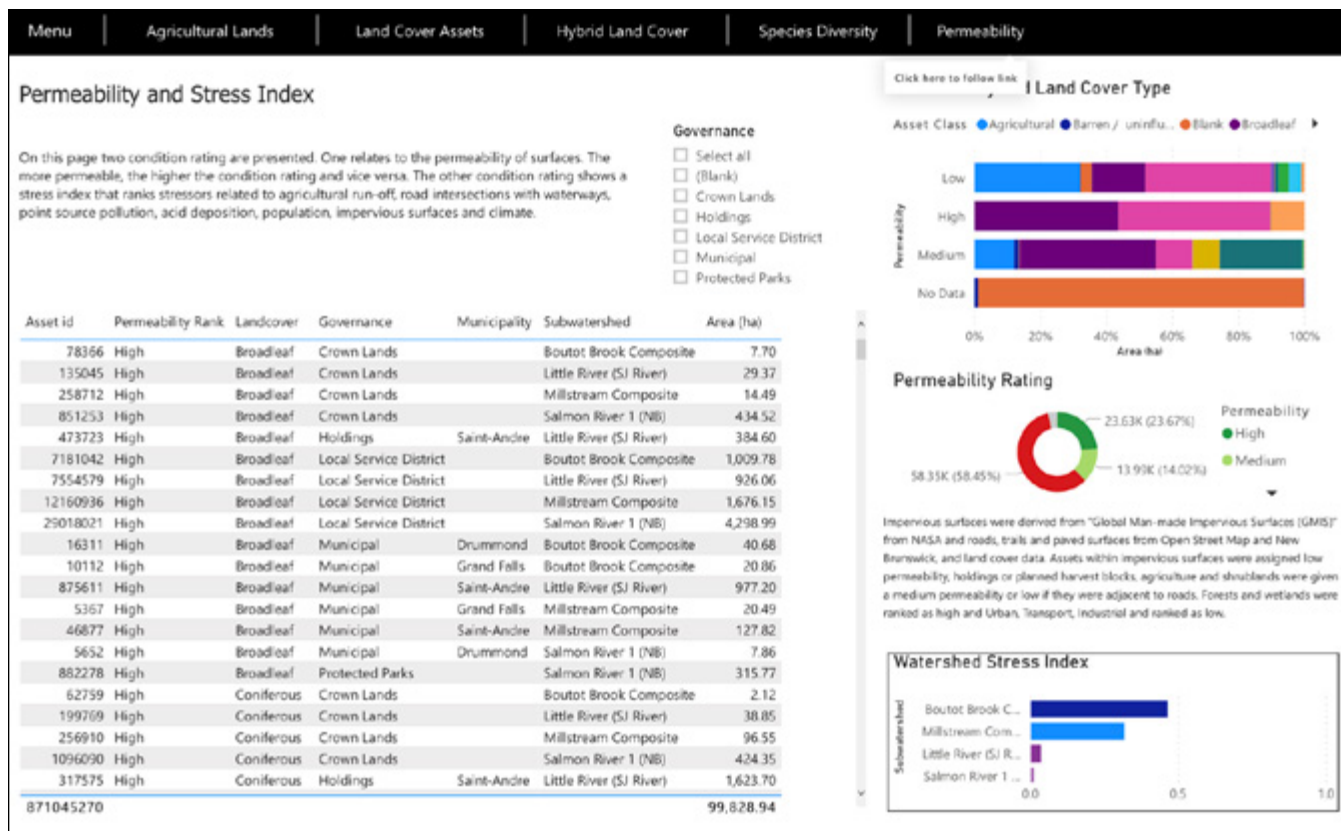


Figure 6

Asset permeability and stress as other proxies for condition, risk and health of natural assets.

DATA MANAGEMENT FRAMEWORK

The underlying asset registry can be expanded as new information becomes available. For example, asset condition might improve as a result of restoration efforts, or additional studies may be conducted in the watershed over time. These changes can be reflected in the depth and breadth of the underlying asset registry and how it is expressed in the dashboard. Furthermore, this inventory was developed with the current capacities and asset management readiness of the communities, as

identified in Step 3 of the inventory development process above. The level of detail desired may evolve as asset management readiness increases, or as areas of specific natural management interests emerge.

As such, the underlying asset registry and dashboard are not static entities, but rather provide a data management framework that can both be used immediately, and can continue to change and evolve over years in keeping with the needs and requirements of the communities.

INSIGHTS FROM THE INVENTORY

The inventory gives the communities of Saint-André and Drummond, together with the Northwest Regional Service Commission:

- A factual and visual basis for communicating the concept that natural assets provide services that the community relies upon.
- A basis for considering the extent of the reliance on the asset and the condition of, and risks to, their natural asset.

More specifically, the inventory indicates:

- The sub-watersheds surrounding the communities comprise significant natural assets – including 36,000 hectares of coniferous forest and 20,000 hectares of deciduous forest. These assets are likely to provide a range of services to the local residents that include carbon storage, storm-water management and water filtration, air purification, improvements to community health, wildlife habitat, recreation, and aesthetic value.
- The significant agriculture production, particularly in the form of potato farming, likely contributes to the low permeability of agriculture lands in the sub-watersheds and hence may be a factor in the degree to which assets provide stormwater management services.
- The condition of the assets from a species diversity perspective is either very good or good (for the areas for which data are available), which speaks to the overall ecological health of the region.

- A high portion of the study area is rated low permeability. This means it has limited ability to absorb and hence manage flood waters.

The data used to develop these insights were, in general, sufficient and robust as it was drawn from provincial (forestry) and federal (agriculture) sources. However, there is a notable data gap around large private land holding areas. There are some gaps around meta data (explaining the data available) and in some cases data were not available for the entire study area (e.g. the data used in the species diversity index).

Furthermore, improved data resolution (e.g. Lidar) will assist with filling data gaps (e.g. differentiating areas with overlapping land classes, identification of riparian buffers) and providing additional indicators of condition (e.g. tree age and height).

Nonetheless, the data contained in the inventory and registry provide the foundation for natural asset management and can be used to:

- **Start setting goals**
 - Given community values, as well as the natural assets and functions of highest importance, consider incorporating natural assets into related asset management plans and goals. To complete this step, it would be helpful to begin by identifying existing practices, tools and plans that are related to the management of natural assets (e.g. park plans, bylaws).

INSIGHTS FROM THE INVENTORY



■ Assess risk

- Overlay service risks onto natural inventory (i.e. maps or spreadsheets) to begin assessing the influence that natural assets have on risk levels.
- What assets are most at risk and what could be lost if no action is taken?
 - E.g. What areas are zoned for development and do they overlap with key natural assets?
- Compare existence of, or lack of, natural assets in areas experiencing frequent flooding, which could identify critical or priority natural assets.
 - Start gathering sources of local climate projects to prepare for assessment of how climate change will affect capacity of natural assets to provide services.

■ Identify opportunities

- Identify where natural assets and engineered assets are working together to provide services (e.g. at source water intake locations).
- Where are opportunities for protection or restoration? Based on those assets and risks you have identified, which should be protected or restored and which need attention now?
 - What future data needs to be collected?
 - Where should you collaborate with other land owners or managers?

At this time, the data alone are not sufficient to provide information related to service levels, asset values, or how assets will respond to changes in demand. The completion of modelling, scenario analysis and economic assessments would help fill these gaps and create a framework for on-going monitoring and maintenance of priority/critical natural assets.

ROADMAP

Saint-André and Drummond, together with the Northwest Regional Service Commission, would like to understand how the inventory can assist them to better manage their natural assets. This section describes a potential roadmap forward.

GENERAL CONSIDERATIONS

Understanding the location, type and condition of natural assets that provide services to local governments underpins most other steps in the asset management cycle [Figure 1]; thus, the inventory is a vital first step.

However, inventories are normally not an end in themselves, and must also be considered within the context of the larger asset management process within which they reside.

Inventories should grow in detail and sophistication only insofar as they remain aligned with the capacity of the communities to maintain them, or 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 at the core of asset management [[see centre of Figure 1](#)].

More specifically, the Maturity Assessment completed with participating communities points to the following needs:

1. Policy & Governance

- Senior management needs to recognize the role of natural assets in service delivery, which is reflected in a formal asset management policy and program.
- Local government needs to identify the benefits they want the natural assets to deliver in their organizational objectives.
- Identification of short-term actions that incorporate natural assets in asset management.

2. People & Leadership

- Asset management staff is sufficient to ensure a holistic and effective approach that can integrate natural asset management into the Asset Management requirements [Note: CSRNO staff could provide essential information to the asset management team].
- A natural assets champion within the Asset Management program.
- Council awareness of resourcing and funding needed to incorporate natural asset management into Asset Management system requirements and an asset management roadmap.

ROADMAP

3. Data & Information

- Awareness of common or emerging approaches for measuring the condition of our natural assets, and their performance in supporting municipal service delivery. Existing plans and studies may provide initial information.
- Financial data that put a value on the natural assets that support municipal service delivery.

4. Planning & Decision-making

- Development of a documented approach to managing or protecting the natural assets that support municipal service delivery.
- Development of formal natural asset management plans.
- Annual capital and operating budgets that include operations and maintenance costs for natural assets when they exist alongside grey infrastructure assets that are being maintained (e.g. culverts, roadside ditches, etc.).

SPECIFIC CONSIDERATIONS

The section, Insights from the Inventory, above, notes some of the limitations to this inventory. Specific actions that could be taken to address these include:

- Prioritizing services and hence assets, which would be a function of determining which services the assets are currently delivering, what their condition is, what risks are applicable to them and what opportunities for conservation, restoration or enhancement might increase the service provision from the assets.
- Further developing the condition assessment and undertaking a risk assessment using the CSRNO modelling results (soil erodibility, climate projections) and other data already at their disposal.
- Linking specific services to assets and assessing the condition of and risks to the assets from the perspective of their ability to deliver services. From a stormwater management perspective, the forested areas in the sub-watersheds will be key.
- Considering how natural assets in and around agricultural lands could be enhanced to increase stormwater management services in the area.
- Adding more condition ratings - for example, canopy cover, which also links to stormwater management services.

- Examining how urban development, forestry, or other pressures could increase the risk to the assets.
- Initiating monitoring data, such as staff gauges, water level sensors, and loggers to improve understanding of trends, feed into condition ratings of assets, and gather information for modelling.

OPTIONS AND ACTIONS

Saint-André and Drummond, together with the Northwest Regional Service Commission, are now at a place where they can choose one of two main options:

1. **Status quo** - maintain their natural asset inventory primarily as it is, with the understanding that an inventory without corresponding action is primarily limited to an awareness-raising and communications tool; or
2. **Define and pursue next steps** in the natural asset management cycle, which may or may not affect the contents of the inventory in terms of its scope, contents or the level of certainty provided by the data it currently includes.

If Saint-André and Drummond, together with the Northwest Regional Service Commission, pursue Option 1, then little additional effort is required at this stage beyond establishing a means to keep the inventory up-to-date within their capacity, and potentially making some incremental changes to address some of the issues noted in Specific Considerations.

If, by contrast, they wish to proceed with a full natural asset management project, including implementation, then they would need to consider the following steps:

1. **Confirming scope, roles and responsibilities.** Undertake a meeting or workshop to confirm (a) assumptions [for example, that overland flooding is the primary service of concern]; (b) roles, responsibilities and capacities; and (c) community capacity to undertake a larger project.
2. **Filling 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 and economic assessment.** Modelling the levels of service that natural assets currently provide, and the levels of service under different potential management, 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. The economic assessment component provides a market-based indication of the costs and values of different interventions in terms of service delivery. This answers questions such as “*what happens to the services provided by the wetland if everyone builds upstream?*” or “*what happens to the services if the forest is restored?*”

ROADMAP



4. **Planning.** Based on the foregoing, the communities will have the opportunity to undertake actions ranging from status quo to planning, regulatory, financial operations, maintenance, acquisition and monitoring interventions. These would occur during the natural asset management planning phase and MNAI would be able to provide technical support as required throughout.
5. **Implementation.** MNAI can provide ongoing advice / guidance on policy pieces and integration of the above information over a period of 12-18 months. After this point, the community, together with local partners and service providers, would ideally have the capacity to continue these efforts on their own.
6. **Ongoing monitoring.** Project monitoring is essential 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 a period of 3 years through a monitoring arrangement to be established with the communities.

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