Making Nature Count

MNAI.CA

TOWARDS A COLLABORATIVE STRATEGY FOR MUNICIPAL NATURAL ASSET MANAGEMENT: *PRIVATE LANDS*

FEBRUARY 2018

MAKING NATURE COUNT

REPORT

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 in developing leading-edge, sustainable and climate resilient infrastructure.

Acknowledgements

Roy Brooke, Director, Municipal Natural Assets Initiative
Sara Jane O'Neill, Lead author, Smart Prosperity Institute
Stephanie Cairns, Secondary Author, Smart Prosperity Institute
Reviewers: Emanuel Machado (Town of Gibsons, BC), Michelle Molnar (David Suzuki Foundation), Nick Stow (City of Ottawa)

Convening Organizations

Smart Prosperity Institute

Brooke & Associates CONSULTING

David Suzuki Foundation

TOWN OF GIBSONS

Acknowledgement of Funders and Supporters

Greenbelt Foundation; Salamander Foundation; Vancity Community Foundation; Tides Canada; Sitka Foundation; Real Estate Foundation of BC; Province of British Columbia through the Ministry of Community, Sport and Cultural Development

Table of Contents

List of Figures

Introduction

Natural Asset Management requires a whole systems approach that includes public and private lands.

Nature provides many services communities rely on for long-term health, well-being, and resilience.[1] Vegetation and soil soak up rainwater, recharging aquifers, rivers, and lakes that provide drinking water sources for many. Forests cool urban areas and remove air pollutants, helping city dwellers breathe better while also reducing energy consumption. Communities hit by major flooding from extreme weather events have experienced firsthand the critical resilience that nature provides and the risks associated with losing those natural services. Following the devastation of Hurricane Sandy, a study found that the presence of coastal wetlands reduced flood heights, avoiding more than USD$625 million in flood damage across 12 states from Maine to South Carolina.[2] In Canada, a recent study by the Intact Centre on Climate Adaptation[3] also demonstrated that wetlands were a cost-effective means to reduce flood risk. They found that, in rural sites, the presence of wetlands reduced flood damage costs by 20% and in urban areas by 38%. This growing understanding of the benefits of natural assets for municipal service provision and resilience has led to a parallel growth in acknowledging the critical role of local governments in protecting natural assets.[4]

The Municipal Natural Assets Initiative (MNAI) is helping local governments to protect nature's services by identifying, valuing and accounting for municipal natural assets (see text box) within existing financial and asset management programs. This will put natural assets on the same level as all other engineered assets, ensuring they are accounted for in the decision-making process. Historically, the term *asset* has only applied to infrastructure such as roads, bridges, water treatment plants, and drainage pipes. Yet as described above, nature, or natural assets, provides many of the same services as engineered infrastructure. In this capacity, from a service perspective, a natural asset is a municipal asset no different from other forms of infrastructure and should therefore be included in the long-term financial and asset management planning of local governments.

Definitions

To set out a common language around natural assets, the previous report *Defining and Scoping Municipal Natural Assets*[5] introduced the following definitions:

The term Municipal[6] Natural Assets refers to the stocks of natural resources or ecosystems that contribute to the provision of one or more services required for the health, well-being, and long-term sustainability of a community and its residents.

The Municipal Natural Asset Management approach views municipal natural assets through an infrastructure asset management lens and generally considers those municipal natural assets that would otherwise need to be provided by a municipality, regional government, or other form of local government.

As part of series of guiding documents being developed in collaboration with the Municipal Natural Assets Initiative (MNAI), this report highlights how local governments can include private land and private landowners in a comprehensive municipal natural asset management framework. It is intended as a resource for local governments practicing municipal natural asset management, providing them with a review of why, in contrast to many engineered assets, a whole system approach, that includes private lands as well as public lands, is required to manage natural assets. This is then followed by a high-level overview of some of the main tools available to local governments for private lands that can complement the traditional asset management toolkit.

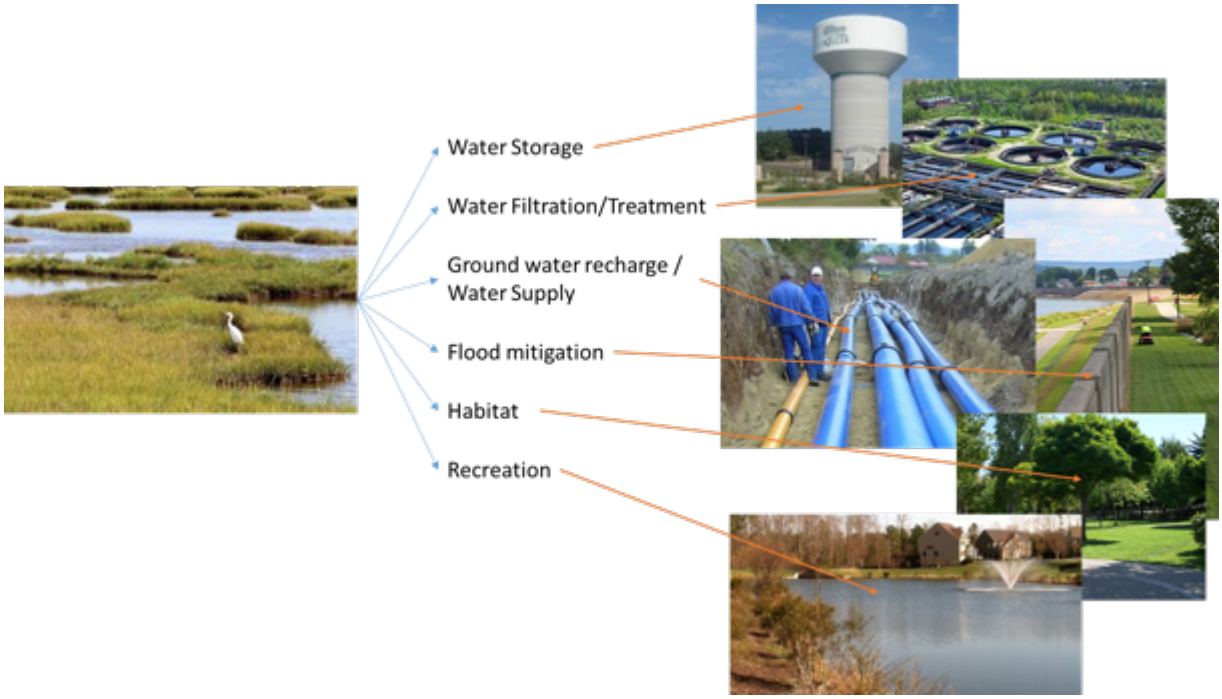
The Value of Nature

Maintaining nature in urban areas provides many financial benefits for cities. The City of Tampa released an Urban Forest Analysis in 2013. Using the i-Tree model for estimating the monetary value of ecosystem services, the overall annual value of all benefits provided by Tampa's urban forest was estimated at approximately US$34.6 million per year.[7] In terms of specific savings, the report found that in 2011, trees provided Tampa residents US$5.2 million in energy savings and saved the population an estimated US$5.4 million in airborne pollutant-related health care costs.[8] In megacities, these numbers simply increase. Megacities hold 10 million people or more and a recent study,[9] examining 10 megacities around the world, estimates that the annual median value from urban forests is US$505 million per year in total benefits or $1.2 million/km^2 of trees.

Municipal Natural Assets & Private Lands

Effective management of a natural asset cannot be done in bits and pieces. Take for example a wetland: the wetland is a single natural asset but it provides multiple services[10] (Figure 1) and its catchment area is often owned or managed by multiple people, organizations and governments (Figure 2). The multiple services provided by the wetland include water storage, water filtration, groundwater recharge, flood mitigation, natural habitat for wildlife, carbon sequestration and recreation. However, if the municipality only owns and manages a portion of the wetland, the continuation of those services is reliant on the other stakeholders, private landowners or other governments, also using best management practices. This is a risk for local governments who would then be responsible for replacing those wetland services with costly engineered infrastructure. Consequently a local government must look beyond the boundaries of public lands in order to develop an effective municipal natural asset management framework.

Figure 1: A single wetland provides multiple services that, if lost, would require many engineered replacemets



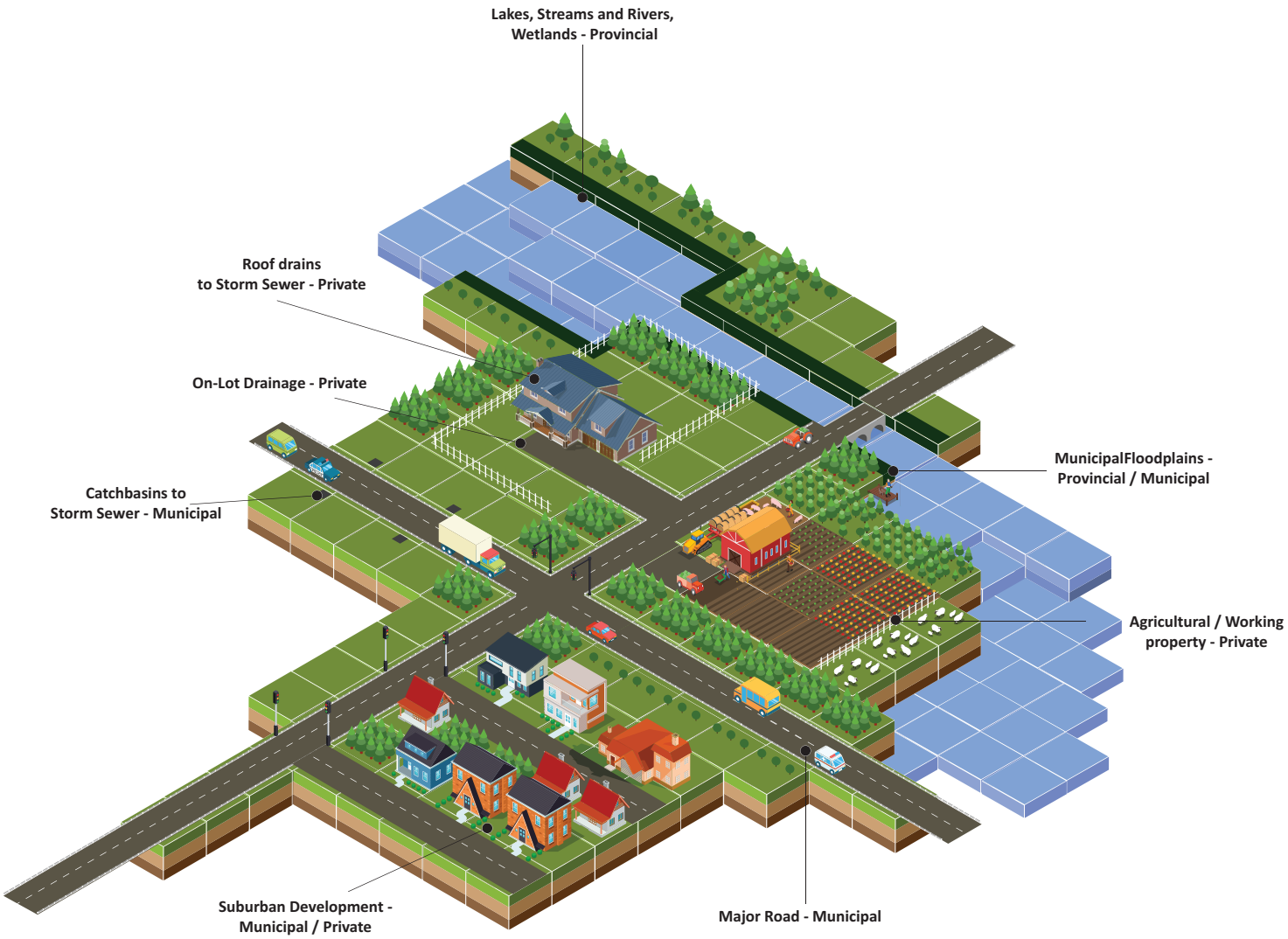
What ecosystem services overlap with the service mandates of local governments?

What services are relevant when discussing how a municipality can manage natural assets for the provision of municipal services? Municipalities appear to have some latitude in determining this.

Looking at BC as an example, the Ministry of Municipal Affairs and Housing[11] defines a service as "an activity, work, or facility undertaken or provided for or on behalf of the municipality", and outlines that a municipality "can provide any service that council considers necessary or desirable, and may provide it directly or through another public authority or another person or organization."

One limitation on the services that can be provided, which might impact the ability of a municipality to manage for a particular ecosystem service, is that where a municipal service overlaps with a federal or provincial jurisdiction, the federal or provincial legislation may either exclude the municipality from providing the service, or the municipal service must be provided within the context of the federal or provincial legislation. Collaboration amongst all levels of government for the effective management of natural assets would help to address this.

Figure 2: A single natural asset, such as a river or creek, can be managed by multiple stakeholders, governments and private interests. It can also be impacted by nearby land uses under various ownerships.



Multiple stakeholders managing a single natural asset

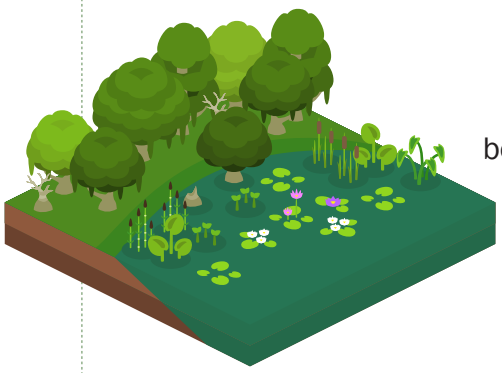
Challenges in Protecting and Managing Natural Assets on Private Lands

Historically, managing natural assets on private lands has been a challenge. In fact, private ownership of certain ecosystem services has been identified as a key factor driving the global decline of ecosystem services.[12] Approximately 11% of Canada's total landmass is privately owned[13] underlining the potential impact of private land management on natural assets. This is particularly relevant in the more heavily populated southern regions of the country, and in provinces that have above average percentages of private land ownership. For example, approximately 88% of Prince Edward Island[14] and 71% of Nova Scotia[15] are privately owned. About 6% of Canada's overall forest cover is also privately owned. [16]

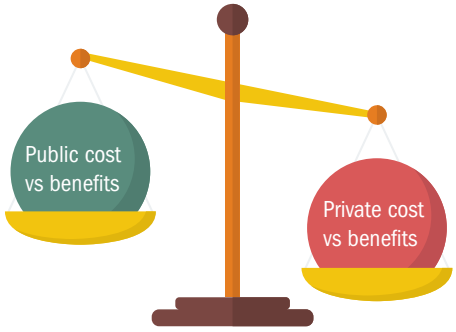
Opportunity Costs: Private Lands & Public Services

One of the main challenges with managing natural assets on private property is that although the land is under private ownership and providing private benefits, it is also providing a public good or service. A forest, for example, may be a privately-owned forest, but it provides a number of public services, such as water quality regulation. The challenge of this situation boils down to costs, benefits and beneficiaries (Figure 3). The private landowner of the forest property receives a certain benefit from leaving the forest intact (health benefits, private natural resources, recreation, etc.). However, they may receive a greater benefit from cutting down the forest to sell timber, or converting the land to agricultural uses. While the landowner and the community both receive the same public benefits from having the forest remain intact, such as water quality and air pollution mitigation, they would not receive these same benefits if the landowner logged the land or converted it to agriculture. The private landowners would receive all of the benefits, while the community would bear the majority of the costs of that conversion, be those in terms of polluted waters and flooding or the costs of engineered infrastructure to provide equivalent services. From the viewpoint of the private landowner, they would receive all of the benefit of converting the forest to agricultural land but only a portion of the cost of loss of the public goods and services. If the forest were to remain as a forest, the private landowner would lose out on the additional benefit (i.e. he/she would bear the cost of protecting that forest), but the community would receive the full benefit.

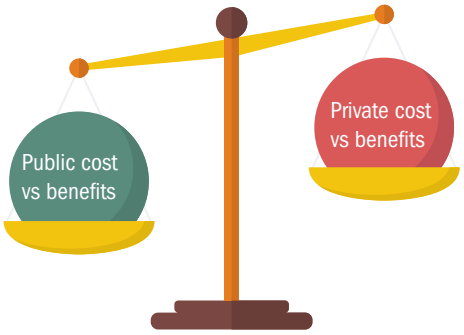
Figure 3: Balancing Cost and Benefits of private lands and public services

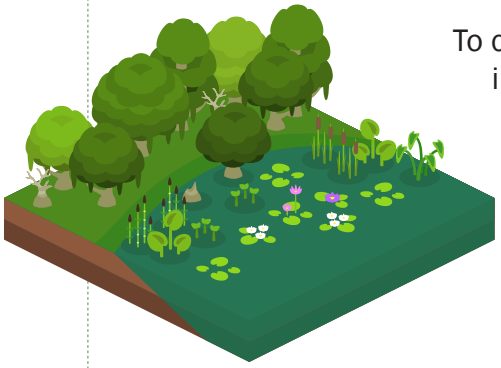


A natural area under private ownership provides both public and private benefits, however, the costs of maintaining the natural area (property tax, lost opportunity costs) rests solely with the private landowner.

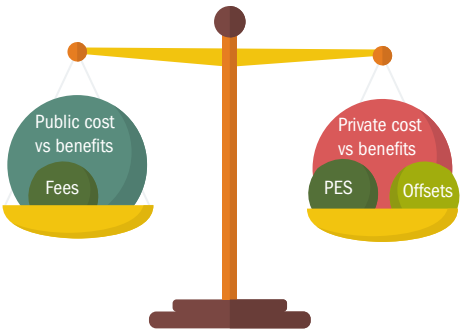


Converting a natural area to a different land use, such as agriculture, will provide the private landowner benefits. The costs of losing the natural area and natural services are distributed to the public, with the private landowner only responsible for their share of the public cost.





To create a situation in which the costs and benefits of maintaining the area in its natural state are balanced for the private landowner and the public, incentives, payments and user fees may be required.



Balancing Public and Private Costs and Benefits

While simplistic, this example demonstrates an important challenge when it comes to managing natural assets for municipal services on private lands: what is the incentive for private landowners to manage natural capital when the benefits are public but the costs are private and how can local governments ensure that the benefits of managing natural assets on private lands outweighs the costs to private landowners?

Overlapping Public Land Authorities

While this report addresses the challenge of including private landowners in natural asset management, challenges can also arise due to overlapping government authority over the protection and management of natural assets in Canada. The federal government has jurisdiction over federal lands, seacoasts and inland fisheries, navigation and shipping (navigable waters), boundary waters, and migratory birds.[17] Provinces have jurisdiction over crown lands, property and civil rights (businesses and industry), municipal institutions (which have been delegated powers over land use, wastewater, drinking water, etc.), and other matters of a local or private nature.[18] The federal government is also responsible for regulating water resources in Nunavut and the Northwest Territories.

As depicted in Figure 2, a river that provides drinking water for a municipality may pass through lands under federal, provincial, municipal, and private jurisdiction. This division of management responsibility means that no single entity will be able to effectively manage a natural asset, such as a river, without the coordination and cooperation from all other stakeholders, including other levels of government. However, it also may mean the responsibility for leading the management is not clear. The successful management of Still Creek in British Columbia is a prime example of organizations overcoming this.[19] After years of consultation and cooperation, multiple levels of government and the public came together to create and implement an effective management plan for the creek. The success of the collaboration set out in the Integrated Stormwater Management Plan (ISMP) for Still Creek has resulted in the return of spawning salmon to the creek after an 80-year absence.[20]

Competiveness Between Local Jurisdictions

An additional issue with overlapping authority is the issue of competitiveness. As noted above, when management of a natural asset that runs through multiple jurisdictions is piecemeal, the overall management suffers. This can happen not just because of different ownerships or authorities, but also because of different policy frameworks if regulations or incentives are implemented in one municipality and not another. As demonstrated by the New York City example below, a combination of watershed regulations and incentive programs that are aligned horizontally between neighbouring local governments and vertically amongst different levels of government, can work together to provide a balance of regulatory and market-based motivations for conservation of natural assets. The degree to which policy mixes within adjacent communities has to match

in order to address issues of competitiveness at a local scale is not clear but, based on the New York example, an overall framework that supports the range of stakeholders can help create an approach that works at all levels of government.[21]

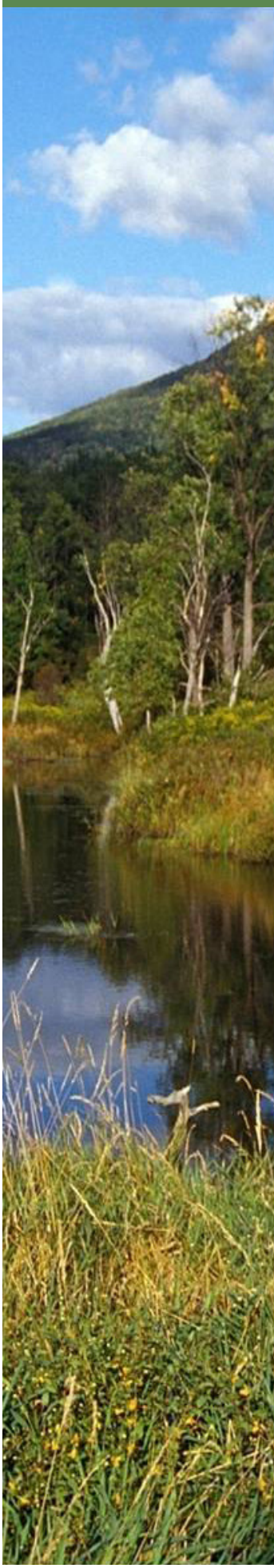
New York City: Comprehensive Management of Natural Assets

New York City is a good example of natural asset protection for municipal services that takes a comprehensive view, including management on private and public lands and through collaboration of multiple levels of government. While the legislative framework and regulatory drivers for New York are different compared to Canadian municipalities, it still provides a number of key lessons for natural asset management.

New York City gets its drinking water from three separate watersheds that include multiple other counties and populated areas: the Croton Watershed provides about 10% of the daily water consumption; the Catskill and Delaware watersheds provides about 90% of daily water consumption.[22] While the Croton water supply is filtered by the Croton Water Filtration Plant, the Catskill supply operates under a Filtration Avoidance Determination (FAD) agreement and is only treated with chlorine and UV to reduce microbial risk.[23]

How is New York City able to do this for such a large population? In 1989, the federal Surface Water Treatment Rule (SWTR) required filtration of all surface water supplies but allowed for a waiver of the filtration requirement if it could be proven that human impacts to the source water supply could be controlled through ownership or agreements with landowners.[24] New York City chose the route of watershed protection and in January 1997, the NYC Watershed Memorandum of Agreement (MOA) was signed by New York City, New York State, the United States Environmental Protection Agency (US EPA), watershed communities and environmental and public interest groups.[25] This agreement established the framework and relationships required to meet the goals of source water protection for New York City and its Catskill water supply. Maintaining the conditions of the agreement is no easy task; although the City owns 8.6% of the land area, with an additional 0.3% of land managed through conservation easements, and New York State managing another 20%, there are still over 200,000 private landowners in the watershed.[26] The MOA signed in 1997 consequently included a number of different measures aimed at protecting the City's Catskill source water supply:[27]

1) **Land Acquisition**: The goal of the land acquisition program is to acquire real property rights in fee simple or through conservation easements. The City and State today protect approximately 38% of the Catskill/ Delaware watershed. Since 1997, the Department of Environmental Protection has purchased more than 144,000 acres of land and easements, in addition to the 42,000 acres the City owned.[28] Land owned by Land trusts, New York State, and local towns add an additional 240,000 acres.[29]



2) **Land Management**: With the above noted acquisition of land, New York City is now one of the largest landowners in the watershed. The Department of Environmental Protection manages these lands to control human impacts on the water source, while still providing recreational opportunities.

3) **Watershed Regulations**:[30] The Department of Environmental Protection ensures critical source water areas are protected by governing certain land use activities within the watershed.

4) **Partnerships**:

    a. *Watershed Agricultural Program*: This is a voluntary, farmer-led program. The City provides funding for the development of pollution prevention plans and the implementation of best management practices through the Watershed Agricultural Council (WAC). Over 92% of large farms in the watershed have participated so far. There is also a Conservation Reserve Enhancement Program (CREP) that funds farms for protecting a buffer along riparian areas.

    b. *Wastewater*: The Catskill Watershed Cooperation is a non-profit organization who, together with the Department of Environmental Protection, have repaired and replaced over 5,000 failing septic systems and have constructed a number of stormwater management projects.[31] All wastewater treatment plants in the watershed have been upgraded to tertiary treatment, with the Department of Environmental Protection funding the operations and maintenance.[32]

    c. *Stream Management Program* (SMP): This program supports protection and/or restoration of stream stability and ecological integrity through long-term stream stewardship planning.

In essence, through the combination of various tools, partnerships and regulations, the City of New York has maintained the quality of their drinking water source through the preservation of their natural assets on both public and private lands. A 10-year FAD was issued by the EPA in 2007 and updated in 2014.[33] A new FAD was submitted in 2016 and is expected to be released in 2017, signalling the continued success of this management program.[34,35]

Land Use Tools

The remainder of this report reviews a number of policy options for including private landowners and private land in the management and conservation of natural assets. While not an exhaustive list, this offers a starting point for creative discussion within local governments on how to integrate these tools for a comprehensive approach to natural asset management.

Land Acquisition

A straightforward way of ensuring that natural assets on private lands are managed to protect ecosystems services for public good is to turn them in to public lands. For the City of New York, the Watershed Land Acquisition Program is a key element for preserving their water supply lands for the long-term.[36] Cities in Canada are also taking this route for natural asset management. The City of Edmonton, for example, employs land acquisition as a way to protect environmentally sensitive lands. The City's Environmental Strategic Plan, *The Way We Green,* lists acquisition of the most ecologically sensitive lands as a key strategic action (Policy 3.3.2).[37]

Through their 2014 Biodiversity Conservation Strategy, the City of Surrey has identified 10,200 acres (4,130 hectares) of land that is required to maintain the City's biodiversity, ecosystems and functions that support wildlife and people.[38] The goal for the city is to manage 100% of this land, called the Green Infrastructure Network (GIN), through public ownership or stewardship programs on private land. In 2014 when the strategy was released, approximately 70% of the GIN was under public ownership.[39] Policy recommendations of the strategy include identifying priority areas for acquisition but also identifying existing public land that could be sold to acquire higher priority land within the GIN.[40]

Land Acquisition Considerations

A major challenge with land acquisition is funding. The City of Edmonton established a Natural Areas Reserve Fund in 1999 for the purpose of purchasing and protecting natural areas within the City.[41] The fund was originally established at $250,000 a year then later increased to $1 million per year. However, with the value of land within the city increasing, the fund was not enough so in 2008 Council approved a strategy to borrow additional funds to purchase natural areas, using the Natural Areas Reserve Fund to make loan payments.[42] The Capital Regional District in British Columbia manages a Land Acquisition Fund that is used to purchase land for regional parks and trails.[43] The funds are generated through a levy applied to each average residential household. The levy started at $10 per household per year in 2000 and is now $20 per household per year, raising approximately $3.7 million per year at its current rate.[44] The fund, however, does not cover the costs of maintenance or improvements to the lands acquired and public consultation are expected in 2018 to determine how the funds could be more broadly applied.

Another challenge with land acquisition is that not all land is equally important; strategic acquisition is key to efficiently meeting protection needs. The City of Surrey has tackled this by doing the upfront work of identifying the network of natural areas, the GIN, that is required to preserve the ecosystem services needed by the community and they are now able to measure progress by measuring how much of this network is protected. The City of New York also targets land acquisition to those lands that have the highest contributory value to overall watershed protection.[45] Consequently, every new land purchase by the City must meet a certain set of criteria, such as proximity to a stream or presence of a wetland, demonstrating this.

Conservation Easements

When land cannot be purchased outright, conservation easements or agreements are the next most prominent tool for conserving natural assets on private lands. Conservation easements are legally binding agreements between a landowner and a third party agency in which certain rights to the private property are transferred to the agency.[46] The agreement outlines the specific restrictions on the land and the process by which the restrictions will be enforced and monitored by the third party agency. The agreement also outlines the rights the landowner maintains on the land and any financial compensation to the landowner.[47] The transferred rights can include development rights or rights to subdivide but can also include other restrictions on future land use; each conservation easement is unique and designed for the specific objectives of the landowner and agency. As well, the landowner can either donate the rights to the agency or the agency can purchase the rights from the landowner.

The third party agency holding the agreement can be a federal, provincial or municipal government body, an independent, non-profit conservation organization or a land trust.[48] As an organization qualified to hold conservation easement, local governments have the ability to use this tool for protecting natural assets, however, the legislation governing conservation easements in each province varies.[49]

Easements on Agricultural Lands

While each conservation easement is unique to the property and particular conservation goals as agreed to by the landowner and the organization holding the agreement, easements on agricultural lands are a unique type of agreement especially important in many areas of Canada. A conservation easement placed on agricultural lands is regarded as a tool to ensure that the land is managed according to best practices for the long-term. It does not interfere with normal farming practices as it is an agreement negotiated by the landowner and the third party agency, which ensures it does not overly restrict land use.[50]

In Alberta, conservation easements have been enabled through legislation since 1996, but were restricted to the purpose of biodiversity conservation or natural scenic values.[51] In 2009, the Alberta Land Stewardship Act expanded the conservation easement provisions to also be applicable to agricultural land and practices. Ducks Unlimited Canada accepts conservation easements for wetland protection in Alberta, Saskatchewan, Manitoba and Ontario, many of which are for agricultural lands.[52]

Conservation Easement Considerations

The Nature Conservancy is the largest non-profit easement holder in the United States.[53] As of 2014, they have protected over 20 million acres of land in the United States, 6.6 million of which has been through conservation easements. In Canada, the Nature Conservancy has protected over 2.8 million acres. Given their experience with conservation easements, the Nature Conservancy (US) has identified a number of benefits:[54]

1) **Private Land & Rights:** Private land under a conservation easement remains in private ownership. Only the specific rights as set out in the agreements are "eased" to another party. Consequently, the landowner is not losing any land but formalizing the way in which the land is to be managed.

2) **Flexibility:** Each conservation easement is a unique agreement between the landowner and the third party agency. Consequently, each agreement can be customized to suit the needs of both the landowner and the agency.

3) **In perpetuity:** Conservation easements run with the property, meaning that if the current landowner sells the property, the next owner remains bound by the conditions of the agreement. This provides a legal guarantee that the land or specific rights will continue even if the property is sold.

4) **Donated or Purchased:** The specific rights in the conservation agreement can either be donated by the landowner or purchased by the agency. The purchase of these rights has the potential to provide the landowner some additional funding.

5) **Tax Consequences:** Transferring land rights through a conservation easement has the potential to provide the landowner certain tax benefits. In Canada, the Ecological Gifts program provides income tax benefits to donors of land through sale or easement.[55] Individuals and corporations can make ecological gift donations and are eligible for a non–refundable tax credit (individuals) or a deduction from the taxable income (corporations).[56]

6) **Public Benefit:** Conserving private land through conservation easements can protect a number of ecosystem services that provide significant public benefit: water quality, flood mitigation, wildlife

habitat, biodiversity conservation, scenic vistas, and property values.

7) **Cost-effective:** Conservation easements are a cost effective way of protecting land. Between 1954 and 2003, the Nature Conservancy protected 3.1 million acres of land through conservation easements at a cost of $0.92 billion USD. During the same time period, 5.3 million acres of land was protected through direct purchase at a cost of $4.8 billion USD, three times the price of conservation through easements.[57]

Additional considerations for local governments attaining conservation easements over natural areas on private lands include:[58]

1) Protection of natural assets through conservation easements can help achieve conservation goals often set out in municipal statutory documents;

2) Municipalities, as stable management agents, are well positioned to ensure the long-term implementation of the agreement conditions compared to land trusts or other third party qualified agents;

3) Municipal conservation easements can support other conservation programs, such as Transfer of Development Credits; however

4) Municipal conservation easements may be subject to political pressures.

The Yellowstone Example

The Greater Yellowstone Ecosystem (GYE) is a 7.3–14.5 million ha landmass in Montana, Idaho and Wyoming that includes Yellowstone National Park. The area represents one of the fastest growing populations in the nation. Depending on the boundaries used for the GYE, private land ownership represents from 25 – 32 % of the land. In the High Divide area, the High Divide Large Landscape Initiative has protected 754,323 acres (305,270 ha) and invested $437.5 million on easements or fee title acquisition between 2004 and 2014. Most of the land protected is privately owned ranch land.[59]

A main challenge with conservation easements is that they are voluntary: the landowner chooses to enter into an agreement to transfer specific property rights. While the landowner may receive some financial gain if the property rights under the easement are purchased by the third party agency, the financial benefits provided as a result of the easement may not be high enough to incent landowners to voluntarily choose this option if they were not intending to do so otherwise.

Another challenge is enforcement. The owner of the conservation easement is responsible for ensuring that the conditions of the agreement are met. If this third party agency does not have sufficient capacity or resources to enforce the agreement, there is potential that management of the lands will not abide by the set conditions and the easement will be ineffective.

Land Use Planning Tools

When the land or rights to the land cannot be purchased or managed by a public institution, local governments also have a number of land use planning tools already in place that can be used to conserve natural assets on private lands. Official Plans, zoning bylaws, and other local plans (climate change adaptation plans, etc.) can help guide the vision of a community and ensure that future development is done in accordance with sound conservation policies.

Each province, however, is slightly different in how land use planning is governed, which can impact the ability of a local government to protect natural assets. For example, tree-cutting bylaws for private property are permitted in Ontario, but not in Alberta. The following is a general assessment of the potential role of various land use planning tools for managing natural assets on private lands.

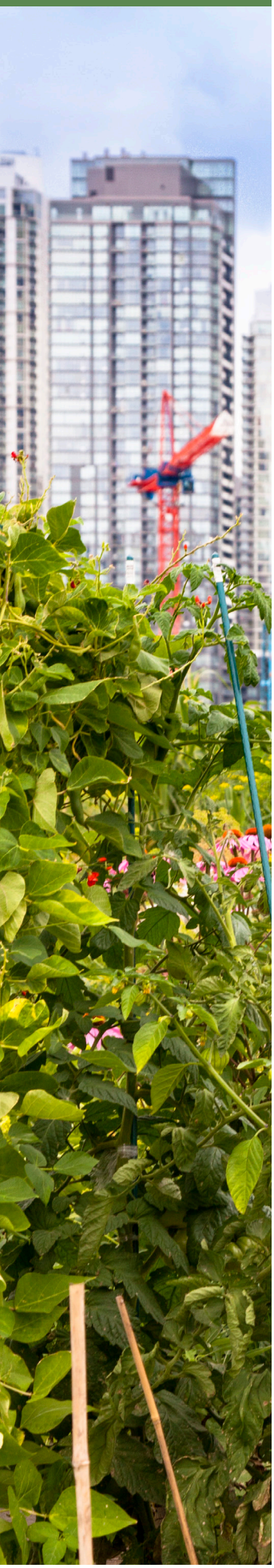
Official Plans

Official Plans are formal planning documents that set out the long-term vision for a community. They identify strategies for addressing major social, economic and environmental challenges and guide the development of all other plans and bylaws for the community. In this sense, it is the key document for setting out how decisions are to be made regarding natural assets in a community.

Official plans come by many names. In British Columbia, under the *Local Government Act*, they are called Official Community Plans (OCPs).[60] In Alberta, the *Municipal Government Act* sets out the authority for Municipal Development Plans, though these plans must be in alignment with regional plans that have been set out under the *Alberta Land Stewardship Act* (2009).[61] In Ontario, the *Planning Act* sets out the provisions for Official Plans and other planning policies.[62]

As Official Plans are the high-level document that directs all development and growth within the municipality, it is an important policy tool for identifying the value of natural assets for the community and how they will be protected. The implementation of Official Plans through bylaws and secondary plans will be just as important, however, as official plans do not have any regulatory authority. Consequently, their power to make significant changes to natural asset management on public and private lands is relatively limited but they are an essential document for ensuring that long-term planning decisions are consistent with the goal of natural asset protection.

In many cases the framework to promote natural asset protection through Official Plans is already in place. In 2008, the *Local Government (Green Communities) Statutes Amendment Act, (Bill 27)* was passed which requires municipalities in British Columbia to set Greenhouse Gas (GHG) emission reduction targets, policies and actions within their Official Community Plan and Regional Growth Strategies.[63] This creates an opportunity to implement strategies on reducing GHG emissions through natural asset protection. The



Town of Gibson's, B.C. updated their Official Community Plan in 2015 to incorporate natural assets into the overall vision of the community, setting a strong example for other Canadian municipalities.[64]

In Ontario, the City of Ottawa has implemented an innovative method of protecting natural assets through their Official Plan by ensuring that any expansion of the urban areas of the city protects natural heritage features. Section 3.11 of the Official Plan outlines the policies for an Urban Expansion Study Area, which are those areas being considered for expansion of the urban boundary. Policy 6(b) states that proponents of development within the expansion area must complete a study or plan that identifies the natural heritage system of the site. No development will be permitted in the identified areas and those lands must be conveyed to the City for public use before development is approved.[65]

A similar policy is included for developing communities in Ottawa, which are areas of the city that are underdeveloped or substantially underdeveloped. Under Section 3.6.4, the Official Plan lays out the policies for areas under this designation. Policy 4 (d) states that when considering approval for a community design plan for one of these areas, a subwatershed plan or environmental management plan is required that not only identifies the natural heritage system within the community but also the measures that will be put in place to protect that system, either through public ownership (i.e. transfer to the City) or other measures.

Specialized Plans

Local governments have the ability to develop plans for specific local matters in order to guide decision-making. For example, many communities are now adopting climate mitigation plans in order to ensure that future decisions take into consideration mitigation and the impacts of climate change. With respect to natural assets in particular, some communities, such as the City of Edmonton[66] and the City of Ottawa[67] have developed urban forest management plans. The Town of Gibsons, BC, was the first community to develop a natural asset strategy specifically guiding how the town will manage critical natural assets.[68]

Like Official Plans, the specialized plans generally do not carry any regulatory authority but instead guide decisions. Given the success of the Gibsons Eco-Asset Strategy in highlighting and documenting the value of the Town's natural assets and the impact this has had on all other decisions, specialized plans clearly have an important role in furthering natural asset management.

Zoning & Bylaws

In contrast to Official Plans and other specialized plans, zoning is a regulatory tool that can be used to control how private lands are developed. Zoning can restrict what development is permitted or require certain conditions to be met. For example, zoning can restrict development in lands designated as floodplains or, as in the community of Beaubassin-est, QC, in an area designated as a sea-level rise protection zone.[69] They can also create building standards, such as to require green roofs when older roofs are replaced.[70]

The challenge with zoning is that it cannot easily be changed or applied to lands that are not going through a new development or re-development process. So if a natural asset is not already under an environmental protection zone, existing zoning would not be changed until either the owner applies for a zoning by-law amendment, or the change is part of a larger zoning by-law update initiated by the local government.

Site Plan Control Bylaws can provide an additional layer of control over development in certain areas, however, again, generally will only be useful for regulating new development or re-development.

By-laws have a greater potential for protecting natural assets on private property as they can be enacted in accordance to provincial planning acts to help preserve natural assets. A tree-cutting bylaw is a good example of this. In Ontario, amendments to the Ontario Municipal Act now allow for municipalities to create climate change mitigation bylaws. Under Section 10(2) of the Municipal Act, a single-tier municipality may pass a by-law respecting:

> *(5) Economic, social, and environmental well-being of the municipality, including respecting climate change.*[71]

This change could have significant ramifications on the ability of municipalities to enact bylaws protecting natural assets that help increase the resiliency of a community to the impacts of climate change.

Subdivision & Development Control

At the time of subdivision, a municipality has the ability to control how the land will be developed through subdivision controls, development permits, and development agreements – all of which require a developer to submit detailed designs or meet certain criteria before permission to develop is granted. For example, the Toronto Green Standard (TGS) requires that all new development that is subject to subdivision, site plan control, or zoning bylaw amendment, demonstrate compliance with Tier 1 of the TGS.[72] Tier 1 requirements include criteria for air quality, energy efficiency, water quality, quantity and efficiency, ecology, and solid waste. However, similar to zoning, these controls will only be useful in new development or redevelopment applications.

Development Cost Charges (DCCs) are charges collected by a municipality from a developer in order to cover the cost of providing services to new developments. The rules governing what a municipality or local government can collect through DCCs are set out in provincial legislation. For example, in British Columbia, the Local Government Act Part 14, Division 19 sets out the requirements for DCC collection by local governments in BC.[73]

While DCCs could be viewed as having the same limitations as zoning and subdivision controls with respect to applicability, the Town of Gibsons has found an innovative way to use DCCs for natural asset conservation. When the Town recently updated their Development Cost Charge Bylaw (2016), they made amendments such that development fees collected through

the bylaw can be put towards improvements to natural areas that support service delivery.[74] This innovation could have significant impacts for natural asset management as it provides a source of funding for natural asset protection outside of the specific development boundaries.

The Suite of Planning Tools: the cascading effect of Gibsons' Eco-Asset Strategy

When Gibsons, BC, started down the path of recognizing the importance of their natural assets for service delivery, they triggered a cascading effect that is now touching on a number of key planning tools. Beginning with the inclusion of natural assets as part of the Town's overall asset management planning and financial framework, and being the first local government to recognize natural assets on official financial documents, the Town next developed a specialized Eco-Asset Strategy. They then updated the Official Community Plan to include policies supporting natural asset conservation, their development cost charge bylaw to provide funding for natural area improvement, and the Town's Strategic Plan (2016-2018) to identify advancing the Town's natural asset approach as a priority. They are now working to expand their knowledge by assessing and including additional natural assets (i.e., the Town foreshore), in all of the above processes.[75]

The lesson learned from the Gibson's approach is that it takes a whole-systems approach to integrate natural assets effectively into the decision-making process of a community. And this does not happen overnight. Even as the leader in this area, the changes occurring in Gibsons have happened over a number of years as a result of a consistent and dedicated effort.

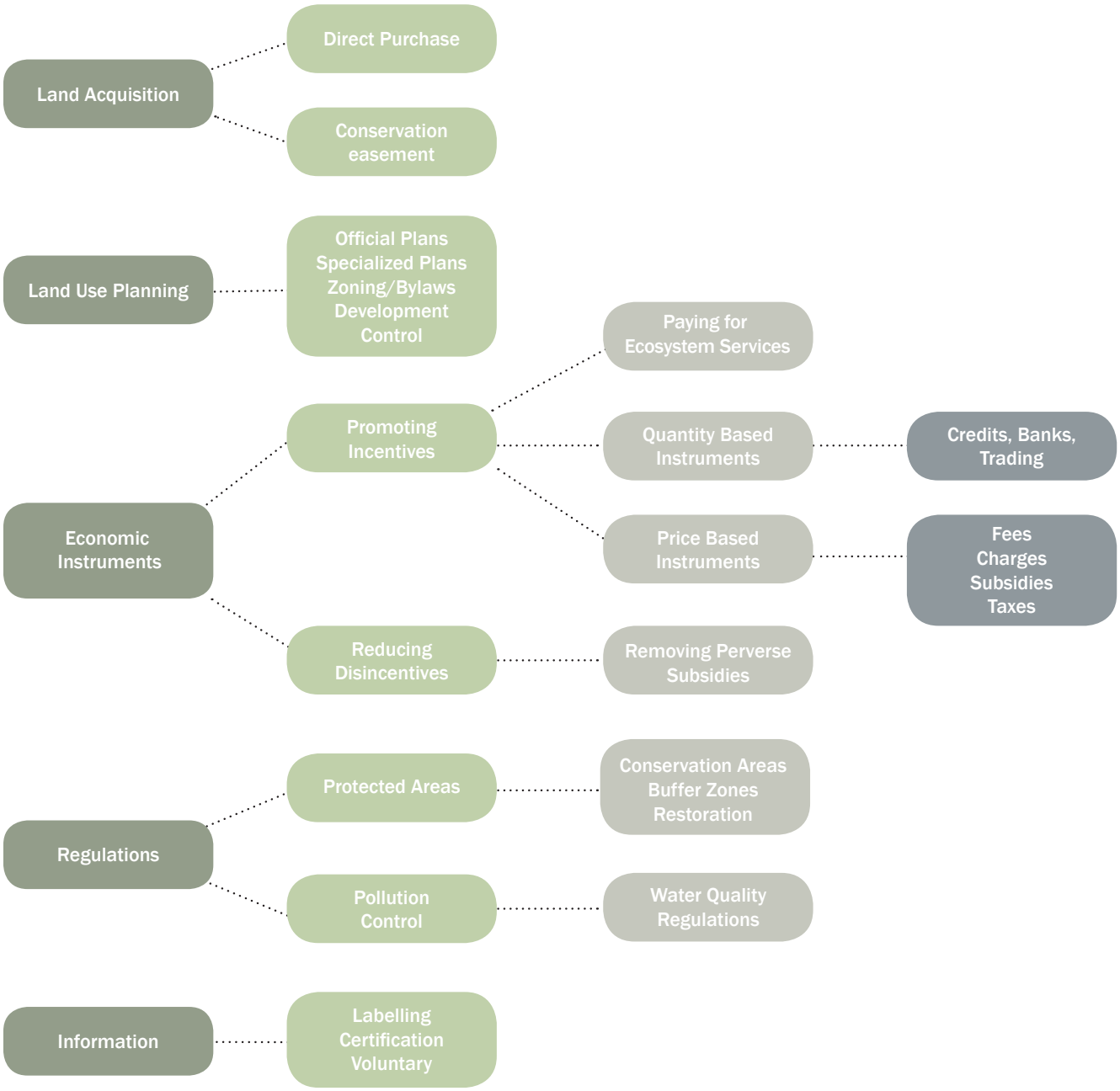
Incentives

Regulatory, price-based, market-based, and other voluntary incentives can play an important role in helping local governments to encourage conservation of natural assets on private property. Regulations are often useful when there is a set level of performance that must be met, for example when a certain concentration of a pollution cannot be exceeded. In the case of natural assets, a bylaw stating that development in a sensitive foreshore area is not permitted, such as in the sea-level rise protection zone of Beaubassin-est, QC,[76] can greatly help conserve vital natural areas. In other cases, however, where regulations are not feasible (i.e. no new or re-development occurring) or would be over-burdensome (where costs of compliance range significantly), other incentive mechanisms can be more effective. They can also be a strong companion to regulations, as seen in the New York City example.

A previous report by Smart Prosperity Institute (formerly Sustainable Prosperity) outlined a number of economic instruments already in use in Canada for the protection of biodiversity and ecosystem services, including: payments for ecosystem services, taxes or fees, and markets for green goods and services.[77] These and other similar economic instruments act to fix market failures by fully incorporating the value of nature into prices,

something that has previously been lacking from most markets. This works to ensure that the benefit of protecting a natural asset on private lands and the costs associated with altering it are accounted for in decision-making processes. Figure 4, adapted from the report, provides an overview of some of the different types of economic instruments that could potentially be used to protect natural assets and ecosystem services and how these economic instruments fit into the overall natural asset management toolkit, including those tools already discussed in this report.

Figure 4: Policy Toolbox for Conserving Natural Assets on Private Lands



Economic Instruments for Local Governments Best Suited for Local Environmental Markets?

Many of the ecosystem services important to a local government are not suited for traditional large market systems, where provincial or federal actors prevail. This is because the value of those ecosystem services (for example, stormwater management) is very local in nature and so the costs and benefits of those services are also very local.[78] The benefit of locally focussed environmental markets is that they will be more tangible to local stakeholders. Regional, national and international environmental markets will continue to be important, but for highly localized challenges, such as the protection of municipal natural assets, a local market has the potential to be more effective. In Canada, while use of local economic instruments is still relatively low,[79] there are a number of programs in place that can provide valuable lessons for municipalities looking to implement a local ecosystem service market.

Payment for Ecosystem Services

One of the best-known mechanisms used to encourage private landowners to protect natural assets is through payments for ecosystem services (PES). The basic premise for PES is that those who benefit from ecosystem services pay the private landowner for conserving or restoring the natural assets.[80] A PES system is often applied where ecosystems on private lands provide, or can be restored to provide, a public good but there is a risk to losing that public good because the benefit of maintaining those ecosystem services is not integrated into the market systems, leaving the private landowner with a hefty conservation price-tag.[81] As opposed to a polluter-pays system whereby a tax or regulation focuses on stopping a negative activity, a PES is a beneficiary-pays system, where those who benefit from the activity, such as water uses or the general public, pay for the protection of that service.[82] Payment systems can be based on a single grant or fund that supports a particular project, such as the restoration of a natural asset, or it can be an ongoing payment for long-term management of a natural asset.

ALUS Canada, for example, is a national non-profit organization that channels funding from various sources (governments, individuals, foundations) into local investments directly to farmers and ranchers who are protecting ecosystem services on working agricultural landscapes.[83] ALUS helps farmers to restore or protect natural assets but also provides annual payments for ongoing stewardship. They have active projects in Alberta, PEI, Manitoba, Ontario, Quebec and Saskatchewan. In Saskatchewan, Ducks Unlimited Canada held a reverse auction where farmers were paid to restore wetlands in fields and pastures.[84] A report on environmental markets in Ontario also identified a number of payment programs already in place for water and biodiversity conservation, including the Ontario Species at Risk Farm Incentive Program.[85] Under the Ontario Land Stewardship and Habitat Restoration Program (LSHRP), [86] landowners can receive up to $20,000 in matching funds for a project that maintains or restores habitats that benefit fish, animals and/or plants. Projects can include stream restoration, upland improvements, wetland restoration, or invasive species control.

Costa Rica Payment for Ecosystem Services

The Costa Rica Payment for Ecosystem Services system is one of the most well-known systems in place today. The PES became operational in 1997. It was based on a Forestry Law (7575), which came into effect in 1996 that banned deforestation and introduced payments for reforestation, protection and management.[87] Since that time the program has worked to conserve nearly one million hectares of forests.

The focus of the program is on four ecosystem services: capturing and storing atmospheric carbon, protecting water sources, conserving biodiversity, and scenic beauty. The program focuses on five private land uses in order to target these four ecosystem services: 1) forest protection, 2) commercial reforestation, 3) agroforestry, 4) sustainable forest management, and 5) regeneration of degraded areas. However, each of these is measured based on the proxy of forest cover, under the assumption that forest cover will provide the services.

The National Forestry Fund (FONAFIFO) is the primary intermediary charged with administrating the PES program. This body manages the contracts with landowners and monitors their compliance. Funds for the program come from three sources: government, private sector, and international banks and bilateral agreements. Landowners transfer the 'rights' to the ecosystem services to FONAFIFO in exchange for the payments. The government funds are the main source of funding and this comes from tax revenue from water and fossil fuels. The private sector funds come from multiple sources with private hydroelectric plants being a significant contributor. Protection of forests and ecosystem services, improved relations with local communities, and improved political prospects at the national level appear to be contributing factors for the participation of large hydroelectric plants in the program.[88]

The system of payments has evolved since the inception of the program to the current system that is controlled by a national priority list. In the beginning, payments were issued on a first-come-first-served basis but in 2011, this system was replaced with a national priority list that assigned funds based on a weighted priority list of projects. The main challenge with the Costa Rica PES system is that there has been a lack of monitoring and evaluation so it is difficult to say if the payments have in fact worked to protect those ecosystem services and if the system is more cost effective than land acquisition or other conservation tools.

Municipal Payment for Ecosystem Services

Many of the local level payments systems identified in Canada are one time project funds or grants and do not necessarily cover the ongoing costs of managing natural assets for continued production of ecosystem services. For example, the Rideau Valley Conservation Authority administers the Rideau Valley Rural Clean Water Program on behalf of its partner municipalities, and provides grants and technical assistance for projects that protect water quality.[89] While single payment systems are effective, a combination of upfront grants and long-term payments is likely to have a greater impact on effectively protecting natural assets in the long-term.

A good example of local level PES program that provide long-term payments comes from The Nature Conservancy, who has developed an innovative way of linking local water users with payments for ecosystem services through Water Funds.

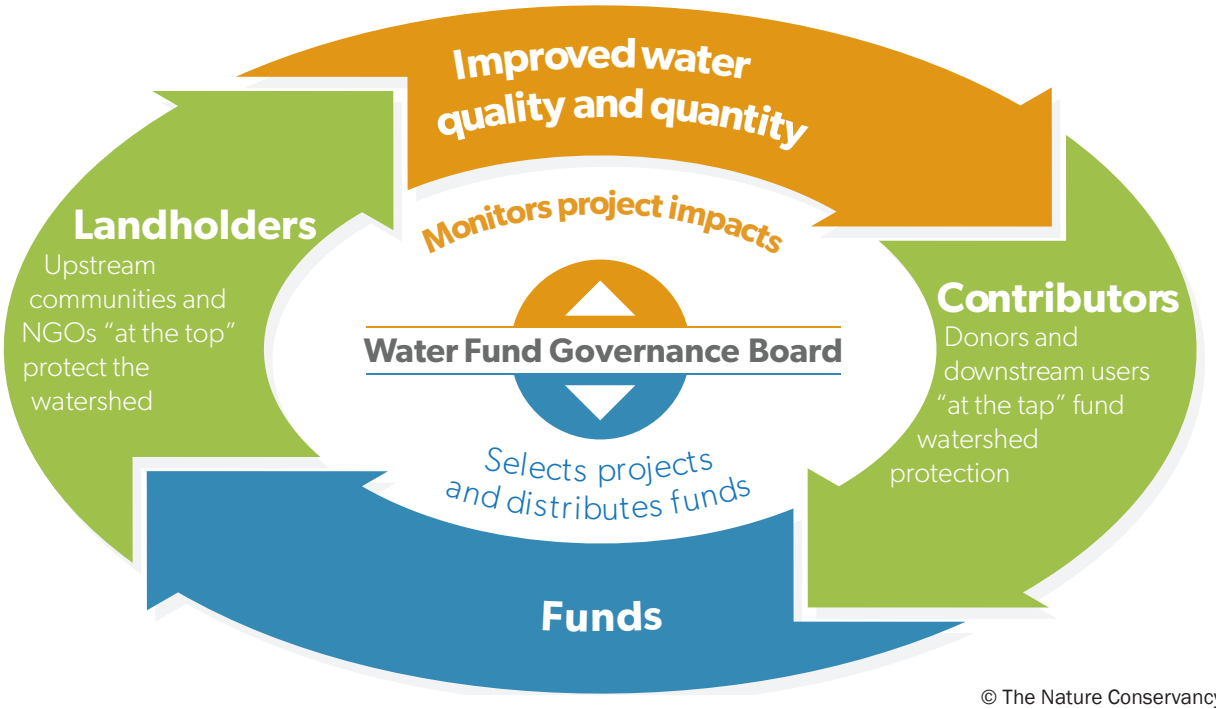
Water Funds

Initiated by The Nature Conservancy in 2000 in Quito, Ecuador, Water Funds link downstream water users to the upstream land stewards through specific finance and governance mechanisms (Figure 5).[90] The three primary organizational features of water funds are 1) a funding mechanism that collects funds from water users, government, and non-government organizations in order to provide long-term funding for the program that is redistributed to upstream landowners to support land conservation, 2) a governance mechanism that is based on the premise of a multi-stakeholder board comprised of water users and actors, and 3) a watershed management mechanism that focuses on conservation and management activities at the watershed level.[91]

The first water fund was launched in Quito in 2000 and there are now around 30 funds in operation, mainly in Latin America where the Latin American Water Funds Partnership (LAWFP) supports 16 separate water funds across six countries.[92] The specific structure of each fund is unique to its location based on the socio-cultural, economic and ecological context. The Nature Conservancy has created a Water Funds Toolbox to compile 15 years of experience in water fund operation in order to provide support for other communities or regions looking to implement a fund.[93]

Figure 5: Water Fund Framework

A water fund is designed to cost-effectively harness nature's ability to capture, filter, store and deliver clean and reliable water. Water funds have four common characteristics: science-based plans, a multi-stakeholder approach, a funding mechanism and implementation capacity.



Payments for Ecosystem Services Considerations

The challenges noted for the Costa Rica PES are common for many PES programs: monitoring and measurement are essential but often lacking, the sustainability of the funding source for payments can impact the long-term effectiveness of the program, and there is the potential issue of additionality, where payments go towards protecting natural areas that would have been protected voluntarily in the absence of the payment.[94] Program design, establishment of baseline conditions and implementing PES systems in combination with other policy tools have all been noted to help address many of these challenges.[95]

Tax Incentives

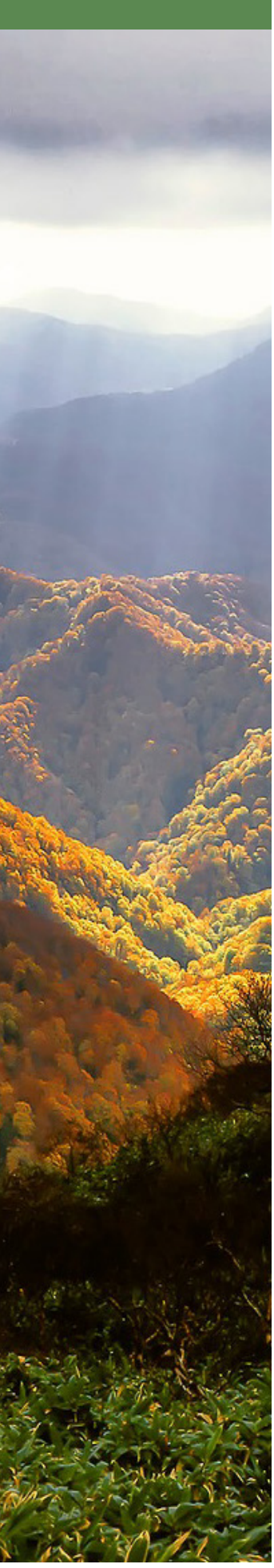
Tax incentives are a type of payment for ecosystem services. Instead of a direct subsidy to a landowner for the protection or improved management of natural assets, the landowners receive a credit towards their tax payments. In Canada, the Federal Ecological Gifts program is a good example of a tax deduction PES program. It provides tax deductions for landowners who either donate ecologically sensitive land or donate the rights to land through conservation easements.[96] Since the program's inception in 1995, 1260 ecological gifts valued at over $807 million have been donated. This represents over 180,000 hectares of protected wildlife habitat. The province of Ontario provides a number of various tax incentives for private landowners who manage their natural assets, although tax incentive programs can be found in most provinces. While tax incentives are generally administered through provincial programs, they are mentioned here because local municipalities can work with provinces to raise awareness of programs but also assist in their development. They have also been used in the context of municipal property taxes.

Ontario Conservation Land Tax Incentive Program[97]

The Conservation Land Tax Incentive Program (CLTIP) offers up to 100% property tax exemption for land that has important natural heritage features. While buildings and other improvements are not part of the exemption, land that has been evaluated by the Ministry of Natural Resources and Forestry (MNRF) to be provincially significant is eligible. This land can include:

- provincially significant wetlands
- provincially significant areas of natural and scientific interest
- Niagara Escarpment natural area
- habitats of endangered species, where specific guidelines for the CLTIP have been developed
- Community Conservation Lands (restricted to non-profit charitable conservation organizations and conservation authorities)

The land must be at least 1/5 hectare (1/2 acre) in size or larger to be eligible.



Ontario Managed Forest Land Tax Incentive Program[98]

Under the Managed Forest Land Tax Incentive Program, landowners with forests classified as 'Managed Forest' pay 25% of the municipal tax rate. To be classified as a Managed Forest, the land must be over 4 hectares (9.88 acres) in size and a 10-year Managed Forest Plan must be in place and approved by a Managed Forest Plan Approver, who is certified by the Ministry of Natural Resources and Forestry (MNRF). A progress report must be submitted every 5 years.

Vancouver Island, BC - Natural Area Protection Tax Exemption Program (NAPTEP)

The picturesque Gulf Islands surrounding Vancouver Island, BC are mostly privately owned.[99] To protect the natural assets in this area there is a Natural Area Protection Tax Exemption Program (NAPTEP), which provides landowners with an annual 65% exemption on the property taxes for the portion of their property protected with a NAPTEP covenant. The exemption requires the landowner to enter into a conservation covenant and the Morrison Waxler Biodiversity Protection Legacy Fund offers grants to landowners to cover some of the costs of registering a conservation covenant or NAPTEP covenant.

Manitoba Riparian Tax Credit

The Riparian Tax Credit in Manitoba encourages farm operators to improve the management of their riparian areas through tax deductions for specific activities (or the restriction of activities). For example, for crop land that is no longer cultivated, up to $100 per acre over five years can be deducted.[100]

Tax Incentive Considerations

Two of the main challenges with tax incentive programs are the administrative burden and the level of funding. For many of these programs, the landowner must first be aware that their land qualifies for a tax incentive and then apply for the program. If the benefit of the tax credit is not great enough to overcome that initial effort/investment, it is unlikely that a large number of landowners will apply. Tax incentives, in that sense, are also voluntary, leaving the uptake of the incentive to external considerations. As well, the impact of a tax incentive program on the management of the natural asset would require additional monitoring and evaluation. As was reported for other payment for ecosystem service programs, this monitoring aspect of incentive programs can be a challenge and can impact effectiveness.

Offsets and Trading Systems

Offsets and trading systems are growing in popularity as tools for environmental protection. Examples of environmental trading include "carbon sequestration offsets, tradable development rights, tradable quota systems, eco-labelling and environment-certification and bio- prospecting."[101] Many offsetting programs focus on biodiversity, wetland, or conservation offsets. In these programs, negative impacts to the environment which cannot be avoided are "offset" by environmental protection elsewhere.

In Canada, offsets and trading markets for ecosystem services are less well used than in other countries[102] and have been slow to develop.[103] A 2015 Smart Prosperity Institute report on Ontario's Environmental Markets identified at least 20 active environmental markets.[104] While many of these markets are payment systems, as discussed in the previous section, a number are more complex established markets. Ontario's Emissions Trading System for NO and SO_2 was Canada's first emissions trading system and has been instrumental in industrial section emissions reductions.[105] Emissions trading schemes, however, are more applicable to industry and large corporations through provincial and federal markets, less so for private landowners and natural assets.

Water Quality Trading programs hold great potential for protecting natural assets at the local level. These programs are directly linked to private landowners but are less common in Canada. In Ontario, the South Nation Conservation Authority and the Nottawasaga Valley Conservation Authority[106] have successfully implemented water quality trading programs and another is being implemented by the Lake Simcoe Region Conservation Authority, to take effect January 1, 2018.[107] The South Nation program was a pilot for water quality trading in Ontario developed by the Ontario Ministry of the Environment and Climate Change (MOECC) and the South Nation Conservation Authority. In 2008, the Ontario Water Resources Act was amended to allow for the Lieutenant Governor in Council to make regulations on water quality trading (Sec 75 (1.7)) but to date no regulations have been adopted. Water Quality Trading was also being considered for the Lake Winnipeg Basin.[108]

The purpose of the South Nation water-quality trading program is to achieve a net environmental benefit: municipal or industrial wastewater or stormwater facilities can offset their phosphorous discharges by investing in non-point source or point-control projects, such as stormwater retrofits or agricultural best management practices. So far, the South Nation program has shown success: between 2000 and 2009, the South Nation trading program reduced phosphorous load by 11,843 Kg through 269 best management practice projects.[109]

Conservation Authorities in Ontario are ideal organizations for these types of local environmental markets as they are based on watershed boundaries and are mandated by Provincial authority to work directly with their

municipal partners to protect watershed health. In Quebec, there are also 40 watershed organizations, *Organismes de bassin versant,* which are funded through the Quebec Ministry of Sustainable Development, Environment and Parks (MDDEP) for the purpose of improving water management in the various regions.

Through their experience in water quality trading, South Nation provided a number of valuable lessons learned, which include:[110]

- *Community agreement and buy-in* (e.g., government, farmers, South Nation Conservation): The program cannot go forward without community agreement. In the South Nation example, it took two years of extensive consultation before the program was approved
- *Legislative backing for trading:* The Ministry of Environment and Climate Change is responsible for regulating water quality. A study completed prior to the trading program showed that the surface waters in the South Nation watershed were 2 to 4 times the allowable limit for phosphorous and 90% of the discharges came from non-point sources, providing a strong justification for implementing an innovative program.
- *Credit certainty* (science based measurement): Managing risk to regulators and stakeholders requires solid evidence on the amount of phosphorous that must be removed and the ability and availability of trading projects to meet that demand, ensuring a degree of certainty among regulators and stakeholders.
- *Cost certainty for buyers/sellers:* Regulated entities must have a degree of certainty regarding the long-term costs of the program and landowners selling the credits must also have certainty regarding long-term revenue.
- *Long-term broker:* The process can be complicated and the availability of a simple application and delivery process through a trusted broker can ease uncertainty for stakeholders
- *Instruments*: Legal documents and certificates of approval are necessary to ensure that roles and responsibilities are clearly laid out and monitored.
- *Legal liability protection:* Although not legally responsible for water quality in Ontario, as the broker of the trading program, South Nation Conservation is still legally liable for the supply of credits and must therefore take steps to insure itself and monitor the program for potential problems.
- *Evaluation:* to ensure continued improvement of the program a full evaluation was conducted five years after implementation.

Other common trading programs relevant for natural assets are wetland offsetting programs or more generally, conservation offsets. A recent report by Sustainable Prosperity[111] reviewed a number of conservation offsets programs in Canada, many of which are in Alberta. Common issues around offsetting programs include uncertainty surrounding our ability to truly offset lost environmental features (e.g. wetlands), strict adherence to the mitigation hierarchy (avoid, reduce, offset), potential for additionality (offsetting through protecting lands that would have been protected anyways), and determination of the appropriate offset ratio.

Revenue Streams

While some of the tools outlined above have funding mechanisms imbedded within the program (i.e. trading programs have independent buyers and sellers), there is still often the cost to administer the programs. Other tools (e.g. purchase of land or conservation easements) require an external revenue stream. There are a number of ways in which a local government can obtain funding for protecting natural assets on private property.

User Fees

Environmental user fees are used throughout the world, including Canada, for both discouraging negative environmental impacts but also for providing a revenue source for governments.[112] A recent report by the Ecofiscal Commission points to user fees as the best way to finance water systems[113] and they are a potential revenue source for the protection of natural assets. Canadians pay very little for water and wastewater services compared to many other countries, and this is because the full cost of providing those water services is not charged to users. Incorporating the true costs of providing clean drinking water, for example, which includes the cost of conserving natural areas that supply that drinking water could provide the needed funding for land acquisition or payments for private landowners. The Water Funds of Latin America, as discussed previously, are a good example of user fees providing financial resources for conservation. Water users provide a portion of the funding that goes in to the water fund, which is in turn used to make payments to land stewards. A report prepared by Earth Economics also recommended watershed protection fees and watershed stewardship fees as ways in which the Nisqually River watershed restoration in Washington State could be funded.[114] The legislation governing how and when user fees can be used by a municipality will depend on its location, but there appears to be a strong existing framework in many cases.

In lieu payment from development

Municipalities may require developers to pay fees for parkland dedication. Depending on the restrictions set out by provincial planning legislation, it is possible that those fees could go towards protection of natural assets or towards programs supporting natural asset grants. In Toronto, for example, the green roof bylaw requires new or retrofitted buildings to include a green

roof but the developer has the option of paying a fee-in-lieu. The revenue from this fee goes towards a funding pot that provides grants for non-regulated green roof projects. A similar approach could be developed for parkland dedication and natural asset protection.

Development Cost Charges

As mentioned previously, the Town of Gibsons has recently updated their Development Cost Charges bylaw and now are able to collect fees from developers that will go towards funding natural asset restoration projects, as these natural assets are part of the "servicing" of a new development.[115] If other local governments follow suit, this could be an innovative new revenue stream for municipal natural asset management.

Provincial/federal funding

Through recent budgets, the Government of Canada has strongly emphasized the need for green and natural infrastructure for climate resilience. The Investing in Canada Plan includes a $9.2 billion dollar Green Infrastructure funding stream, which will be implemented through bilateral agreements with the Provinces. The Disaster Mitigation and Adaptation Fund is a $2 billion dollar investment supporting provincial and municipal infrastructure for climate change resiliency.

Through these programs, municipalities could potentially access a large amount of funds for building capacity and developing trading programs, payment for ecosystem services programs or new bylaws.

Stormwater Utilities

As outlined in a recent report[116], transitioning to a stormwater user fee system has the advantage of creating a fair, dedicated and sustainable funding stream for municipal stormwater management programs. With a dedicated revenue source for stormwater management, funds can be put towards natural asset protection, restoration and enhancement projects to address the many water quality and flooding issues that result from failing or under-capacity stormwater infrastructure.

Green Bonds

Green bonds are just like traditional bonds with the exception that they exclusively direct proceeds towards projects that are "green" or that have positive environmental benefits. A recent report on Bonds and Climate Change in Canada found that issuance of green bonds in 2017 exceeded that of all other previous years combined, for a total of CAD$3.8 billion.[117] At the provincial level, Ontario issued its third green bond in 2017[118] and Quebec entered the market in 2017 as well.

In November 2017, the City of Ottawa became the first municipality in Canada to issue a green bond. As outlined in the City of Ottawa Green Debenture Framework[119], the proceeds of a Green Debenture will be used to finance capital works that promote environmentally sustainable development that helps the City mitigate or adapt to the effects of climate change. Within the list of eligible projects the protection of natural assets is included. With the green bond market in Canada and globally continuing to increase,[120] there is opportunity for municipalities across Canada to access this market for natural asset protection.

Towards a Municipal Natural Asset Management Strategy that includes Private Lands

Natural assets do not abide by jurisdictional boundaries and they cannot be effectively managed in bits and pieces. A whole ecosystem level approach must be taken to effectively identify, measure and manage natural assets for the continued (or restored) provision of sustainable municipal services and benefits.

Private landowners must be involved in the process of managing natural assets because they are a significant piece of the natural asset management puzzle. As with many policy challenges, no single tool or economic instrument is definitively best for most situations because there will be different barriers and challenges facing private landowners in all areas across Canada. The information presented in this report is a starting point for local governments to begin to assess local management issues associated with natural assets and provides examples of what could be done to design a comprehensive natural asset management system that includes private lands. The New York City case study remains a compelling story of how, through the implementation of a number of different mechanisms aimed at various stakeholders, natural assets can be managed and protected for sustainable municipal service delivery, even for one of the largest cities in the world.

Financial incentives are also not enough. A strong consultation process, such as in the South Nation Conservation Water Quality Trading program, can have the unintended, but welcome, side effect of not only implementing a successful natural asset management program, but also of increasing awareness of the importance of natural assets and building a community-owned responsibility for the management of those assets.[121]

The following recommendations are designed to encourage a conversation on how a comprehensive natural asset management strategy that includes private land owners could be developed in communities across Canada:

1) **Bring private landowners into the conversation early:** The first step in developing a comprehensive natural asset management strategy that includes private landowners is to invite them to the table. Landowners stewarding different types of lands in different regions will all be facing different barriers. Properly addressing the unique barriers being experienced by the landowners in your region will require a "boots on the ground" effort to identify and develop the most appropriate toolkit for effectively managing natural assets.

2) **Appreciate what you have:** Many of the tools available for working with private landowners for the protection of natural assets are already in use today by local governments. Land use planning tools, development control, user fees, and payments (grant) programs are all very common municipal tools that may simply need a new direction or a minor tweak to create an effective natural asset management toolkit out of existing tools.

3) **Consider local environmental markets:** The development of local environmental markets in Canada holds great potential for increasing the protection, conservation and better management of our natural assets and the benefits and services they provide. Examples such as the water quality trading programs in Ontario, the ALUS Canada payment systems, and the Nature Conservancy Water Funds all demonstrate that there are ways to provide financing to private landowners for the protection of ecosystem services on their land for the benefit of the public.

4) **Seek Partnerships & Support:** All levels of government are recognizing the importance of nature and natural assets for many of the greatest challenges facing us today. The federal government budget allocations for green infrastructure and climate change resiliency are significant opportunities for local governments to investigate the potential for investing in protecting, conserving or restoring their natural assets. A comprehensive natural asset management strategy that includes government and private landowners will require strong partnerships that build on the strengths and knowledge of everyone involved.

5) **Focus on Service:** A key lesson learned by the Town of Gibsons, BC is that ownership should not be a barrier to natural asset management[122]. 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.

References

1 See The Economics of Ecosystems and Biodiversity (TEEB) 2011 publication TEEB Manual for Cities: Ecosystem Services in Urban Management, available here: http://doc.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf

2 Narayan, S, et. al. March 2017. The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA. Scientific Reports, 7, Article Number 9463; doi:10.1038/s41598-017-09269-z. The US Army Corps of Engineers has also concluded that non-structural, natural, and nature based solutions can help increase the resilience of coastal areas threatened by sea level change and coastal storms: US Army Corps of Engineers, January 2015, North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk (http://www.nad.usace.army.mil/Portals/40/docs/NACCS/NACCS_main_report.pdf)

3 Intact Centre on Climate Adaptation, July 2017, The role of wetlands to limit urban and rural flood damage;
http://www.intactcentreclimateadaptation.ca/wp-content/uploads/2017/07/When-the-Big-Storms-Hit.pdf

4 See The Economics of Ecosystems and Biodiversity (TEEB) 2011 publication TEEB Manual for Cities: Ecosystem Services in Urban Management, available here: http://doc.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf

5 Municipal Natural Assets Initiative, 2017, Defining and Scoping Municipal Natural Assets; available: http://institute.smartprosperity.ca/library/publications/defining-and-scoping-municipal-natural-assets

6 The term 'municipal' is taken to mean, as defined in Merriam-Webster's dictionary: of or relating to the internal affairs of a major political unit (such as a nation), or restricted to one locality. As such, the term municipal applies to all forms of local governments, including, but not limited to, municipalities, regional governments, and First Nation communities.

7 Ecosystem services included pollution removal, carbon storage, carbon sequestration, oxygen production, building energy savings, and avoided stormwater management costs. Source - City of Tampa 2011 Urban Forest Analysis, September 2013, available at: http://waterinstitute.usf.edu/upload/projects/TampaUEA/Tampa_2011_UrbanForestAnalysis.pdf

8 This figure includes the energy savings of cooled buildings, the additional cost of heating those cooled buildings, and the value of carbon emissions avoided due to reduced demand on power plants.

9 Endreny, T., Santagata, R., Perna, A., De Stefano, C., Rallo, R.F., and S. Ulgiati. 2017. Implementing and managing urban forests: A much needed conservation strategy to increase ecosystem services and human wellbeing. Ecological Modelling (360): 328-335 https://doi.org/10.1016/j.ecolmodel.2017.07.016

10 See also The Economics of Ecosystems and Biodiversity (TEEB), 2011, TEEB Manual for Cities: Ecosystem Services in Urban Management; available: http://doc.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf
David Suzuki Foundation, ND, Natural Capital Policy Review: A review of policy options to protect, enhance, and restore natural capital in B.C.'s urban areas.

11 Province of British Columbia, Ministry of Municipal Affairs and Housing – Municipal Services; available at:
http://www.cscd.gov.bc.ca/lgd/municipality/municipal_services.htm

12 IISD (Anantha Kumar Duraiappah), 2006, Markets for Ecosystem Services: A Potential Tool for Multilateral Environmental Agreements; retrieved from https://www.iisd.org/pdf/2007/economcs_markets_eco_services.pdf

13 Source: http://www.ducks.ca/our-work/landowners/ and http://www.thecanadianencyclopedia.ca/en/article/crown-land/

14 Public Lands, Prince Edward Island: https://www.princeedwardisland.ca/en/information/communities-land-and-environment/public-lands

15 Crown Land in Nova Scoptia: https://novascotia.ca/natr/land/

16 Natural Resources Canada (2017), Forest Land Ownership; retrieved from: http://www.nrcan.gc.ca/forests/canada/ownership/17495. The majority of forest lands in Canada is publicly owned and managed by provincial, territorial and federal governments (94% - 4% of this is federal); Only 6% of Canada's forest lands are privately owned.

17 Library of Parliament, 2013, Federal and Provincial Jurisdiction to Regulate Environmental Issues; available at: https://lop.parl.ca/Content/LOP/ResearchPublications/2013-86-e.htm

18 Ibid.

19 Adaptation to Climate Change Team (ACT), Simon Fraser University, 2017, Still Creek: A Case Study of Transboundary Municipal Ecosystem Governance; available: http://act-adapt.org/still-creek-a-case-study-of-transboundary-municipal-ecosystem-governance/

20 See City of Vancouver Still Creek Enhancement: http://vancouver.ca/home-property-development/still-creek-enhancement.aspx Still Creek integrated Stormwater Management Plan http://www.waterbucket.ca/rm/sites/wbcrm/documents/media/151.pdf

21 See the Sustainable Prosperity Report on Green Measures for insights into environmental regulations and their impacts on competitiveness. Sustainable Prosperity, 2016, Green Tape Measures Up: Environmental Regulation Comes with Lower Compliance Costs and Greater Innovation than Previously Thought; available at: http://institute.smartprosperity.ca/sites/default/files/green-tapejune-2016.pdf

22 New York State Department of Environmental Conservation, Facts about the NYC Watershed http://www.dec.ny.gov/lands/58524.html

23 New York City 2016 Drinking Water Supply and Quality Report, available at: http://www.nyc.gov/html/dep/pdf/wsstate16.pdf

24 New York City Department of Environmental Protection, 2016, Watershed Protection Program Summary and Assessment, retrieved from: http://www.nyc.gov/html/dep/pdf/reports/fad_5.1_watershed_protection_program_summary_and_assessment_report_03-16.pdf

25 Ibid.

26 Potter, John R. Management of New York City Water Supply Lands: A Component of a Comprehensive Watershed Protection Program; available at: http://www.awra.org/committees/techcom/watershed/pdfs/0203WU.pdf

27 UC Davis, Information Centre for the Environment, and New York City 2016 Drinking Water Supply and Quality Report, available at: http://www.nyc.gov/html/dep/pdf/wsstate16.pdf. Additional information on the Filtration Avoidance Determination can be found through progress reports on the NY DEP website: http://www.nyc.gov/html/dep/html/watershed_protection/fad.shtml

28 New York City 2016 Drinking Water Supply and Quality Report, available at: http://www.nyc.gov/html/dep/pdf/wsstate16.pdf

29 Ibid.

30 New York City Department of Environmental Protection, 2016, Watershed Protection Program Summary and Assessment, retrieved from: http://www.nyc.gov/html/dep/pdf/reports/fad_5.1_watershed_protection_program_summary_and_assessment_report_03-16.pdf

31 New York City 2016 Drinking Water Supply and Quality Report, available at: http://www.nyc.gov/html/dep/pdf/wsstate16.pdf

32 New York City Department of Environmental Protection, 2016, Watershed Protection Program Summary and Assessment, retrieved from: http://www.nyc.gov/html/dep/pdf/reports/fad_5.1_watershed_protection_program_summary_and_assessment_report_03-16.pdf

33 New York City 2016 Drinking Water Supply and Quality Report, available at: http://www.nyc.gov/html/dep/pdf/wsstate16.pdf

34 At the time of writing of this report, only the draft 2017 Filtration Avoidance Determination (FAD) was available: https://www.health.ny.gov/environmental/water/drinking/nycfad/

35 See also the New York City 2016 Drinking Water Supply and Quality Report, available at: http://www.nyc.gov/html/dep/pdf/wsstate16.pdf

36 See also Watershed Protection Programs at: https://archive.epa.gov/region02/water/nycshed/web/html/protprs.html#rules

37 The Way We Green: The City of Edmonton's Environmental Strategic Plan; available at: https://www.edmonton.ca/city_government/documents/PDF/TheWayWeGreen-approved.pdf

38 City of Surrey, Biodiversity Conservation Strategy: http://www.surrey.ca/city-services/11565.aspx

39 See the City of Surrey Sustainability Dashboard: http://dashboard.surrey.ca/#ecosystems/vegetativecover

40 See City of Surrey Biodiversity Strategy Policy Recommendations Table: http://www.surrey.ca/files/BCS_Policy_Recommendations_Table.pdf

41 City of Edmonton, Office of Natural Areas, Integrated Conservation Plan Update Report (no date); available at: https://www.edmonton.ca/city_government/documents/Conservation_Plan_Update_Newsletter.pdf

42 City of Edmonton, Biodiversity Action Plan, 2009; available at: https://www.edmonton.ca/city_government/documents/PDF/Edmonton_Biodiversity_Action_Plan_Final.PDF

43 Capital Regional District, Regional Parks Land Acquisition Strategy 2015 to 2017l available at: https://www.crd.bc.ca/docs/default-source/parks-pdf/land-acquisition-strategy-2015-2017.pdf?sfvrsn=be7a49ca_10

44 Capital Regional District, Regional Parks Land Acquisition Strategy 2015 to 2017l available at: https://www.crd.bc.ca/docs/default-source/parks-pdf/land-acquisition-strategy-2015-2017.pdf?sfvrsn=be7a49ca_10

45 New York City Department of Environmental Protection, 2016, Watershed Protection Program Summary and Assessment, retrieved from: http://www.nyc.gov/html/dep/pdf/reports/fad_5.1_watershed_protection_program_summary_and_assessment_report_03-16.pdf

46 The Nature Conservancy, What are Conservation Easements; available at: https://www.nature.org/about-us/private-lands-conservation/conservation-easements/what-are-conservation-easements.xml

47 Ontario Ministry of Agricultural, Food, and Rural Affairs (OMAFRA), 2011, Conservation Easements for Agricultural Land Use; available at: http://www.omafra.gov.on.ca/english/busdev/facts/11-027.htm

48 Ibid.

49 See *Conservation Easements, Covenants and Servitudes in Canada: A Review* for a detailed (though dated) survey of the legislation governing conservation easements in each province and territory; available at: http://nawcc.wetlandnetwork.ca/conseasecov04-1.pdf

50 Ontario Ministry of Agricultural, Food, and Rural Affairs (OMAFRA), 2011, Conservation Easements for Agricultural Land Use; available at: http://www.omafra.gov.on.ca/english/busdev/facts/11-027.htm

51 Environmental Law Centre & Miistakis Institute, 2012, Conservation Easements for Agriculture in Alberta: A report on a proposed policy direction; available at: http://www.rockies.ca/project_info/CE%20Ag_Final%20Report%20(30%20March%202012).pdf

52 Ducks Unlimited Canada – Conservation Easements; available at: http://www.ducks.ca/resources/landowners/conservation-easements/

53 The Nature Conservancy, Easements 101; available at: https://www.nature.org/about-us/private-lands-conservation/conservation-easements/conservation-easements-101.pdf

54 The Nature Conservancy, All about Conservation Easements; available at: https://www.nature.org/about-us/private-lands-conservation/conservation-easements/all-about-conservation-easements.xml

55 Environment and Climate Change Canada, 2011, The Canadian Ecological Gifts Program Handbook; retrieved from: http://publications.gc.ca/collections/collection_2011/ec/CW66-157-2010-eng.pdf

56 Each province/territory may have additional restrictions

57 The Nature Conservancy, Easements 101; available at: https://www.nature.org/about-us/private-lands-conservation/conservation-easements/conservation-easements-101.pdf

58 See *Conservation Easements in Alberta* information website managed by the Environmental Law Institute and the Miistakis Institute, available at: http://www.ce-alberta.ca/question/23/#!/section/1/

59 Shafer, Craig L. 2015. Land Use Planning: A potential force for retaining habitat connectivity in the Greater Yellowstone Ecosystem and beyond. Global Ecology and Conservation (3): 256-278. DOI: https://doi.org/10.1016/j.gecco.2014.12.003

60 Government of British Columbia, Local Government Department; retrieved from: http://www.cscd.gov.bc.ca/lgd/planning/official_community_plans.htm

61 Alberta Municipal Affairs, 2012, The Legislative Framework for Regional and Municipal Planning, Subdivision, and Development Control; available at: http://www.municipalaffairs.alberta.ca/documents/ms/THE_LEGISLATIVE_FRAMEWORK_2012-08_Version.pdf

62 See Ontario Ministry of Municipal Affairs and Housing, Guide to Land Use Planning; available at: http://www.mah.gov.on.ca/Page1760.aspx

63 Smart Prosperity Institute (formerly Sustainable Prosperity), 2016, Provincial Climate Action Plans and Local Governments – Lessons from BC; available at: http://institute.smartprosperity.ca/sites/default/files/publications/files/BC_CAP_Report.pdf

64 See Town of Gibsons Official Community Plan, available here: http://gibsons.ca/services/community-development/official-community-plan/

65 City of Ottawa Official Plan, By-Law No. 2003-203, available at: https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan#volume-1-official-plan

66 City of Edmonton, Urban Forest Management Plan, 2012; available at: https://www.edmonton.ca/residential_neighbourhoods/PDF/Urban_Forest_Management_Plan.pdf

67 City of Ottawa, Putting Down Roots for the Future: City of Ottawa Urban Forest Management Plan; available at: https://documents.ottawa.ca/sites/documents.ottawa.ca/files/final_ufmp_en.pdf

68 Town of Gibsons, 2015, Towards an Eco-Asset Strategy for the Town of Gibsons; available at: http://gibsons.ca/wp-content/uploads/2017/12/Eco-Asset-Strategy.pdf

69 Richardson, G.R.A. and Otera, J., 2012, Land Use Planning tools for local adaptation to climate change; available at: http://publications.gc.ca/collections/collection_2013/rncan-nrcan/M4-106-2012-eng.pdf

70 Richardson, G.R.A. and Otera, J., 2012, Land Use Planning tools for local adaptation to climate change; available at: http://publications.gc.ca/collections/collection_2013/rncan-nrcan/M4-106-2012-eng.pdf

71 See Ontario Municipal Planning Act, 2001, S.O. 2001, c. 25; available at: https://www.ontario.ca/laws/statute/01m25#BK336

72 See City of Toronto, Toronto Green Standard: https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/toronto-green-standard/

73 See Province of British Columbia, Ministry of Municipal Affairs and Housing, Local Government Division, Development Cost Charge: http://www.cscd.gov.bc.ca/lgd/finance/development_cost_charges.htm

74 Town of Gibsons, July 11, 2017, Eco-Asset Strategy – Update to Council, Staff Report; available https://gibsons.civicweb.net/document/42076

75 Ibid.

76 Richardson, G.R.A. and Otera, J., 2012, Land Use Planning tools for local adaptation to climate change; available at: http://publications.gc.ca/collections/collection_2013/rncan-nrcan/M4-106-2012-eng.pdf

77 Sustainable Prosperity, 2011, Advancing the Economics of Ecosystems and Biodiversity in Canada: A Survey of Economic Instruments for the Conservation & Protection of Biodiversity; retrieved from: http://institute.smartprosperity.ca/sites/default/files/publications/files/Advancing%20the%20Economics%20of%20Ecosystems%20and%20Biodiversity%20in%20Canada.pdf

78 Kroeger, T, and F. Casey. 2007. An assessment of market-based approaches to providing ecosystem services on agricultural land. Ecological Economics (64) 321-332.

79 Sustainable Prosperity, 2011, Advancing the Economics of Ecosystems and Biodiversity in Canada: A Survey of Economic Instruments for the Conservation & Protection of Biodiversity; retrieved from: http://institute.smartprosperity.ca/sites/default/files/publications/files/Advancing%20the%20Economics%20of%20Ecosystems%20and%20Biodiversity%20in%20Canada.pdf

80 Wunder, Sven (2005), Payments for environmental services: some nuts and bolts; retrieved from http://www.cifor.org/publications/pdf_files/OccPapers/OP-42.pdf

81 Engel, S., Pagiola, S., and S. Wunder. 2008. Designing payments for environmental services in theory and practice: An overview of the issues. Ecological Economics DOI: https://doi.org/10.1016/j.ecolecon.2008.03.011

82 Ibid.

83 For more information on ALUS Canada see: https://alus.ca/

84 See Hill, Michael, R.J., et. al. 2011. A Reverse Auction for Wetland Restoration in the Assiniboine River Watershed, Saskatchewan. Canadian Journal of Agricultural Economics. DOI 10.1111/j.1744-7976.2010.01215.x. Also see, Lucas Novak's Thesis: A Reserve Auction for Wetland Restoration in Southern Alberta; Available at: https://era.library.ualberta.ca/files/cxw42n827d/Novak_Lucas_L_201707_MSc.pdf

85 Sustainable Prosperity. 2015. Ontario's Environmental Markets: Creating Price Signals to Protect our Natural Environment; available: http://institute.smartprosperity.ca/sites/default/files/ontariosenvironmentalmarkets.pdf

86 Ontario Land Stewardship and Habitat Restoration Program: https://www.ontario.ca/page/land-stewardship-and-habitat-restoration-program

87 Learning from 20 years of payments for ecosystem services in Costa Rica, 2013, Authors: Ina Porras, David N. Barton, Adriana Chacón-Cascante and Miriam Miranda – 2013

88 See analysis by Blackman & Woodward, 2009, User Financing in a National Payments for Ecosystem Services Program: Costa Rican Hydropower; available at: http://www.efdinitiative.org/sites/default/files/efd-dp-09-03.pdf

89 See Rideau Valley Conservation Authority, Rideau Valley Rural Clean Water Program: https://www.rvca.ca/stewardship-grants/rural-clean-water-grants/rideau-valley-rural-clean-water-program

90 See The Nature Conservancy, 2017, Beyond the Source: The environmental, economic, and community benefits of source water protection. Available at: https://thought-leadership-production.s3.amazonaws.com/2017/08/15/13/08/06/94ed694b-95aa-457d-a9d0-4d8695cfaddc/Beyond_The_Source_Full_Report_FinalV4.pdf

91 See Bremer, L.L. et. al. 2016. One size does not fit all: Natural infrastructure investments within the Latin American Water Funds Partnership. Ecosystem Services (17): 217-236. http://dx.doi.org/10.1016/j.ecoser.2015.12.006

92 The LAWFP was launched in 2011 by The Nature Conservancy (TNC), the FEMSA Foundation, the Inter-American Development Bank (IDB), and the Global Environment Facility (GEF). See Bremer, L.L. et. al. 2016. One size does not fit all: Natural infrastructure investments within the Latin American Water Funds Partnership. Ecosystem Services (17): 217-236. http://www.sciencedirect.com/science/article/pii/S2212041615300681?via%3Dihub

93 See the Water Funds Toolbox at https://www.nature.org/ourinitiatives/habitats/riverslakes/waterfundstoolbox.xml?redirect=https-301 . Also reference, The Nature Conservancy, 2017, Beyond the Source: The environmental, economic, and community benefits of source water protection. Available at: https://thought-leadership-production.s3.amazonaws.com/2017/08/15/13/08/06/94ed694b-95aa-457d-a9d0-4d8695cfaddc/Beyond_The_Source_Full_Report_FinalV4.pdf

94 Sustainable Prosperity, 2011, Advancing the Economics of Ecosystems and Biodiversity in Canada: A Survey of Economic Instruments for the Conservation & Protection of Biodiversity; retrieved from: http://institute.smartprosperity.ca/sites/default/files/publications/files/Advancing%20the%20Economics%20of%20Ecosystems%20and%20Biodiversity%20in%20Canada.pdf

95 Engel, S., Pagiola, S., and S. Wunder. 2008. Designing payments for environmental services in theory and practice: An overview of the issues. Ecological Economics DOI: https://doi.org/10.1016/j.ecolecon.2008.03.011

96 Government of Canada, Ecological Gifts Program: https://www.ec.gc.ca/pde-egp/default.asp?lang=En&n=FCD2A728-1

97 Ontario Conservation Land Tax Incentive Program: https://www.ontario.ca/page/conservation-land-tax-incentive-program

98 Ontario Managed Forest Tax Incentive Program: https://www.ontario.ca/page/managed-forest-tax-incentive-program

99 Islands Trust Fund: http://www.islandstrustfund.bc.ca/initiatives/privateconservation.aspx

100 Government of Manitoba, The Riparian Tax Credit - Information for Taxpayers; available at: https://www.gov.mb.ca/finance/tao/pubs/riparian/info_for_taxpayers.pdf

101 IISD (Anantha Kumar Duraiappah), 2006, Markets for Ecosystem Services: A Potential Tool for Multilateral Environmental Agreements; retrieved from https://www.iisd.org/pdf/2007/economcs_markets_eco_services.pdf

102 Sustainable Prosperity, 2011, Advancing the Economics of Ecosystems and Biodiversity in Canada: A Survey of Economic Instruments for the Conservation & Protection of Biodiversity; retrieved from: http://institute.smartprosperity.ca/sites/default/files/publications/files/Advancing%20the%20Economics%20of%20Ecosystems%20and%20Biodiversity%20in%20Canada.pdf

103 Smart Prosperity Institute, Mercedes Marcano, 2015, Ontario's Environmental Markets: Creating Price Signals to Protect Our Natural Environment; Available at http://institute.smartprosperity.ca/sites/default/files/ontariosenvironmentalmarkets.pdf

104 Ibid.

105 Ibid.

106 For the South Nation Conservation Authority water quality trading program see the Ottawa Rural Clean Water Program at http://www.nation.on.ca/water/grant-programs/ottawa-rural-clean-water-program; for the Lake Simcoe Region Conservation Authority phosphorous offset program see http://www.lsrca.on.ca/watershed-health/phosphorus-offsetting-program

107 See news release by Water Canada: http://watercanada.net/2017/phosphorus-offsetting-policy-to-safeguard-lake-simcoes-health/

108 IISD, 2010, Water Quality Trading in the Lake Winnipeg Basin: A multi-level trading system architecture; Report available at: http://www.iisd.org/library/water-quality-trading-lake-winnipeg-basin-multi-level-trading-system-architecture

109 Presentation to the Workshop on Evaluation of Agri-Environmental Policies, Braunschweig, Germany, by Dennis O'Grady, General Manager South Nation Conservation, June 2011: Socio-Political Conditions for Successful Water Quality Trading in the South Nation River Watershed; available at: http://www.oecd.org/tad/sustainable-agriculture/48170312.pdf

110 O'Grady, Dennis, 2011, Socio-Political Conditions for Successful Water Quality Trading in the South Nation River Watershed, Journal of the American Water Resources Association, February 2011, Vol 47, No.1.; DOI: 10.1111/j.1752-1688.2010.00511.x

111 Sustainable Prosperity, 2014, A Study of Canadian Conservation Offset Programs; available at: http://www.sustainableprosperity.ca/sites/default/files/publications/files/Noga%20Adamowicz%20Conservaton%20Offsets%20Oct%202014.pdf

112 Sustainable Prosperity, 2011, Advancing the Economics of Ecosystems and Biodiversity in Canada: A Survey of Economic Instruments for the Conservation & Protection of Biodiversity; retrieved from: http://institute.smartprosperity.ca/sites/default/files/publications/files/Advancing%20the%20Economics%20of%20Ecosystems%20and%20Biodiversity%20in%20Canada.pdf

113 Canada's Ecofiscal Commission, 2017, Only the Pipes should be hidden: Best practices for pricing and improving municipal water and wastewater services; available here: https://ecofiscal.ca/wp-content/uploads/2017/09/Ecofiscal-Commission-Report-Only-the-Pipes-Should-be-Hidden-FINAL-Sept-26-2017.pdf

114 Earth Economics, 2014, Funding Mechanisms for Restoring and Maintaining a Healthy Nisqually Watershed; Available at: http://www.eartheconomics.org/finance-and-investment-strategies/

115 Town of Gibsons, 2017, Advancing Municipal Natural Asset Management: The Town of Gibsons experience in financial planning & reporting. Available at: http://gibsons.ca/wp-content/uploads/2018/01/GibsonsFinancialPlanningReportJan2018-PRINT.pdf

116 Smart Prosperity Institute (formerly Sustainable Prosperity), 2016, New Solutions for Sustainable Stormwater Management in Canada. Available at: http://institute.smartprosperity.ca/library/publications/new-solutions-sustainable-stormwater-management-canada

117 Climate Bonds Initiative and the Smart Prosperity Institute, 2017, Bonds and Climate Change: Canada Report; available at: https://www.climatebonds.net/resources/reports/bonds-and-climate-change-canada-report-2017

118 Province of Ontario Green Bonds, http://www.ofina.on.ca/greenbonds/

119 City of Ottawa Green Debenture Framework, available at: https://ottawa.ca/en/business/doing-business-city/investor-relations#green-bonds

120 See Climate Bonds Initiative, Green Bond Highlights 2017 Report, available at: https://www.climatebonds.net/files/reports/cbi-green-bonds-highlights-2017.pdf

121 O'Grady, Dennis, 2011, Socio-Political Conditions for Successful Water Quality Trading in the South Nation River Watershed, Journal of the American Water Resources Association, February 2011, Vol 47, No.1.; DOI: 10.1111/j.1752-1688.2010.00511.x

122 Town of Gibsons, 2017, Advancing Municipal Natural Asset Management: The Town of Gibsons experience in financial planning & reporting. Available at: http://gibsons.ca/wp-content/uploads/2018/01/GibsonsFinancialPlanningReportJan2018-PRINT.pdf

GET INVOLVED

MNAI.CA

Email info.mnai@gmail.com | Municipal Natural Assets

Mnai

Making Nature Count

Smart Prosperity Institute

Brooke & Associates CONSULTING

David Suzuki Foundation

Town of Gibsons

MNAI wants to thank our funders and supporters

Green Belt — Possibility grows here.

The Salamander Foundation www.salamanderfoundation.org

Vancity Make Good Money

Tides Canada

real estate foundation BRITISH COLUMBIA