

Integrating Natural Assets into Asset Management



A Sustainable Service
Delivery Primer

2019

A companion
document to Asset
Management for
Sustainable Service
Delivery: A BC
Framework



Integrating Natural Assets into Asset Management is one of a series of primers developed to expand upon concepts in Asset Management for Sustainable Service Delivery: A BC Framework. Other primers, and the BC Framework are available on the Asset Management BC website: www.assetmanagementbc.ca.

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Asset Management Framework and Primers

This primer is one of a series of primers that are provided to expand upon concepts in Asset Management for Sustainable Service Delivery: A BC Framework. While the content in this primer can be used alone, we recommend reading it in conjunction with the Framework. The other primers can also provide additional context and insight into the asset management process.

Primers in this Series

- Climate Change and Asset Management
- Integrating Natural Assets into Asset Management
- The Role of Operations and Maintenance in Asset Management
- Land Use Planning and Asset Management

Who Should Read This?

The Asset Management Framework and Primer series are designed for local government staff. Asset management is an inherently multidisciplinary process. This content is relevant for all departments / disciplines involved in asset management.

Introduction

The sustainability of core service delivery is a concern for local governments across Canada. The 2016 Union of BC Municipalities report titled *The Status of Asset Management in British Columbia*¹ illustrates how local governments in BC are engaged in improving their asset management practices to effectively manage this concern, but challenges remain. Reinvestment in infrastructure is below the low end target recommended by asset management practitioners², and local governments struggle to implement levels of preventative maintenance required to manage risk and extend the life of assets. Climate change is introducing new stresses on assets, decreasing lifespan and making it more difficult to deliver levels of service. Rather than continuing to attempt to do more with less, local governments have an opportunity to do things differently - and achieve better results - by including natural assets in asset management processes.

Natural assets support the delivery of core local government services, while doing so much more. The functions that nature provides to communities beyond core services, such as recreation, climate regulation, clean air, habitat, and biodiversity are invaluable to the overall health and well-being of a community. Including natural assets in asset management processes provides an integrated approach to maintaining or enhancing the natural assets in a community.

Asset management processes have traditionally been applied only to engineered infrastructure. However, there is growing evidence that by considering natural assets within asset management processes, local governments can decrease capital, operations, and maintenance costs; increase levels of service; enhance their ability to adapt to climate change; and reduce the community's unfunded liabilities – all while protecting or enhancing the multitude of other benefits that natural assets bring to communities.

¹Union of BC Municipalities, October 2017.

²Informing the Future: Canadian Infrastructure Report Card, 2016

Natural assets such as wetlands, forests and streams, for example, store rainwater, reduce flooding, and thereby offset, complement or in some cases eliminate the need for, engineered solutions.

Furthermore, they can often do so at lower costs as most natural assets have limited capital costs, can have lower operating costs, and may be more resilient to the effects of climate change than engineered alternatives³.

Therefore, natural asset management can offer a solution to aging infrastructure and service delivery risks, while combatting ecosystems decline. These benefits are available to all local governments, not just those with advanced asset management practices.

Significant strides have been made in natural asset management in British Columbia and across Canada. Several initiatives have built on each other, forming a foundation for local governments to increase their consideration of the potential of natural assets. Important initiatives include:

- In 2008, Living Water Smart: British Columbia's Water Plan set the tone for more careful consideration of natural assets, emphasizing their important role in flood protection and climate change adaptation. Furthermore, the plan highlighted the importance of considering the full economic, environmental, and social benefits of green infrastructure on community development. Living water smart is being implemented through British Columbia's Water Sustainability Act, which came into effect on February 29, 2016.

FROM ENVIRONMENTAL PROTECTION TO SUSTAINABLE DELIVERY OF CORE SERVICES

Local governments have long had environmental protection tools in place, such as integrated stormwater management plans, source water protection plans, riparian area setbacks, and erosion and sediment control measures. These are important tools; however, their scope is limited. These tools typically focus on protecting natural assets for a narrow set of environmental functions, rather than managing them for the role that they play in the delivery of core services. Integrating natural assets into asset management processes is not a replacement for these tools, but it is necessary to developing a full understanding of the role of natural assets in sustainable service delivery and how local governments can integrate the protection, maintenance, and enhancement of these assets into strategic and operational decision-making.

³See MNAI 2017 case studies for example

- The Town of Gibsons pioneered the inclusion of natural assets in asset management processes. The original Gibsons' approach is now being refined and replicated in communities across Canada with guidance and support from the Municipal Natural Asset Initiative.
- Since the launch of Asset Management for Sustainable Service Delivery, A BC Framework, the Partnership for Water Sustainability in BC has recognized asset management as a process for achieving sustainable watershed systems. The Partnership has worked with the provincial and local governments to promote, pilot, and support the adoption of this approach.

This primer builds on the foundations established by these initiatives.

Purpose of this primer

This primer is for staff of local governments in BC and is intended to help them capitalize on the real and immediate benefits of managing their natural assets. It introduces an approach for including natural assets throughout the asset management process.

It provides an overview of the following topics:

- Foundational key concepts
- Why include natural assets in asset management
- Initial ideas on how to include natural assets throughout the Asset Management process

This primer is a companion document to Asset Management for Sustainable Service Delivery, A BC Framework (the Framework) and builds on the concepts and asset management process in the Framework.

Key Concepts

Natural Assets

Natural assets are the stock of natural resources or ecosystems that are relied upon, managed, or could be managed by a local government for the provision of one or more services to a community⁴. They provide critical services and functions to communities both on their own and as part of infrastructure systems with engineered assets, including:

- Soil quality and stability
- Flood protection
- Drainage and rainwater attenuation
- Water treatment and storage
- Recharge of aquifers, rivers and creeks
- Recreation
- Climate regulation
- Habitat and biodiversity
- Air quality regulation
- Health and well-being

Although all communities have natural assets, the benefits that can be gained from managing them have been poorly understood or overlooked. Historically, standard processes for planning, engineering, and operations have not considered the services that natural assets provide to communities, or the

⁴"Primer on Natural Asset Management" Municipal Natural Asset Initiative.

impact of development and operations decisions on these assets and services. Natural assets are not inherently better or worse than engineered assets; the types of assets function together and rely on each other and therefore need to be managed as a system. Today, there is an opportunity available to local governments to realize multiple benefits by including natural assets in asset management processes.

Managing Natural Assets

The goal of asset management is sustainable service delivery. Achieving this goal requires asset management processes that consider whole infrastructure systems, recognizing both natural and engineered assets and the interactions between them. Asset Management for Sustainable Service Delivery, A BC Framework lays out the foundational principles of asset management and can be used by local government as a tool to start applying an asset management process.

Including natural assets in asset management processes is not about treating engineered and natural assets in exactly the same way. For example, an inventory of engineered assets may include different attributes than an inventory of natural assets; depreciation of natural assets and engineered assets will not be determined in the same way – and in some cases, natural assets can appreciate over time. The aim is to ensure that relevant information about natural assets are included in the overall process of assess, plan, and implement to allow evaluation of trade-offs between service, cost and risk. How to do this is outlined in the later sections of this primer.

The management of engineered assets is a process of continuous improvement, and so is the process of including natural assets in asset management processes. Eventually, through the process of including natural assets in asset management, natural assets, and the services they provide will be recognized throughout major local government functions.

RESULTS OF INCLUDING NATURAL ASSETS THROUGHOUT ASSET MANAGEMENT PROCESSES

Local Government Function	Results of Including Natural Assets in Asset Management Processes
Land use and development planning	<ul style="list-style-type: none"> ▪ Land use and development scenarios (at all scales) are evaluated for how they impact or benefit natural assets and how this impact translates to lifecycle costs and sustainable service delivery for local government. ▪ Brownfield / redevelopment can be leveraged to address the restoration of natural assets and services. ▪ Land use and development scenarios also recognizes natural systems, and the value the community places on the environment.
Infrastructure servicing	<ul style="list-style-type: none"> ▪ Natural assets servicing solutions are considered and evaluated alongside engineered asset solutions in terms of their current or potential ability to provide core services. ▪ New engineered infrastructure systems are designed to leverage, compliment and protect natural assets. ▪ Evaluation of infrastructure servicing options is based on multiple benefit criteria (economic, social, and environmental benefits) for today and the future. ▪ Renewal of infrastructure assets is done in a way that restores and protects natural systems, sometimes reducing the need for engineered assets.
Operations and maintenance (O&M)	<ul style="list-style-type: none"> ▪ O&M activities consider interaction between natural assets and infrastructure. ▪ O&M activities are undertaken to monitor, maintain, and enhance natural assets for their role in core service delivery as well as for environmental functions.
Budgeting and financial planning	<ul style="list-style-type: none"> ▪ Lifecycle cost evaluations consider solutions and services provided by natural assets as well as their potential resilience and adaptability in different climate change scenarios. ▪ Budgeting and long-term financial planning includes costs and savings associated with protecting, managing, monitoring and/or restoring natural assets. ▪ Development cost charge bylaws include appropriate projects required to restore or enhance natural assets for core service provision. ▪ Estimates of the infrastructure gap or unfunded liability considers risks to natural asset functions. ▪ Adding value and worth to ecological systems and services

THE IMPORTANCE OF FINANCIAL VALUATION

"the reality is that if you do not value the services from natural assets then you don't protect them. In many urban areas there is pressure to develop, and this often means destroying natural assets unless we understand their value. And once nature is gone, it can be hard to get back."

- Isabel Gordon, CFO,
District of West Vancouver

RESTORING BROOKLYN CREEK IN THE TOWN OF COMOX

After conducting an assessment of the hydrologic functioning of Brooklyn Creek, the Town of Comox concluded that decades of constructing engineered drainage infrastructure to collect and convey away rainfall had caused the creekshed to lose much of its capacity to spread, retain and infiltrate rainwater. This loss of functioning had contributed to increased flooding throughout the creekshed, leading the Town to construct a diversion facility in 2005 at the cost of \$1.98 million.

"At this juncture the Public Works Department, Parks Department and Brooklyn Creek Watershed Society collaborated to devise and adopt a long-range strategy to maintain and enhance the creek corridor and riparian areas. Since that time about \$780,000 has been invested in annual projects with funding provided by the Town of Comox, external sources, and donated labour and expertise by the Watershed Society and others. This enhancement work has been invested in lands owned and/or acquired by the Town for parks and greenway purposes (including 2.46 acres at the former Brooklyn Elementary in 2013 at a declared value of \$292,375). Overall, the investment secures ecological services: the stream corridor, riparian areas, fish habitat, portions of the urban woodlands, as well as natural areas to enhance parks, trails, etc. The investment also maintains the conveyance capacity of the creek which is part of the municipal drainage systems."

The Ecological Accounting Process was applied to obtain a financial value of \$2,705,000 per kilometre or \$2,705 per metre of the creek and riparian area.

"This commons asset approach provides a consistent method to place a financial value on ecological assets of this kind; that is, ecological services dependent on creekshed hydrology. As well, it indicates the amount of annual expenditure (say 1%) for maintenance that might be expected to protect the asset."

Partnership for Water Sustainability, Brooklyn Creek Demonstration Application, September 2018

Local Government's Role in Managing Natural Assets

A common challenge encountered in the process of managing natural assets is attempting to determine the responsible jurisdiction when natural assets are not located strictly on land owned by the local government. Examples include natural assets located:

- Partially or fully located on private property
- Located across multiple jurisdictions
- Managed under provincial legislation, such as the Water Sustainability Act
- On Crown land

However, the local government still has a critical role to play. A local government's ability to deliver core services may be impacted by the improper management or use of the natural asset, regardless of who has management responsibilities for the natural asset. This means that it is in the local government's best interest to understand and manage risks to natural assets, including those risks related to actions or stewardship of other parties. Local government can play an important role in incentivizing desired behaviors on private property and bringing together other jurisdictions to understand how interests and actions can be aligned⁵.

Financial Valuation of Natural Assets

Similar to engineered assets, the worth of natural assets is dependant on the services they provide. Unlike engineered assets, natural assets will always provide an ecological service as well. The purpose of assigning a financial value to natural assets is to inform decisions about service delivery, throughout planning, engineering, operations, maintenance, and financial management. An estimated financial value of a natural asset can help to supplement qualitative knowledge of the value placed on the natural asset by the broader community.

Various processes for assigning a financial value to natural assets are being tested and refined by local governments across Canada and internationally. The

MANAGING NATURAL ASSETS ON CROWN LANDS

"A key lesson learned by the Town of Gibsons, BC is that ownership should not be a barrier to natural asset management. Charman Creek runs through the Town providing stormwater management services, however, it is under the jurisdiction of the Province of British Columbia. The Town understands that an investment today in maintaining the creek through permissions from the Province will ensure the long-term benefit to the community in stormwater services. A collaborative approach focused on service, and not ownership, can be developed to balance the inter-jurisdictional nature of the assets."

- *Towards a Collaborative Strategy for Municipal Natural Asset Management, 2018, p. 32*

⁵The document, *Towards a Collaborative Strategy for Municipal Natural Asset Management: Private Lands (MNAI 2018)* provides detailed options for managing natural assets on private lands.

most common methods are summarized in the following table. These methods refer to financial valuation of the services provided by the asset and may not include additional intangible benefits that the community places on the natural assets. Local governments can select and apply the process that is most appropriate for their context based on the information available and the type of decision they are working to inform.

COMMON METHODS FOR VALUATION OF NATURAL ASSETS⁶

Method	Description
Replacement (or Avoided) Cost Valuation	The value of the service provided by the natural asset is estimated based on the cost of engineered assets that would be required to provide the same services. <i>Example: Nanaimo Case Study, MNAI</i>
Damage Cost Avoided	The value of the service provided by the natural asset is estimated based on the costs of damages avoided through the maintenance, protection, or enhancement of natural assets. <i>Example: Grand Forks Case Study, MNAI</i>
Benefits Transfer	The previously determined value of an asset is transferred to other similar assets to provide an approximate estimate. <i>Example: Region of Peel Case Study, MNAI</i>
Ecological Accounting Process (EAP)	The value of the natural asset is estimated by defining the assessed value of the land underlying the asset, based on an average unit rate of adjacent properties (using BC Assessment values) multiplied by the total area of the natural asset. EAP focuses on wetlands, streams, ponds, and riparian areas. <i>Example: Town of Comox EAP Demonstration Application</i>

Current Public Sector Accounting Board standards do not permit the inclusion of natural assets as a tangible capital asset except where there is a historic cost. This limitation only impacts reporting on audited financial statements – it does not affect financial planning or service delivery decision-making and so should not be a considered a barrier to assessing the financial value of a natural asset.

⁶Methods are from TEEB - The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers (2010), except the Ecological Accounting Process which is from The Partnership from Water Sustainability in BC, Assessing the Worth of Ecological Services Using the Ecological Accounting Process for Watershed Assessment (2018).

Why Include Natural Assets in Asset Management Processes?

1. Delivering desired levels of service depends on a community's ability to manage natural assets.

Natural assets provide core service functions such as water treatment, waste treatment, rainwater management, flood protection, recreation, habitat, and pollination. The presence and health of natural assets influence the levels of service that can be provided or supported by local governments, ultimately influencing the overall well-being and livability of a community.

The services provided by natural assets are not guaranteed to last forever; particularly if they are not recognized/documentated. Decisions made today and in the past by local governments and other stakeholders can lead to unintentional and undesirable consequences that risk the ability of natural assets to continue to provide the desired levels of service. Aquifers can be contaminated, leading to loss of a clean drinking water supply. Urban forests can be -- cut down in favour of development, leading to flooding caused by unattenuated stormwater. Natural drainage channels can be filled in for development, leading to increased reliance on piped drainage systems that require ongoing maintenance and ultimately, renewal. Natural assets can be particularly vulnerable when there is no understood or accepted value to the natural assets as compared to the readily calculable benefits of development.

Through proactive management of healthy natural assets, local governments are better equipped to deliver target levels of service – today and into the future.

The Water Balance Model

is a tool that enables urban planners, drainage engineers, developers and stewardship groups to: quantify the impact of development on rainwater runoff at a site, assess how rainwater leaving the site affects adjacent areas such as agriculture and urban/rural developments, fish streams or water for human use, and select on-site source controls so that, ideally, rainwater that leaves the site would be the same after the development as before.

It supports a 'Design by Nature' approach that can produce real benefits of an improved environment through reduced erosion of streams, increased carrying capacity of watercourses for fish spawning, increased storage capacity of topsoil to capture rainfall or reducing irrigation water demands during hot summer growing periods.

- Partnership for Water Sustainability in BC <https://waterbalance.ca/tool/water-balance-model/>

2. Leveraging and managing natural assets can reduce lifecycle costs of service delivery.

Integrating natural assets into asset management reduces the costs of service delivery in three ways:

A. REDUCES UPFRONT CAPITAL COSTS OF ENGINEERED INFRASTRUCTURE

Natural asset management can reduce the upfront capital costs in new development or infrastructure renewal where natural assets can be leveraged to provide, or assist in achieving, the desired service rather than building a solution that relies only on engineered assets. For example, a local government may make enhancements to upper reaches of a watershed to improve natural water storage rather than building large downstream storage facilities or change the layout of a new subdivision to take advantage of natural drainage courses rather than requiring the construction of significant piped systems. Well managed, healthy natural assets may have an indefinite service life, and not require end-of-life replacement like engineered assets do.

These upfront decisions can also reduce ongoing operations and maintenance costs. Although natural assets will require operations and maintenance activities to effectively provide services and maintain the health of the asset, the costs are often not as high as with what is required for engineered assets and the benefits of healthy natural assets extend beyond the delivery of core services.

B. LOWER COST RISK MANAGEMENT

Integrating natural assets into asset management processes can help local governments manage risks associated with the sustainability of services already provided by natural assets, which may require engineered asset equivalents if functioning of the natural asset is lost. Natural assets provide many services to a community at no cost. These services can be at risk if there is not an established understanding of the importance of natural assets in delivering these services, or if the importance of natural assets is not fully communicated with relevant stakeholders.

These services cannot be fully replaced with engineered assets. For example, through recognizing that a wetland provides a large drainage and attenuation function to a community, the wetland can be protected and managed to continue to provide that service. Loss of the wetland would lead to increased costs associated with constructing and maintaining engineered asset solutions, and the engineered solutions would not provide other services like habitat and biodiversity.

C. REDUCES FINANCIAL LIABILITY

Leveraging healthy natural assets can reduce financial liabilities associated with engineered assets that are aging and not designed to provide the level of service required to address a changing climate. Natural assets do not have a limited service life the way that infrastructure assets do, and they are typically more resilient to changes in climate. They don't depreciate; instead they can appreciate over time.

3. Infrastructure systems that integrate natural assets can provide higher levels of service than systems that rely only on engineered assets.

Choosing to leverage natural asset solutions over engineered asset solutions can lead to benefits beyond decreased costs. Natural assets can typically provide multiple service delivery functions, as well as a suite of ecological and social functions⁷. For example, wetlands provide both flood control and drought attenuation; and they are also critical to supporting biodiversity and ecosystem health.

MITIGATING FLOOD LOSSES

Water damage is responsible for growing losses to homeowners and communities Canada. According to Combatting Canada's Rising Flood Costs, prepared for the Insurance Bureau of Canada, the average insurance loss between 1983 and 2008 was \$405 million per year. This figure grew to \$1.8 billion per year between 2009 and 2017. Natural systems are the most cost-effective means to mitigate flood losses while providing other valuable environmental and social benefits. Best practice with respect to using natural systems for flood control can be simplified in three key priorities:

1. Retain what you have – preserve existing natural systems, such as rivers and wetlands;
2. Restore what you've lost – undertake restoration projects for lost natural systems, such as 'daylighting' streams and rivers; and
3. Build what you must – build infrastructure to mitigate flooding, this may include engineered assets or green infrastructure that mimics natural assets.

⁷Further information about the services provided by ecosystems and natural assets are well documented in the Millennium Ecosystem Assessment report *Ecosystems and Human Well-being: Synthesis*.

Engineered assets are designed to meet a limited set of purposes and criteria, but nature is inherently adaptable. Well functioning natural assets can increase resiliency to both flood and drought, and support both the mitigation of and adaptation to climate change.

In addition to supporting core service delivery, natural assets provide other community benefits such as recreation, beautification, increased property values, and general improved well-being.

4. Including natural assets in asset management can lead to, or strengthen, beneficial partnerships.

Managing natural assets is an initiative that requires the participation and integration of multiple functions across the organization. Building relationships between departments to realize these functions can have the added benefit of improving the flow of information in support of decision-making in other areas.

Natural assets are not confined to local government boundaries and effective management often requires the co-operation of multiple jurisdictions to meet multiple goals. Improving external partnerships between local and provincial governments, First Nations, and in some cases, private land owners, can improve the ability to set and reach targets and goals associated with natural asset management projects. Local governments have an important role to play in fostering these partnerships and relationships.

Other external partnerships may include stewardship groups that can provide helpful resources for managing assets on the ground. Local governments can look for opportunities to engage with community groups to support stewardship initiatives that leverages the strengths of the community group and meets their interests, while simultaneously protecting the service delivery of natural assets.

**THE VALUE OF NATURAL ASSETS: MUNICIPAL NATURAL ASSET INITIATIVE
(MNAI) BC PILOT PROJECTS**

SUMMARIZED FROM CASE STUDY REPORTS BY THE MUNICIPAL NATURAL ASSET INITIATIVE, 2018.

In 2013, the Town of Gibsons, BC pioneered a new approach to include natural assets in their asset management plan. The town evaluated the services that their natural assets provided against the cost of providing the same level of core services using engineered assets. This inspired the MNAI project, which was developed through an 18-month pilot study to refine, replicate and scale up their approach in the following five communities.

Grand Forks, BC, which had extensive damage due to floods in early 2018, assessed the capacity for flood-mitigation of the Kettle River Floodplain, upstream of the city. The pilot project consisted of a high-level hydraulic modelling and economic evaluation based on differences in flood-water levels and estimated building damage values. The pilot used an avoided cost approach, based on potential damage to buildings in the downtown core during high flow events.

This approach provided a conservative estimate of the value of the floodplain as it does not capture the full capacity for flood-mitigation at all flow levels, nor the comprehensive amount of the avoided damages. However, the pilot provided important results given time and resource limitations. The study concluded that the floodplain provided between \$500 and \$3,500 per hectare in flood damage reduction during high flow events.

Going forward, Grand Forks will incorporate modelling and trade-off information into regional flood plain mapping and hazard assessment; the development permit update process; and the update of their Official Community Plan.

Nanaimo, BC is home to the Buttertubs Marsh Conservation Area and Millstone River, which comprises 55 hectares of reclaimed wetlands and adjacent river within Nanaimo. The pilot project consisted of a hydrological analysis to quantify (1) the storage benefits for stormwater detention from the surrounding developed

areas that drain into the marsh, and (2) the attenuation of flood flows in the Millstone River.

The pilot project assessed three development scenarios and a future climate change scenario using information on the intensity, duration, and frequency of rainfall. The study found that during a 1 in 100-year storm event, the marsh could provide very significant flow attenuation and water retention (up to 92%) before discharging into the Millstone River. This was drastically different in scenarios where the marsh was filled in with housing or grass, in which it would attenuate between 6% and 20% of the flow before discharging into the river. The marsh was found to provide stormwater storage and flood-regulation benefits valued at more than \$4.5 million, if replaced with engineered assets. This increased to between \$6.5 and \$8.2 million under climate-change scenarios. In addition, the marsh provides many other benefits and services that support the well-being of the community, including habitat, biodiversity, and recreation.

West Vancouver, BC undertook an initiative to restore a tributary of Brothers Creek that had been buried. The pilot project was intended to determine the financial issues related to restoring (or 'daylighting') the stream. In order to accomplish this, the project sought to (1) determine the value of the services that the stream could provide if daylighted versus the value it currently provided (covered), and (2) to develop a model to identify candidate streams for daylighting.

It was determined that the stream could provide stormwater benefits equal to the upgraded engineered infrastructure required to meet current stormwater standards (i.e. 1 in 200-year event). The cost of daylighting the creek was slightly higher than to replace the current culvert to meet the same stormwater requirements (\$327,200 versus \$300,000). However, the study did not account for long-term operations and maintenance costs nor co-benefits of daylighting the stream.

The District has worked with MNAI to use the results of this pilot to develop a guidance document to identify other candidate streams for daylighting.

How to Include Natural Assets in Asset Management Processes

Where to start

Natural assets can be included in asset management processes from the start, you do not need to wait until processes are well developed or sophisticated. The steps outlined in the following pages can be applied without any specific preparation or foundational information. However, if you are looking for a low barrier entry point to build momentum in your organization, there are some small steps you can take:

1. Build a team. Just like management of engineered assets, management of natural assets requires an interdisciplinary team. Identify a team that brings together knowledge in planning, engineering, operations, and finance. Ideally, include someone that brings basic understanding of hydrology and environmental functions. The role of this team will be to meet a few times to support a high-level pilot. A significant time commitment is not required.
2. Select a pilot project. As a team, identify a pilot project where you can begin to work with the concepts of natural asset management. You may choose a project, like a stormwater system upgrade, or the update of a policy or high-level plan. Or you may begin with a natural asset that plays a critical role in delivery of core services where additional information would be helpful to make important decisions. Some examples of the decisions you may be looking to inform are:
 - What will be the impact of future development on this asset and the service it provides?
 - Should we invest in restoration projects? How much should we invest?

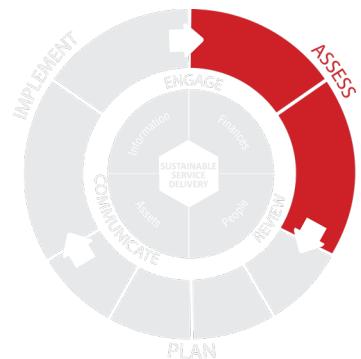
- Do we need to be doing anything more than what we're currently doing to manage risks to our services?
 - Are there opportunities to reduce our reliance on engineered infrastructure systems?
3. Identify the services provided by the natural asset, the potential risks to these services (or opportunities to improve these services). What would be the consequence of losing the function of that asset? What is the likelihood of that happening? Identify what your organization is doing to manage risks or realize opportunities. Conduct this step as a team, using currently available or anecdotal information. Based on these preliminary findings, assess whether further information would be helpful to inform decisions.
4. Identify key internal and external stakeholders and communicate the findings. Include recommendations about next steps, which may include:
- Further analysis to improve information
 - Incorporating the findings into relevant decision processes
 - Next steps to include natural assets in asset management processes.

Integrating natural assets with the BC Asset Management Framework



ASSET MANAGEMENT PRACTICES

Assess AM practices to identify practical opportunities for including natural asset management throughout the AM Process.

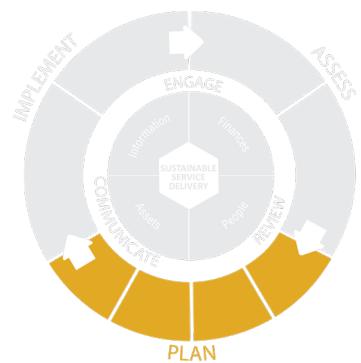


ASSETS

Develop an inventory of natural assets. Assess the value and condition of natural assets. Identify risks to natural assets and sustainable service delivery.

ASSET MANAGEMENT POLICY

Formalize the organization's commitment to including natural assets in asset management through the AM policy.



ASSET MANAGEMENT STRATEGY

Identify the approach the organization is taking to integrate natural assets in AM. Identify connections to other organizational plans and processes (e.g. land use plans, stormwater management plans, etc.).

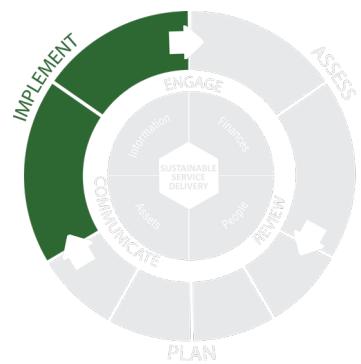
ASSET MANAGEMENT PLAN

Identify specific service delivery risks, impacts to level of service, actions for managing risks (capital and operational), and costs.



LONG TERM FINANCIAL PLAN

Update the LTFP to include considerations of natural assets. Include funding strategies and potential risks to funding strategies. Identify financial risks of not managing natural assets.



IMPLEMENT ASSET MANAGEMENT PRACTICES

Implement the policy, strategy, plans and actions to better understand, maintain, or enhance natural assets.

MEASURE AND REPORT

Measure the health of the natural asset, the management of risk to natural assets over time, lifecycle cost savings, and additional benefits of managing natural assets. Report to staff, council or the board, and the public.

ASSESS

ASSESS ASSET MANAGEMENT PRACTICES

Assess AM practices to identify current tools that are in place to monitor, protect, or restore natural assets; and practical opportunities to include natural assets in asset management practices.

The purpose of assessing current practices is to build an understanding of the organization's capacity and blind spots related to managing natural assets, as well as within processes for managing engineered assets.

Activities

- Identify existing practices, tools, plans, and resources that are related to the management of natural assets (e.g. bylaws, conservation plans, ISMPs, etc.)
- Assess how your organization considers the interaction between engineered and natural assets, and the level of integration between decision making.
- Identify clear opportunities for including natural assets in AM practices, throughout the process of AM.
- Identify areas where information or decision support may be helpful to understand options, risks and sustainable service delivery related to natural assets⁸.

⁸An assessment of the current state of assets (the next process step) may be required to identify where additional information or decision support may be helpful.

HOW MUCH EFFORT WILL THIS TAKE?

At the outset, it is not necessary to be comprehensive in the identification of natural assets, or to develop a formal register of natural assets.

Most of BC's local government could reasonably conduct the activities listed in this section for the first time through a half day workshop with the right knowledgeable staff in the room. This type of high-level initial assessment would not be enough to inform major capital or land development decisions, but it's an important foundation that would add significant value. An initial inventory and assessment will begin to raise awareness and consistent understanding among staff of the reliance on natural assets for the delivery of core services, how the health of natural assets may be at risk, and where further efforts should be dedicated to informing decision making.

ASSESS THE CURRENT STATE OF ASSETS

Develop an inventory of natural assets and the services they provide. Assess the value and condition of natural assets. Identify risks to natural assets and sustainable service delivery.

This stage of the process can feel the most daunting at the outset, but it is important to remember that asset management is a process of continuous improvement. While detailed assessment of the service capacity and value of a natural asset may require modelling and technical analysis, doing a high-level assessment as a start can still add value to decision-making. Detail can be increased over time where needed to inform specific decisions about appropriate management actions.

Activities⁹

- Assemble an interdisciplinary team of staff who can support the identification and assessment of assets. The size and membership of the team will vary by organization, but should include people who understand core service areas, planning, finance, operations, and local environmental conditions.
- Develop an inventory of the natural assets that the community relies on.
- Identify the services provided by each natural asset.
- Identify the key engineered assets or asset systems that interact with natural assets.
- Identify the current condition of the natural assets. Use existing plans or studies where available and supplement with anecdotal information.
- Identify potential hazards and assess the risk of these hazards to the health and performance of the natural asset. These hazards may include greenfield or infill development, climate change, public use activities, and activities upstream or elsewhere in the watershed.
- Develop a valuation for the service provided by each natural asset, starting with those that are highest risk.
- Identify other jurisdictions or stakeholders that have influence on the protection or management of the natural asset.

PLAN

ASSET MANAGEMENT POLICY

Formalize the organization's commitment to including natural assets in AM practices through the AM policy.

The planning process may be initiated by creating an AM policy that provides guidance to staff and council to include natural assets in the organization's asset management practices. However, the specific details of how natural assets will be managed will be found in the strategy or plan, not the AM policy.

Activities

Review and update the AM policy to recognize the role of natural assets in the delivery of core services and to reflect a formal commitment to including the management of natural assets in asset management practices¹⁰.

ASSET MANAGEMENT STRATEGY

Identify the approach the organization will take to include natural assets in asset management practices.

The AM strategy is simply a summary of where an organization is now (results from the Assess stage of the AM process), where it would like to be (improvement goals and objectives), and how it will get there. Rather than identifying a long list of all the areas an organization needs to improve, the strategy should be clear about priorities and focus areas.

When including natural assets in the AM strategy, providing context about the specific role of natural assets in the delivery of core services and the potential risks to these assets will help to support why the goals and objectives related to improving the management of natural assets are important.

The strategic approach that the organization is taking to integrate natural assets in AM should recognize connections to other organizational plans and processes

¹⁰The Town of Gibsons' AM Policy includes specific references to natural assets throughout. It is available on the Asset Management BC website as a reference.

Integrated Stormwater Management Plans (ISMPs) are used by municipalities to set direction for how they will manage stormwater so that the environment is protected, and even enhanced, as development occurs in the watershed. ISMPs are key servicing plans that can have an influence on land use decisions, environmental management decisions, and stormwater management practices. Typically, asset management and natural asset management are not intentionally considered in the process to develop an ISMP.

The District of Squamish saw this as a missed opportunity. In 2018, as part of the process to develop an ISMP, the District conducted a high-level valuation of the stormwater services provided by its natural assets such as wetlands, creeks, and forests. The valuation showed that these natural assets provide important services to the community, and that it would be costly for the District to replace these assets with engineered assets. The valuation process also highlighted how many of the District's natural assets are at risk from development. With this information, Council adopted the ISMP, which sets direction for how the District will consider natural assets in its asset management planning, land use planning, and more detailed integrated stormwater management planning processes.

that may be in place. These may include land use plans, integrated stormwater management plans, environmental stewardship or conservation plans, climate adaptation plans, operation and maintenance plans, and capital plans. Effective management of natural assets should not be a standalone activity, it requires the integration of information about natural assets throughout local government decision processes.

Activities

- Identify how natural assets, and the services provided by them, are currently understood and managed (this information will be produced as part of the Assess stage of the AM process).
- Identify specific links in your community between natural assets, land use planning, climate change mitigation and adaptation, and asset management.
- Develop objectives related to improving the management of natural assets by considering how information about natural assets needs to be improved and identifying specific opportunities for integrating information about natural assets into operations and decision processes.
- Identify the desired approaches to achieving the defined objectives.

ASSET MANAGEMENT PLAN

Identify natural assets, their interaction with infrastructure assets, and actions for managing risks, levels of service, and cost in the AM plan.

Asset management plans document the activities required to deliver the desired levels of service, manage risks, and minimize costs over time. Natural assets should be included in asset management plans along with infrastructure assets, rather than planned for separately. These plans provide an opportunity to consider natural assets in the context of other asset risks, costs, and service objectives, and

develop an integrated and cost-effective set of actions for sustainable service delivery. Existing AM plans can be updated to include natural assets.

Activities¹¹

- Identify the level of service delivered by natural assets.
- Identify critical interactions with infrastructure required.
- Assess risks to service delivery from the natural assets. Important considerations include:
 - Changes in demand on the asset due to factors such as growth, development, or changes to land use;
 - Potential impacts of climate change;
 - Risks related to the performance of infrastructure assets;
 - Risks related to the actions of external jurisdictions/stakeholders.
- Identify programs, capital projects, and operating and maintenance activities that will be implemented to reduce risk to services delivered by natural assets. Examples include:
 - Adjusting land use plans to protect or enhance the ability of natural assets to deliver services;
 - Capital projects to restore or improve the function of natural assets;
 - Programs to monitor the health of natural assets;
 - Supporting or incentivizing community-based groups to provide ongoing stewardship of natural assets;
 - Public education or incentive programs to promote behaviors that protect the health of natural assets.
- Identify the costs and benefits of projects and activities. Consider benefits such as:
 - Reduced costs or financial risk;
 - Increased level of service from the natural asset;
 - Community benefits such as recreational opportunities, improved aesthetics, or enhancements to well-being and quality of life.
- Update the asset management plan to integrate and coordinate projects and activities related to natural assets with those related to engineered assets.

¹¹Many of these activities may have already been completed as part of the Assess stage of the AM process. Developing the AM plan is about combining key information from different sources into one user-friendly document.

NATURAL ASSETS, FINANCIAL PLANNING, AND FINANCIAL REPORTING

As outlined in Advancing Municipal Natural Asset Management: The Town of Gibsons' experience in financial planning & reporting, including natural assets in financial planning and reporting is key for risk reduction and supports integrated decision making. While there are challenges to integrating natural assets in financial planning and reporting, there are things that can currently be done – and the state of information and tools is improving quickly.

"In the immediate term, local governments can make use of the Notes section in annual financial statements, departmental reports, municipal publications, and annual public meetings to describe the local government's approach to municipal natural assets and focus on financial planning aspects of municipal natural asset management." - Town of Gibsons, 2017

LONG-TERM FINANCIAL PLAN

Include considerations for managing natural assets in the long-term financial plan (LTFP) and other financial planning tools.

The LTFP identifies the gaps between the costs of sustainable service delivery and the projected funding available, to support the development of approaches to close this gap. As sustainable service delivery relies on both engineered assets and natural assets, they should both be reflected in the LTFP. In addition, it can be helpful to document the financial risks of not managing natural assets as important context for decision-making.

Activities

- Recognize the financial value of the services provided by critical natural assets, and therefore the financial risk associated with failing to manage natural assets.
- Incorporate projects and activities required to manage risks to natural assets into the LTFP.
- Identify sources of revenue and funding.
- Assess full lifecycle costs of new capital projects and servicing solutions when evaluating natural asset vs. engineered asset options. This will help to identify situations where engineered assets have lower up front capital costs but higher ongoing O&M, renewal, and replacement costs.

IMPLEMENT

IMPLEMENT ASSET MANAGEMENT PRACTICES

Implement the policy, strategy, plans and actions to better understand, maintain, or enhance natural assets.

Implementation may include building organizational capacity to better understand and make decisions about natural assets, as well as projects and programs to maintain or enhance natural assets. Appropriate communication and engagement with key stakeholders, such as staff, council or board, and the public, throughout earlier stages will help with successful implementation.

Actions for implementation may have multiple benefits. Look for examples of win-wins, such as achieving reduced lifecycle costs and other benefits such as improved recreation opportunities, increased resiliency to climate change, and enhanced quality of life.

Activities

- Provide education and training opportunities for staff and elected officials to build the desired knowledge and skills to improve understanding of the services provided by natural assets and how other decisions may impact natural assets.
- Improve data and information about natural assets in a way that supports decision-making.
- Update capital plans to reflect decisions made about natural assets.
- Update operations and maintenance plans to include maintenance of natural assets.
- Communicate the importance and value of natural assets with staff, elected officials, and the public.
- Establish effective ways of communicating and coordinating with jurisdictions and external stakeholders who have direct impact on the health of natural assets.

MEASURE AND REPORT

ENGAGING THE COMMUNITY FOR BETTER OUTCOMES

Community based organizations, stewardship groups, and citizen volunteers often play an important role in monitoring and maintaining natural assets. By communicating and engaging with these groups, local governments can demonstrate support for the actions of these groups – especially where objectives are aligned.

The actions of private property owners can also impact the health of natural assets. Local governments can play a role in educating and incentivizing property owners to care for natural assets in a way that reduces risk to service delivery.

Measure the health of the natural asset, the management of risk to natural assets over time, lifecycle cost savings, and additional benefits of managing natural assets. Report to staff, council or the board, other impacted jurisdictions, and the public.

Measurement and reporting are critical to continuously building awareness about the importance of natural assets in decision making and improving decision making to include natural assets. Measures related to natural assets can be integrated with other reports related to sustainable service delivery. Examples of platforms for sustainable service delivery reporting include annual reports, asset management maturity and progress reports, service delivery or infrastructure report cards and dashboards.

Activities

- Include indicators related to natural asset health in overall set of asset management progress measures.
- Evaluate progress against actions identified in AM Strategy and AM Plan.
- Track changes in AM practices using an assessment tool like AssetSMART 2.0.
- Report results to staff and elected officials.
- Report messages about natural assets with the public through tools such as the annual report and other relevant engagement opportunities.
- Report progress in the management of risks to natural assets to other jurisdictions or authorities that influence the health of the natural asset.

COMMUNICATE, ENGAGE, REVIEW

Communication, engagement, and review is the engine of continuous improvement. These ongoing activities are critical towards enabling an organizational shift towards including natural assets in asset management. This shift requires aligned understanding and objectives of decision-makers, staff, council, the public, and key stakeholders.

Maintaining the health of natural assets often requires more than just local government stewardship – members of the public, private property owners, and adjacent jurisdictions can play an important role and should be considered in communication and engagement efforts.

Helpful Resources

Asset Management for Sustainable Service Delivery, A BC Framework

The framework for asset management is a guide through the circular process model for service, asset, and financial sustainability. The framework is scalable to any community size and capacity with a focus on desired outcomes and reflecting current best practices rather than specific methodologies.

<https://www.assetmanagementbc.ca/framework/>

Towards a Collaborative Strategy for Municipal Natural Asset Management: Private Lands

This report highlights how local governments can include private land and private landowners in a comprehensive municipal natural asset management framework and this approach is necessary. Additionally, it provides a high-level overview of some of the tools that are available.

<https://institute.smartprosperity.ca/sites/default/files/reportmnaifeb7.pdf>

Beyond the Guidebook 2015: Towards a Watershed Health Legacy in the Georgia Basin

In 2013, the Gibsons was the first known municipality to include natural assets into their municipal AM Framework. Advancing Municipal Asset Management is a guide to best practice and lessons learned from financial planning and reporting of Gibsons' natural assets, including their aquifer and foreshore area.

<http://gibsons.ca/wp-content/uploads/2018/01/GibsonsFinancialPlanningReportJan2018-PRINT.pdf>

Towards an Eco-asset Strategy in the Town of Gibsons

This report outlines background information on natural assets in the Town of Gibsons, the strategic position in overhauling the asset management process, and the steps required to accomplish natural asset management.

<http://gibsons.ca/wp-content/uploads/2017/12/Eco-Asset-Strategy.pdf>

Municipal Natural Assets Initiative: Final Technical Reports

As a result of Gibsons Natural Asset Management Framework, the Municipal Natural Asset Initiative (MNAI) was created. Through this initiative, five municipalities were selected to conduct an 18-month pilot study to refine, replicate and scale up the approach developed by Gibsons. The pilot projects focus on stormwater management and include Grand Forks, BC; Nanaimo, BC; West Vancouver, BC; Region of Peel, ON; and Town of Oakville, ON.

<https://mnai.ca/pilot-communities/>

Assessing the Worth of Ecological Services Using the Ecological Accounting Process for Watershed Assessment Brooklyn Creek Demonstration Application in the Comox Valley

Ecological Accounting Process (EAP) is one of three streams of deliverables from the "Sustainable Watershed System, through Asset Management". The EAP Demonstration Application reviews the lessons from an application of EAP on Vancouver Island. The report reviews the goals and key take-aways that have helped build EAP.

https://waterbucket.ca/gi/wp-content/uploads/sites/4/2018/09/Brooklyn-Creek_EAP-Demonstration_FINAL_Sep2018_low-res.pdf

Primer on Natural Asset Management

The primer introduces Municipal Natural Asset Management; explains why it is important to consider natural assets as part of your overall asset management strategy; and helps to provide guidance to chart your community's course towards implementing Municipal Natural Asset Management.

<https://mnai.ca/media/2018/11/FCMPrimer-updated.pdf>

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