



Literature Review Market-based Instruments within the Green Economy



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1.0 Introduction

The purpose of this literature review is to provide a summary of a selection of the key literature on market-based instruments as they pertain to Conservation Ontario and the Conservation Authorities with the intention on gaining a better grasp of potential use of economic tools in relation to green economy. There is an abundance of literature focusing on the many types of MBIs; this paper focuses on those types that best apply to the work of and capabilities of the Conservation Authorities. The objective is to have this review available as an accessible resource of relevant information and an additional compilation of other sources that can be used as a guide for the development of a future framework. This review presents research findings pertaining to the use of market-based instruments in environmental protection collected and reviewed by Kaitlyn MacEachern for Conservation Ontario, the organization that represents Ontario's 36 Conservation Authorities.

2.0 Market-based Instruments: Background

Market-based instruments (MBIs) are tools and practices that utilize markets, price, and other financial incentives and economic variables to reduce or eliminate unintended environmental impacts which economists refer to as negative environmental externalities¹.

MBIs are used to maintain or enhance natural capital which includes renewable and non-renewable resources such as minerals and energy, forests, water and fisheries, and ecosystems that provide essential services (Anderson, Gomez, McCarney, Adamowicz, Chalifour, Weber, Elgie, & Howlett, 2010). They are defined as instruments or regulations that encourage environmentally-friendly behaviour through market signals as opposed to only standard command and control methods (Whittem, van Bueren, & Collins, 2003). MBIs use market processes or financial instruments to motivate desired types of behaviours and decision making in order to encourage individuals and companies to improve environmental performance and protection while still meeting their own economic self-interests (Stirrett, Rolfe, Schewchuk, 2012). MBIs migrate away from traditional command and control methods for environmental conservation and look at establishing a balance between economic incentives and regulation.

Some of the Conservation Authorities have already done work based off of the idea of MBI use in environmental protection. However, it is difficult to locate information on the existing and proposed projects and initiatives.

¹ In its working paper for the Canadian Council for Ministers of the Environment, Marbek Resource Consultants defines negative externalities as "Damage that results from the consumption and/or production of a good or service that is not directly reflected in the price charged for the good or service or compensated for in some other, non-price way. *Analysis of Economic Instruments for Water Conservation*.

2.1 Types of Market-based Instruments

There are three classifications of market-based instrument levers:

- **Price-based MBIs** that encourage behavioural change by changing prices in existing markets e.g. changing taxes and adding levies or giving subsidies,
- **Rights-based MBIs** lever behaviour change by specifying new obligations e.g. cap and trade/offset schemes, and
- **Market friction MBIs** drive behavior change by tweaking existing private markets to work better e.g. ecolabelling (Whitten, van Bueren, & Collins, 2003). Specific examples of MBIs that this report considers include:
 - Cap and Trade Mechanisms
 - Environmental Offsets
 - Habitat Banking/Wetland Banking/Conservation Banking
 - Conservation Tenders
 - Green Infrastructure Incentive Programs

Cap and Trade Mechanisms

These are quantity based market tools that work with regulatory policies. Capping can be a limit on the right to use a natural resource or a cap placed on harmful by-products in order to keep them within the regulating and allowed limits (Designer Carrots: Cap and Trade Mechanism, 2008). The 'cap' sets the limit allowed and the 'trade' creates a market for allowance and leads to investment and innovation (Environmental Defense Fund, 2012).

Trading is done with permits or credits for either the limited allowed use of a natural resource, or permits or credits for limit of an allowed pollutant. The unused permits or rights can be sold to the market which creates a constant incentive to find the most cost-efficient way for the stakeholder to reduce either their use of the resource, or their pollutant discharge sum (Designer Carrots: Cap and Trade Mechanism, 2008).

A cap-and-trade mechanism ensures a level of certainty that environmental thresholds will not be exceeded as well as promotes economic growth without compromising the quality of the environment (Designer Carrots: Cap and Trade Mechanism, 2008). The effectiveness of this mechanism relies heavily on whether or not the cap is achievable, the issues are well known, the cap is accepted by the stakeholders and monitoring and enforcement can be done at low cost (Designer Carrots: Cap and Trade Mechanism, 2008).

Environmental offsets

These are also quantity based MBIs that aim to ensure that significant unavoidable environmental impacts are counteracted by a positive environmental gain (Environment Protection Authority, 2006). Offsets use positive actions to compensate for negative environmental by working off the principle of 'no net loss' (NNL). They have the ability to use market forces in environmental protection programs or

projects such as wetland and habitat banking, credit trading, and a number of other incentive programs (Environment Protection Authority, 2006).

Companies can be formed with the purpose of generating environmental improvements through ecosystem restoration, rehabilitation, or re-establishment initiatives with the intent to sell the improvements at market price to other companies looking to offset environmental impacts (Environment Protection Authority, 2006). Offsets are used by developers to meet environmental regulatory requirements and have been applied to a number of environmental problems such as green house gas emissions, waste management, emissions to water and air, vegetation management and other management issues such as habitat, wetland, or biodiversity loss.

There is concern that offsets are a reactive rather than proactive approach. Although, it is argued that offsets are not a substitute for traditional environmental management responsibilities, but are in addition to these through maintaining and improving environmental quality (Environment Protection Authority, 2006).

Habitat banking, wetland banking, and conservation banking

These instruments are used in markets where credits from actions that have benefits to biodiversity and can be purchased to offset environmental damage. Credits are produced prior to the environmental damage, and are stored as debits to compensate for future impacts (Eftec, IEEP et.al, 2010). Compensation, habitat, and wetland banking consists of the following elements; restoration, development impacts, re-establishment of habitat, and compensation.

Restoration applies to creation or enhancement of habitat in advance of ecological impacts to provide compensation for future loss. Restoration can consist of a large habitat to compensate for several small habitat losses or on a single equivalent loss basis.

Development impacts are quantified as debits and *re-establishment of habitat* functions through restoration are quantified as credits. Credits are awarded for restoration work that can be bought, sold or traded to proponents looking to compensate for development impacts. These habitat banks are created by third party habitat bankers, and restored land is protected through conservation easement or other title restrictions (Hunt, Patrick, & Connell, 2011). These Projects transform environmental liabilities into marketable assets (Commission of the European Communities, 2007).

However common problems identified with habitat banking is lack of monitoring of compliance, evaluation of effectiveness, accountability of habitat management, and measurement of biodiversity lack or gain (Hunt, Patrick, & Connell, 2011).

Conservation tenders

These instruments are auctions that fund conservation works on private lands where there was previously no incentive for land managers to undertake the works privately. They aim for outcomes such as better vegetation management, erosion control, biodiversity, water quality, water environmental flows, salinity control and carbon sequestration (Designer Carrots: Conservation Tenders, 2008).

In most cases, land owners submit bids to undertake conservation works on their property. The bids are assessed, ranked and funded based on value for money where formal agreements between the funder and the land manager are established (Designer Carrots: Conservation Tenders, 2008). Tenders do not estimate the economic benefit of conservation actions or the value of the objective, but are used after an agreement is made that the particular conservation actions will create a net benefit to society (Designer Carrots: Conservation Tenders, 2008). The tender process is usually open to all landholders and the competitive nature keeps bid costs low.

While the costs of development and implementation of tender programs can be higher than traditional grant programs, the effectiveness of tenders often outweighs any additional costs (Designer Carrots: Conservation Tenders, 2008).

Green infrastructure (GI) incentive programs

Many programs can provide ways to increase the use of green infrastructure practices on private property as well as help cities implement both new and existing developments. There are five main types of green infrastructure incentive programs; development incentives, grants, rebates/installation financing, awards/recognition programs, and stormwater fee discounts (Water Environment Federation, 2013).

- *Development incentives* apply to private developers and go further than single-site improvements (Environmental Protection Agency, 2009). These incentives are typically provided within existing land use or development regulation framework and often remove fees, requirements, or steps in the permit process (Environmental Protection Agency, 2009). They can have large-scale impacts including expedited permitting, decreased fees, zoning upgrades, reduced stormwater requirements, and other benefits to developers who plan to use green infrastructure (Water Environment Federation, 2013). Grants can be provided by cities to private-property owners directly for green infrastructure practices or use to promote them indirectly through low-impact development competitions, public outreach, and other avenues (Water Environment Federation, 2013). Grants can encourage site-specific green infrastructure projects such as rain gardens, green roofs, and cisterns, as well as community and municipal scale projects such as wetland construction or stream restoration (Environmental Protection Agency, 2009).
- *Rebates and installation financing* include funding, tax credits, or reimbursements to property owners who install green infrastructure based typically of a list of specific practices e.g. cisterns, permeable pavement, or green roofs (Water Environment Federation, 2013). They are offered by communities to provide incentives for property owners and are also an effective way of educating the public on the benefits of green infrastructure and its application in a variety of property types and settings (Environmental Protection Agency, 2009).
- *Awards and recognition programs* increase awareness of green infrastructure practices by rewarding innovation motivating homeowners with increased property values (Water Environment Federation, 2013). Awards are provided to recognize innovative green

infrastructure projects and may focus on water conservation and reuse, stormwater mitigation and management, landscaping, watershed restoration and other sustainable strategies (Environmental Protection Agency, 2009).

- *Stormwater fee discounts* encourage retrofits of existing properties as well as implementation of green infrastructure in new developments for stormwater quantity reductions and in some cases pollution reduction for improved water quality (Environmental Protection Agency, 2009). They are the most common incentive program and work to reduce runoff from private properties and decreasing burdens on the city stormwater system resulting in a reduction in service demand that can be reflected to property owners through fee discounts (Water Environment Federation, 2013).

2.2 Market-based Instruments for Environmental Protection

There is increased use and recognition of market-based instruments for environmental protection. They have been identified as potentially more efficient because they are cheaper and more equitable than command and control regulations creating a large global appeal (Stirrett, Rolfe, & Schewchuk, 2012). Market-based instruments are identified as only ‘potentially’ more efficient because they are considerably new, especially in Canada, and understanding of them is limited.

MBIs attempt to combine government regulation with the power of the market by utilizing the price of positive and negative externalities (Stirrett, Rolfe, & Schewchuk, 2012). MBIs are designed to *encourage investment* in natural capital through incentives rather than top-down government command. The combination of the market operating within governmental framework and regulations gives potential to be a very useful tool in environmental protection because it enables flexibility and equity in ways classic command and control could not previously (Stirrett, Rolfe, & Schewchuk, 2012).

3.0 Challenges and Issues of Market-based Instruments

Various publications have identified some consistent issues and challenges with market-based instruments. Some MBIs appear to function in theory but there can be many flaws and issues in the details requiring careful implementation and ongoing management. The literature itself is also very conflicting. Often there are many different sides and opposing opinions on what works and what does not and what the challenges and problems are with using MBIs. This section addresses challenges and issues as identified by three selected articles.

3.1 Incenting Behaviour Change

Discussed in Shawna Stirett’s article *The Devilish Details of Market-based Instruments* (Stirrett, 2012), is the MBI example of Alberta’s home rebate program for energy efficient new homes. The goal of the rebate is to encourage homebuilders or buyers to use products and designs that are as energy efficient as possible. In the program if a homeowner buys a new home with an EnerGuide rating of 80 or higher they receive a government rebate ranging from \$1,500-\$10,000 on a sliding scale tied to efficiency

ratings. However, the EnerGuide home energy rating is not made explicit initially by the builders either because they do not know it or simply do not advertise it. Therefore, in order for a new buyer to find out the rating of their home they need to complete a pre-evaluation process which entails sending extensive building site plans for assessment. Not only lot of work, but also costs the homeowners approximately \$300 just to have the pre-evaluation done to establish whether or not they are eligible for the rebate. If they decide to proceed to get their home EnerGuide rated, there are several other needed tests involved totaling a conservative estimate of about \$600 in order to apply for the rebate. Those homeowners whose houses are rated at the highest level earning a rebate of \$10,000 the invested \$600 is worth it, however those who come in at the lowest level of rebate who have spent \$600 and in addition whatever was spent on high efficiency furnaces, windows, installation, etc. Only to receive \$1500, may not consider it worth it. As well as those who invest \$300 in the pre-evaluation and find out they are not eligible.

The argument made in the article is that the program does not incent buyers to purchase or build energy efficient homes but will only reward those who already have their own personal interest in participating. A solution suggested in the article was to make it required that homebuilders assess and disclose the EnerGuide rating of their homes similar to the way auto manufacturers are required to disclose the fuel economy. This could make the rebate program more effective and even lead to buyers purchasing homes with high efficiency ratings and, in turn, could substantially improve Alberta's overall environmental performance. This example demonstrates the need for attention to detail of the instrument if the tool is going to be effective at protecting the environmental and actually incenting behaviour change (Stirrett, 2012).

3.2 Lack of Clarity

The report *Fish Habitat Banking in Canada: Opportunities and Challenges*, (Hunt, Patrick, & Connell, 2011), examined and identified the challenges with habitat compensation in Canada. The report's main concerns were with the lack of consistency and clear details of habitat banking. There is no clear process found for running a habitat bank and inadequate or lack of documentation results in limiting the ability to learn from past projects or test and redefine based on experience.

According to the article, there are also many inconsistencies between the regional offices of Fisheries and Oceans Canada (DFO) in how compensation is applied and implemented as well as inconsistent credit valuation and lack of credit valuation standards. Poor record keeping and lack of performance standards make determining if desired outcomes were achieved difficult and addressing flaws and challenges difficult. The lack of compliance monitoring makes determining if the past compensation practices in Canada since the Habitat Policy was introduced in 1986 have actually resulted in the no net loss (NNL) goals. In addition, the article identified a lack of measurement and monitoring with DFO's habitat management program (Hunt, Patrick, & Connell, 2011).

3.3 MBIs in Canadian Water Management

The policy brief by Sustainable Prosperity, *Economic Instruments for Water management in Canada* (Sustainable Prosperity, 2011) discussed the under utilization of market-based instruments to regulate

water demand, increase efficient water use, improve water quality and defray the cost of infrastructure within Canada. It examined successful case studies and provided the potential barriers to implementation within Canada.

Through its research, it addressed the greatest difficulties and lessons learned for implementation of MBIs for water management in Ontario. For example, targeting all commercial and industrial users is vital to gaining support for water extraction charges, trading and other economic instruments complement but do not replace traditional government regulatory process. Based off of the example of the South Nation Basin Water Quality Trading Program, it is essential to clearly define goals and targets and to have a good understanding of both point and non-point sources of pollution and their contributions to the phosphorous loading. In addition, there is a need for written management agreements between the point-source discharger and the stakeholder responsible for administering the trading program (Sustainable Prosperity, 2011). The article poses several questions to keep in mind when implementing MBIs including asking if the total benefits outweigh the total costs considering both initial and ongoing costs, such as costs of administering and monitoring (Sustainable Prosperity, 2011).

The two major issues identified with use of MBIs in Canada in water management are: 1) gaining political and stakeholder support to determine how to best share scarce water resources, and 2) determining water quality thresholds, and two, the lack of experience with and political will to implement such instruments and complimentary regulations for water management.

3.4 Recommendations for Success

The report, *The Invisible Hand's Green Thumb: Market-based instruments for environmental protection in Alberta* (Stirrett, Rolfe, & Schewchuk, 2012), further examined several case studies of use market-based instruments and identified the following key ideas to consider in the development of MBI initiatives:

- There is a need for a clear environmental goal supported by scientific evidence and studies in order to make clear which MBI is suitable. A lack of clarity of the environmental goal will pose problems with utilizing the MBI effectively.
- It is vital to have community and stakeholder interest by fully educating the people on the value and potential of the instrument. Finding the right balance between regulation and market forces is often very challenging but is mandatory for MBI success and it is important to remember MBIs are not replacements for regulations.
- During the process of implementing a MBIs there is a need for high tolerance of failure. MBIs are experimental and there is no clear "This will work for this area" model of MBI (Stirrett, Rolfe, & Schewchuk, 2012). It is important to explore and assess which MBI will work in each individual case making it difficult to determine what the optimal circumstances might be without some level of experimentation posing the potential for some failure.
- MBIs are complex and it requires plenty of time to develop an effective tool that pays close attention to the details. As a result of their complexity there is a necessary level of flexibility by

establish allowed discharge while staying below the maximum salt concentration standards. Credits are what determine permitted salt discharge.

License holders have a different number of salt discharge credits of the total 1000 salt discharge credits in the scheme. Discharge of salt into a river block is proportionate to the credits the discharger holds. Trading of credits enables flexibility of license holders' allowable discharge. The trading is done online through a designated trading system where the terms of the trade are negotiated by the partaking parties. The information on credits is made publicly available at all times through a registry. Initially at the start up of the scheme, 1000 credits were distributed free of charge and based on a formula that considered environmental performance, salty water by-product, employment and economic output. As old credits expire, 200 new credits are auctioned every two years and have a new lifespan of ten years maintaining the total number of active credits to 1000. The public auction is a process that can reveal the market value of the credits. A new industry can enter the scheme by purchasing credits at the auction or acquiring credits from other scheme participants directly.

The Environment Protection Authority (EPA) was a vital part of the project's implementation as they were a large and credible agency which was willing to look at alternative market-based instruments and move away from traditional pollution control strategies. The Department of Land and Water Conservation (DLWC), now called the Department of Infrastructure, Planning and Natural Resources, played an essential part of trial and implementation of the water management aspects of the instrument and assisted by the NSW Minerals Council. A pilot scheme operated 1995 to 2002 to allow the approach to be refined. The monitoring and modeling of the river and the river register are provided by the Services Coordinator at the Department of Infrastructure, Planning and Natural Resource. Administering licenses and regulation, online credit registration and exchange facility are provided by the Department of Environment and Conservation (DEC). Issues and day-to-day operations are dealt with by the Operations Committee. And the cost of administering the scheme is shared equally between credit holders and discharge license holders.

This program succeeds by reducing damages to the river and still permitting both industry and agriculture to use the river to suit their needs. The project is economically effective as it enables the license holders to choose the most cost-efficient strategy for their operation either by purchasing more credits, or implementing cleaner technologies and practices so that fewer credits are needed, or a combination of both. Australia is an internationally known leader in utilizing market-based instruments, tools, and schemes for environmental protection. Other examples of the work done in Australia can be found in Figure 1.

Information from: Department of Environment and Conservation NSW. (2006). Hunter River Salinity Trading Scheme: Working together to protect river quality and sustain economic development. Retrieved from <http://www.environment.nsw.gov.au/resources/licensing/hrsts/hrsts.pdf>

Figure 1: Other Examples from Australia

Program	Description	Retrieved From
<p>Woodland BushBids Program</p>	<p>This is a Payment of Ecosystem Service (PES) scheme focused on protecting and managing existing native vegetation by providing funds to assist landholders to manage remnant vegetation. Woodland BushBids was established through funding from the Native Vegetation Council of South Australia and delivered through the South Australian Murray-Darling Basin Natural Resource Management Board. The Auction developed a competitive market for management contracts to achieve conservation. Landholders whose bids were ranked as ‘high biodiversity value-for-money’ using the BushBids metric were invited to enter an agreement with the South Australian Murray-Darling basin NRM Board to implement the management plan and receive payment of the tendered price over a five year contract period.</p>	<p>Designer Carrots. (2011). Woodland BushBids conservation tender. Retrieved from http://www.marketbasedinstruments.gov.au/MBIsinaction/Currentcasestudies/WoodlandBushBidsconservationtender/tabid/390/Default.aspx</p>
<p>BushBroker</p>	<p>The BushBroker program is a biodiversity offset program designed to accommodate native vegetation offsets in the State of Victoria. The program works mainly on the supply-side identifying landowners willing to preserve and manage native vegetation. A government representative of the program then assesses the site to determine the number and type of credits available.</p>	<p>Ecosystem Marketplace. (2010). Australian Market-based Instruments. http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?section=biodiversity_market&page_name=aumi_market</p>
<p>Biobanking</p>	<p>The New South Wales (NSW) biodiversity offset and banking scheme, biobanking, is a state program driven by regulatory requirements to offset impacts from urban development. Those involved in this biobanking scheme are the regulators; NSW Department of Environment, Climate Change and Water, and DECCW, the buyers; developers, transportation, wind farms, and extractive industries, and offset brokers’ e.g. Eco Logical Australia, assisted by the Consultants who are accredited to conduct assessments of sites.</p>	<p>Ecosystem Marketplace. (2010). Australian Market-based Instruments. http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?section=biodiversity_market&page_name=aumi_market</p>

4.2 Wetland Banking – United States

Compensation mitigation is a national wetland and stream offset banking program driven by compliance to the Clean Water Act and following the concept of ‘no net loss’ (NNL). The wetland and stream offsets are created through restoration, enhancement, creation, and preservation and must be within the same

watershed of the impacted area. The US Army Corps of Engineers is in charge of overseeing all mitigation permits and interpret and implement regulation by region.

When there is impact had on a wetland by a land developer they must offset the damage. They can purchase offsets from a third party mitigation bank whose job is to restore, enhance, create, or preserve an area of wetland to generate credits. The values of the credits are determined by the area of wetland and the functionality which considers hydrology, vegetation, and presence of exotics. Mitigation bankers must follow financial and environmental guidelines to establish a wetland bank and before credits can be for sale. The timeframe for the required steps of the approval process and final decisions on mitigation banks should be made within 225 days. Prior to impact on the wetland, mitigation must occur and establishment of a performance bond and contingency security are required to cover five year post construction monitoring of wetland function and quality to ensure long-term success. The regulating authority can perform random audits and inspections of the compensation wetland projects. The price of the credits range anywhere between \$3,000 and \$600,000 and vary based on many contributing factors such as the availability in the area, price of land suitable for bank development and the cost to create wetland compensation within a region.

This project is a nation-wide initiative therefore the basic rules for mitigation banking apply to the entire United States, however trading for a given bank is limited to a localized geographic region established by the US Army Corps of Engineers hydrologic unit designations.

The participating stakeholders are contractors, mitigation banking review team, sellers, and buyers. The contractors are consultants that are able to analyze wetlands or other waters of the United States, design wetland compensation mitigation projects, and assist mitigation bankers going through the permitting process. The mitigation review team is made up from representatives of the US army corps of engineers in collaboration with local regulatory agencies that together oversee the activities of the mitigation bankers, evaluate proposed bank products, and certify credits. Sellers are the third party mitigation bank sponsors and can include environmental consultants, engineers and lawyers hired by permittees, private mitigation bankers, non-profit organizations and government agencies. The buyers are anyone that is having an impact on a stream or wetland most commonly government transportation agencies, residential and commercial developers, the Department of Defense, extraction industries and utilities.

Beginning in 1999 the Federal agencies began organizing stakeholder forums to establish the different opinions on the concerns and challenges of mitigation banking. These forums have brought together a diverse group of individuals representing the regulating community, environmental organizations, academia, NGOs, and mitigation providers that has resulted in creation of the National Wetlands Mitigation Action Plan to further achieve the goal of NNL and were incorporated into the 2008 Final Compensatory Mitigation Rule.

This approach has been very successful since initial implementation, resulting in significant wetland and stream bank growth throughout the 1990's in the US. By 2010 the active number of banks was 798 having increased from 46 in 1992 and 431 in 2009.

Information From: Ecosystem Marketplace. (2010). US Wetland Banking. Retrieved from http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?section=biodiversity_market&page_name=uswet_market

4.3 Onondaga County's Green Improvement Fund – New York, United States

The green improvement Fund (GIF) is a grant incentive program sponsored by Onondaga County's Department of Water Environment Protection (WEP) that provides financial incentives for the installation of Green Infrastructure (GI) technologies such as rain gardens, bioretention, dry wells, underground infiltration systems, green roofs, porous pavement, tree plantings, tree trenches planter boxes, cistern systems, and added green space on private property.

GIF offers assistance to applicants looking to incorporate GI technologies in development, redevelopment, and/or retrofitting of certain classes of privately owned properties. The projects funded through the program must obey all environmental laws and regulatory permits. The applicants are in charge of obtaining all the required permits prior to construction and the plans and specifications must be reviewed by the County to ensure that the proposed incorporation of GI will reduce stormwater runoff under state and local requirements.

The potential funding for the GIF is distributed differently between high, medium and low priority sites. High priority site locations are eligible for funding up to \$0.30 per gallon of stormwater captured, medium priority sites are eligible for up to \$0.20 per gallon captured, and low priority sites are eligible for \$0.10 per gallon captured. To determine the final grant award amount, Onondaga County verifies the location of the project, reviews the project scope and calculator that determines the reimbursement costs, analyzes the area being managed through Green Infrastructure, and determines a final grant award amount. The grant only covers the costs for the installation of Green Infrastructure technologies (including design, testing and construction costs beyond traditional infrastructure practices) with all grants on a reimbursement basis after the Green Infrastructure has been installed.

Once the Green Infrastructure installation has been completed the applicant must contact WEP to schedule a final walk-through to confirm the project followed the GIF program requirements. Once this has been confirmed and the applicant has received Certificate of Completion from WEP, the applicant has sixty calendar days to submit a Claim Form provided by the WEP to request payment. The funds awarded from the GIF are distributed in a one-time lump sum reimbursement. The applicant is responsible for proper maintenance of the Green Infrastructure installed and must agree to protect the effective operation and efficient function of Green Infrastructure.

Information from: Mahooney, J. (2013). Green Improvement Fund: Program description and application. *Save the Rain Clean the lake*. Retrieved from http://savetherain.us/wp-content/uploads/2010/10/GIF_ProgramDescription-Application_Version-4.0_Final_Fillable.pdf

5.0 Market-based Instruments: Canada

Market-based instruments are underutilized in Canada but there is room for development and opportunity on many scales and sizes and at all levels of government and authority. There are several cases where MBIs have successfully been implemented. These examples are listed and briefly outlined in Figure 2 and three additional examples are discussed in further detail.

Figure 2: Examples of MBIs in Canada

Program	Description	More Information
Habitat Compensation Port Metro Vancouver	Focuses on constructing, enhancing, or restoring fish and wildlife habitat for future use when port development project proposals affect the surrounding habitat. Upon completion of a new habitat, it is considered a deposit in Port Metro Vancouver's habitat bank. Withdrawals of habitats can be made from the habitat bank. At which time an assessment is done by the Department of Fisheries and Oceans Canada of the value and stability of the habitat determines whether it is suitable to offset the proposed development project.	Port metro Vancouver. (2013). Habitat banking Program. Retrieved from http://www.portmetrovancover.com/en/environment/initiatives/HabitatBankingProgram.aspx
Grassland Habitat Farm Incentive Program (GHIFP)	GHIFP offers financial support to farm projects that strengthen agricultural operations while ensuring preservation of grassland birds that rely on the meadows, pastures, and hay fields that are provided through agriculture. The program is a competitive bid system and environmental benefit index to identify and reward the proposed projects. The competitive bid process gives opportunity to justify costs while competing with other applicants to identify the unique benefits of their projects.	Ontario Soil and Crop Improvement Association. (2013). Grassland Habitat. Retrieved from http://www.ontariosoilcrop.org/en/programs/grassland_habitat.htm
Stormwater Credit Program	The cities of Waterloo and Kitchener's stormwater credit program offers financial incentives for reducing amount of stormwater runoff and pollutants that enter the municipal stormwater management system from private properties. The incentives include lower monthly stormwater management fees to all ratepayers who demonstrate best practices in managing stormwater runoff through such activities as using rain barrels, installing stormwater treatment devices in parking lots, and using permeable pave ways to control runoff.	The City of Waterloo. (2012). Stormwater credit Program. Retrieved from http://www.waterloo.ca/en/living/creditprogram.asp
South Saskatchewan River Basin	Water resources are governed on a system of prior allocation where water licenses are tied to land or specified facilities in order to protect existing capital	Government of Alberta. (2013). South Saskatchewan River

Water Transfers	investments from water shortages that are a result of newer entrants. Water applications for the South Saskatchewan river basin are no longer accepted. However, Alberta’s Water Act allows for the creation of a water market where water licenses can be transferred between a willing buyer and seller on a permanent or temporary basis under an approved water management plan.	Basin. Retrieved from http://environment.alberta.ca/01734.html
TRCA Aquatic Habitat Bank		http://aquatichabitat.ca/wp/consultants/habitat-bank/

5.1 Wetland Restoration Incentive Program – Manitoba

The Manitoba Wetland Restoration Incentive program was established to help Manitoba meet its greenhouse gas (GHG) emissions reduction targets under the Kyoto Protocol. Wetlands are valuable assets as they perform carbon sequestration, surface and groundwater storage, nutrient retention, pesticide absorption as well as provide habitat for wildlife. In addition, other benefits to restoring wetlands include improved water quality, water storage capacity, habitat restoration, and biodiversity enhancement. The program works to permanently restore wetlands that were drained before 2006.

The program is a partnership between Manitoba Water Stewardship (MWS), Ducks Unlimited Canada (DUC) and the Manitoba Habitat Heritage Corporation (MHHC) to work with farmers to restore wetlands by providing financial incentives, technical support, and advice to landowners. Landowners enter a Conservation Agreement with either Ducks Unlimited or Manitoba Habitat Heritage Corporation and then are offered an ecological goods and services payment to restore wetlands. The landowner must be willing to sign a Conservation Agreement and which is individually negotiated to meet the needs of the landowner. The Conservation Agreement is a voluntary legal agreement between the landowner and the conservation agency that ensures permanent protection without interfering with the activities on the landowner’s productive agricultural lands and allows continued acceptable activities on the restored land while ensuring ecological integrity.

Payments for Conservation agreements are based on the assessed value of the land with a premium paid for restored wetland acres. The Wetland Restoration Incentive Program payment is a one-time ecological goods and services payment to landowners of \$200/acre paid in addition to the conservation agreement payment. The area of restored wetland is calculated based on a survey of the land. The calculation of restored acres is based on the high water level as agreed to by the landowner. All of the restoration work will be completed by project partners at no expense to landowners. The project partners in charge of restoring the wetlands will obtain appropriate licenses under criteria laid out by the Manitoba Water Stewardship. In most cases, restoration work consists of plugging the ditch of a drained wetland with an earthen plug. After entering the agreement the landowners will receive an additional one-time ecological goods and services payment that recognizes the value of the restored

wetlands and helps to provide an offset for the operational costs to the landowner in retaining the wetlands on their lands. The partners involved in the project provide the technical expertise, manpower and equipment needed for the reconstruction of the wetlands ensuring maximum benefits from the wetlands and minimal disruption to the landowner.

Information from: Province of Manitoba. (2013). Wetland Restoration Incentive Program. *Water Stewardship Division*. Retrieved from http://www.manitoba.ca/waterstewardship/water_info/riparian/wetland_restoration.html

5.2 On-Farm Water Management Program – Alberta

The Alberta On-Farm Water Management Program, similar to Grand River Conservation Authority's Rural Water Quality program, provides technical support for agricultural producers in completing a Long-Term Water Management Plan (LTWMP) and shares the related costs of enhancements to their on-farm water supply management. The program is part of Growing Forward 2 which provides programs and services to achieve a profitable, sustainable, competitive and innovative agriculture, agri-food and agri-products industry that is market-responsive, and anticipates and adapts to change. The program's objectives are to improve resource management by helping producers achieve greater water security and more efficient and effective management of their on-farm water resources, and to improve production capacity by also advancing the long-term competitiveness of their operation and embrace business opportunities.

Within the On-Farm Water Management Program there are two offered eligible costs: standard incentive projects include construction of water sources (i.e. wells, dugouts, spring development, dams and pipelines) which are eligible for reimbursement of one third of expenses with a maximum of \$5000 per applicant; and special incentive projects that include well decommissioning, well pit conversions, water meters, water well depth measurement equipment, and connections to multi-use water supply pipelines and are eligible for reimbursement of up to 50% of expenses with a maximum particular to each applicant or project. The grants are available on a first come first serve basis and no advanced payments are permitted. In order to be eligible for funding, and prior to starting the project, the participants must have completed a LTWMP and have it approved by an ARD Water Specialist.

The program focuses on producers, corporations, and not-for-profit- organizations with active agricultural businesses in Alberta. To be eligible there must be a minimum of \$10,000 of farm commodity production income and can be located on private land, rented land, and some types of Crown land with written approval from the land owner.

Information From: The Government of Alberta. (2013). On-Farm Water Management. *Growing Forward 2*. Retrieved from http://www.growingforward.alberta.ca/Programs/index.htm?contentId=ONFARM_WTRMGT_PRG&useSecondary=true&active=yes

5.3 Water Quality Trading Program – South Nation Conservation

The South Nation River watershed supports both farming activities and municipal water usage. Prior to implementation of the Phosphorus Management Program the river exceeded the provincial standard for phosphorus levels and the issue was addressed with basic waste water treatment facilities. This system was not always economically affordable or physically possible. As a result and as part of their Clean Water Program, South Nation Conservation (SNC) developed and implemented a water quality trading program called Total Phosphorus Management (TPM).

Agreements between SNC and the dischargers exist and state that the dischargers will pay SNC a specified amount in exchange for credits that permit phosphorus release. The payments received by the SNC for the credits as outlined in the agreements is then directed into their Clean Water Program. This program works with landowners to implement best management practices and assists in development of projects that work to prevent phosphorus from entering the watercourse, therefore reducing the need for future treatment or removal. In order for the projects to be eligible they must be permanent in nature and have a way to calculate the phosphorus reductions. In summary, private landowners receive financial assistance for implementing phosphorus reduction projects that meet eligibility requirements funded by credits purchased to enable the discharge of phosphorus.

The South Nation River Total Phosphorus Management (TPM) and the Clean Water Management Program has had recognized success. It is considered to be one of the most successful examples of credit trading programs in North America. Thus far, South Nation Conservation has signed and implemented ten TPM agreements, of which seven have been completed. During the period of 2000 to 2007 many of the 212 phosphorus reducing projects that were put in place through the Clean Water Program were funded by the TPM credits. As a result, river water quality has significantly improved with the reduced phosphorus concentration and has created a strong relationship between all users and stakeholders of the watershed.

The TPM program provides a more cost-efficient approach for dischargers to meet the provincial standards for phosphorus release and provides a funding source for the local Clean Water Management program and the private landowners who implement best management practices. The TPM has leveraged over \$100,000 since 2000 for the Clean Water Program which, in turn, has stimulated economic development in sectors such as consulting, permitting, construction, labour and equipment, and materials. This program is a great example of success through stakeholder consultations and partnerships.

Information From: Environment Canada. (2009). Agents of Change – South Nation Conservation. *Environment Canada*. Retrieved from <http://www.ec.gc.ca/p2/default.asp?lang=En&n=21E379B9-1>

6.0 Conclusion

Market-based instruments are policy tools that are efficient and effective for environmental protection when utilized properly. They are emerging worldwide and when combined within a regulatory framework have shown great success. Through markets, price, and other financial incentive and economic variables they reduce or eliminate negative environmental externalities whilst maintaining or enhancing natural capital.

There are many different types of MBIs that work differently to protect select renewable and non-renewable resources. Due to their newly developed nature there are quite a few flaws identified with MBIs and many knowledge gaps. In order to be successful, attention needs to be paid to detail when developing an MBI initiative. For example it is important to ensure there are incentives for behaviour change rather than simply rewarding those who already do something. Also, it is critical to ensure consistency and accountability in the implementation, monitoring, and reporting of MBIs. Having clear documentation, set standards for maintenance and monitoring are common neglected details.

Agencies also need to set clear environmental and economic goals backed by scientific evidence and studies in order to determine which MBI is suitable for their use. And finally, flexibility is needed from the involved stakeholders, accompanied by full transparency in order to ensure success. Several examples of successful MBI initiatives presented demonstrate these characteristics.

A variety of additional resources are listed in Figure 3 that can also assist in many aspects of future MBI development and implementation.

Figure 3: Additional Resources

Source	Description
Green Economy Roadmap www.greeneconomyroadmap.com	This website is the Green Economy Roadmap for Conservation Authorities. It provides an overview of the roadmap as well as useful information, materials, and resources intended to be used by the CAs. The website is a “living document” and will be updated as the project proceeds.
Green Analytics www.greenanalytics.ca	Green Analytics measure environmental values. They assist in creating natural resource management policy to protect the environment and ensure economic returns. They are an independent for profit consulting firm. The website has examples of projects they have worked on, various news and events resources and gives an overview of their work and the solutions they work on to support public policy, business planning, and community engagement.

<p>Measuring The Green Economy: Waterloo Region http://uwaterloo.ca/school-environment-enterprise-development/sites/ca.school-environment-enterprise-development/files/uploads/files/Measuring%20the%20Green%20Economy%20Waterloo%20Region.pdf</p>	<p>The report summarizes the findings of a study done by the University of Waterloo to quantify and measure the amount of green economy in the Waterloo Region to assist the region with development of their Climate Action Plan. The report gives an overview of the research done on Green Economy and how quantifying and measuring green economy can be done. Discusses the study and methodologies briefly, and provides the results of the study. It also provides a conclusion and recommendations.</p>
<p>Canadian Environmental Markets www.sustainableprosperity.ca/article3228</p>	<p>The annual report tracks and analyzes Canada’s 57 environmental markets, makes recommendations to help develop more functioning markets that contribute to environmental protection and economic prosperity. The markets presented are those that address biodiversity and habitat conservation, water quality, water quantity, climate change, and air quality. The report is very comprehensible and informative demonstrating all that is available within Canada.</p>
<p>Rideau Valley Carbon Neutral Program http://www.rvcf.ca/carbon_neutral/</p>	<p>The Carbon Neutral Program through Rideau Valley Conservation foundation allows families or individuals, local conferences or meeting organizers, and small businesses calculate their own carbon output and then contacts RVCF who plants the appropriate number of trees to offset the amount of carbon that they wish. The cost is \$3 per tree planted to the participant.</p>
<p>Ontario’s Wealth, Canada’s Future: Appreciating the value of the Greenbelt ecosystem services. http://greenbelt.ca/sites/default/files/david_suzuki_foundation_-_value_of_greenbelt_eco-services_study_.pdf</p>	<p>This is a report that quantifies the value of the ecosystem services provided by the Greenbelt’s natural capital. It examines the benefits of the Greenbelt and the potential costs of human impact if natural capital is depleted. It gives a detailed overview of the carbon values, air quality protection value, watershed value, pollination value, biodiversity value, recreation value, and agricultural value. Based off of the report’s findings the David Suzuki Foundation gives recommendations for the future based on The Greenbelt Act and Plan’s framework.</p>
<p>Landowner Views on Wetland Enhancement and Restoration in and Adjacent to the Credit River Watershed http://www.creditvalleyca.ca/wp-content/uploads/2013/03/CVC_LandownerWetlandSurvey_Finalreport_Feb1_2013.pdf</p>	<p>This report analyzed two surveys, one sent to farmers and one to non-farmers to explore the preferences of the landowner about wetland management and the provided ecosystem services to assess the willingness of landowners to implement wetland restoration or enhancement on their property, and evaluate the landowners preferred method of compensation, implementation details, and willingness. The report details the key findings and provides further discussion.</p>
<p>Phosphorous Trading: Projects to offset Nutrient Enrichment in a Riverine</p>	<p>This report examines the effectiveness of 12 best management practices (BMP) in respect to phosphorous control in the Nottawasaga valley Watershed. The report conducted a literature review of relevant research,</p>

<p>Environment using Agricultural and Rural Best management Practices http://www.nvca.on.ca/ws_pargroups/public/@pub/@nvca/documents/web_content/wspar_044808.pdf</p>	<p>considered studies, and examined 12 BMPs and reviewed the current phosphorous trading ratio. This report discusses the findings and provides recommendations for the future.</p>
<p>ABCA Land Stewardship Initiatives http://abca.on.ca/downloadfile.php?Item=260</p>	<p>This report assesses the carbon sequestration in ABCA and looks at sponsorship and funding programs and awareness opportunities. It also examines potential future opportunities for carbon offsets in ABCA. Recommendations are made for future financial sponsorship and raising awareness for future carbon offsetting.</p>
<p>Market based instruments and fiscal mechanism www.environment.alberta.ca/01825.html</p>	<p>Gives an overview of MBI and the various fiscal mechanisms that provide financial incentives and disincentives to guide behaviour change towards environmentally friendly activity that are used in Alberta. In a tool list format providing fact sheets of examples of economic instruments used in Alberta.</p>
<p>Ecosystem Marketplace www.ecosystemmarketplace.com/</p>	<p>Ecosystem Marketplace is a great source for news, data, and documents on markets and payments for ecosystem services such as water quality, carbon sequestration and biodiversity. Available is information on policy, finance, regulation, science, business, and other market-relevant sources.</p>
<p>Feasibility of Habitat Banking in Manitoba http://www.prasinogroup.com/pdfs/Feasibility%20of%20Habitat%20Banking%20in%20Manitoba.pdf</p>	<p>This thesis paper written by a graduate student at the University of Manitoba gives a background on habitat banking and the various corresponding acts and legislation in Canada. The purpose of the paper was to examine the feasibility of habitat banking as a compensation tool for Manitoba Hydro generation projects. The study presents numerous case studies from Canada and the US and discusses both the challenges and opportunities for habitat banking in Canada.</p>
<p>The role of market-based instruments in achieving a resource efficient economy http://ec.europa.eu/environment/enveco/taxation/pdf/role_marketbased.pdf</p>	<p>The purpose of this framework report is to discuss the use of market-based instruments for resource efficiency. It gives a background on the global use of MBIs focusing on taxation. The report gives several case studies within the European Union and discusses the findings and final conclusions and lessons learned. It provides further recommendations for implementation of market-based instruments in the EU.</p>

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