ONTARIO'S ENVIRONMENTAL MARKETS

CREATING PRICE SIGNALS TO PROTECT OUR NATURAL ENVIRONMENT

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METCALF FOUNDATION

SP Sustainable Prosperity

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Made up of business, environment, policy and academic leaders, Sustainable Prosperity (SP) is a national green economy think tank/do tank. We harness leading-edge thinking to advance innovation in policy and markets, in the pursuit of a greener, more competitive Canadian economy. At the same time, SP actively helps broker real-world solutions by bringing public and private sector decision-makers to the table with expert researchers to both design and apply innovative policies and programs. We believe that achieving the necessary innovation in policy and markets for a stronger, greener Canadian economy requires a new knowledge base and new conversations. SP's approach is to promote both by generating policy-relevant, expert knowledge to inform smart policy solutions and foster innovative conversations and connections.

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INTRODUCTION

Ontarians derive abundant benefits from their natural environment. The provinces' environment supports economic activity - Ontario has more than half of the highest quality Canadian farm land,[1] it leads all other provinces in terms of mining (by contributing 25% of all mining production in the country[2]) and its forestry sector supports almost 200,000 direct and indirect jobs.[3] Ontario's natural environment also provides vital ecosystem services – including clean air and water, climate regulation, and flood control. In addition, individuals enjoy access to it for recreation and cultural purposes.

In large part because of Ontario's environment, the province is an attractive place to live and work; it generates 37% of Canada's GDP[4] and it is home to 38% of the country's population[5], 13.7 million, which is projected to grow by 4.2 million (or 31.3%) over the next 28 years.[6]

A challenge thus exists; how can Ontarians ensure that as the population and economy expand, we are able to manage the province's natural resources more sustainably and considerably reduce the environmental impact of daily activities?

Although Ontarians benefit greatly from the natural environment, the value of the natural resources we draw from it are not always priced (such as is the case with water) and the value of the ecosystem services it provides are almost never priced – meaning we may overuse them. At the same time, the negative impacts of our activities are generally not priced, as happens when we release air or water pollutants or displace species and habitat for development – meaning we may not have any financial incentive to reduce environmental degradation.

Considering the full costs and impacts of our daily activities on the environment can help establish more accurate prices for goods and services. These price signals in turn can help align individual interests with sustainable economic development — making the otherwise invisible visible. They are a policy tool used to make environmental costs and benefits more visible. Environmental markets create a market for the positive environmental attributes of goods and services, and can help limit environmentally-damaging activities.

Despite their potential to advance environmental outcomes in a flexible and cost-efficient way, environmental markets have been slow to develop in Canada, as shown in previous Sustainable Prosperity analysis.[7] This report thus seeks to focus on a single geographic area — Southern Ontario — in order to understand why some of these markets have been used in some regions and for some policy challenges, while underutilized in other regions or challenges. The report also highlights barriers to their use, and identifies potential areas for implementation.

1 About Ontario. https://www.ontario.ca/government/about-ontario

2 Preliminary estimate of the mineral production of Canada, by province, 2014. http://sead.nrcan.gc.ca/prod-prod/2014p-eng.aspx

3 2010-2011 Ministry of Northern Development and Mines, Annual Report. http://www.mndm.gov.on.ca/en/about-ministry/annual-report/annual-report-2010-2011#simple-table-of-contents-22

4 Statistics Canada. Real gross domestic product, expenditure-based, by province and territory. http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ50-eng.htm

5 Statistics Canada. Population by year, By province and territory.http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm

6 Ontario Population Projections 2013-2041. Ontario Ministry of Finance. http://www.fin.gov.on.ca/en/economy/demographics/projections/#s1

7 Sustainable Prosperity. 2013 Environmental Markets Report http://www.sustainableprosperity.ca/content/environmental-markets-2013

As one of the most economically diverse and densely populated regions in Canada, Southern Ontario is an interesting region to explore through research and policy analysis. This report shows that environmental markets are not new in Ontario. In fact, the report identified 20 environmental markets and the provincial government has recently announced the intent to develop another province-wide environmental market: a cap and trade system to help reduce greenhouse gas (GHG) emissions.[8]

However, the report also demonstrates that opportunities still remain to expand existing markets and develop new ones. By looking at status and trends of environmental markets in Southern Ontario, policy makers, new markets participants and potential market operators can take stock of lessons learned in order to make more informed decisions. This can ultimately enable the development of more robust and effective environmental markets.

The aim of this report is to explore how environmental markets can be employed as a way to maintain and improve environmental quality and limit pollution as Southern Ontario's population and economy grow. By creating an explicit value where none currently exists, they can help incentivize Southern Ontario's businesses, farmers and other landowners, and citizens to protect Ontario's air, water, and biodiversity.

This report first defines environmental markets; it then explores their use in Ontario by considering them in three environmental areas: air and carbon, water, and biodiversity. Further details on each market are available in the Appendix. It is important to note, however, that not all environmental markets fit under a single area. Some of the identified markets place a value on goods and services that provide benefits in more than one environmental area and it is therefore appropriate to classify these under a distinct fourth area entitled *multiple ecosystem services*. To avoid repetition, this report does not analyse *multiple ecosystem services* markets under a separate section. However, these markets are listed separately in the environmental markets table on page 9 and on the Methods Appendix.

Each section in the report includes a *Focus Area* where a particular type of environmental market is explored more closely. The *Focus Area* provides an in-depth analysis of the type of market, describing how it works, and discussing its effectiveness and limitations. The focus areas were chosen for their potential to offer important lessons learned and/or their potential to be used more often. Other specific environmental markets of particular interest are detailed in *Featured Market* sub-sections. Each section concludes with a *Going Forward* segment that outlines recommended steps to increase the use of these environmental markets.

8 Apart from the 20 identified environmental markets, the Lake Simcoe conservation authority is considering the possibility of introducing a water quality trading scheme – a form of environmental market – to reduce phosphorous loadings into lake Simcoe.

ENVIRONMENTAL MARKETS DEFINED

As previously defined by Sustainable Prosperity, an **environmental market** refers to any market in which the transactions taking place are aimed at either improving or maintaining environmental quality, or minimizing environmental degradation.

Although traditional markets (meaning the markets in which goods and services are sold every day) work very well to establish prices, these prices do not always fully reflect the inputs used in the production of what is being bought and sold (particularly ecosystem goods and services as inputs) or the full environmental impact of the production, use and disposal of the goods or services. For instance, when a landowner sets land aside for conservation, this person does not receive any compensation for the valuable ecosystem services provided by this land, which benefit everyone. Similarly, when a factory releases harmful pollutants into nearby water bodies, its operators do not compensate downstream water users for the cost of lower quality water.

Since the value of many of these environmental costs and benefits are often not reflected in the prices seen in the market, there is often a role for government to create a mechanism to value them. There are many ways in which governments can do this, including taxation, regulation, direct program spending, or the creation of environmental markets. Unlike policies that prescribe a specific technology or outcome, environmental markets may allow greater flexibility and cost-effectiveness. Buyers and sellers can look at the market price and determine whether they will participate in the market or not, and if so, choose their level of activity.[9]

By creating a monetary value where none exists, environmental markets help buyers and sellers see the full cost of using our environment and the full benefits of preserving it.[10] Environmental markets include markets in which:

1. Market participants buy or sell a good or service with an environmental benefit with the aim of protecting it.

Included in this category are markets in which a payment is made for conserving land for the protection of biodiversity (such as the Ontario Species at Risk Stewardship Fund) or for valuing clean energy sources (such as the trading of renewable energy certificates.) In both examples, market participants treat the environment as an asset, and create a value for the environmental benefits of the good or service that are traded.

2. Market participants buy or sell a good or service with an environmental cost with the intention of limiting its activity – thus reducing its environmental impact.

An example of this would be a market in which participants pay for the right to undertake a limited amount of an activity that would cause a negative environmental impact, such as wastewater treatment plants purchasing credits to release phosphorus into the South Nation River.

9 For more information on environmental markets read Sustainable Prosperity's 2013 Environmental Markets in Canada report (released in 2014).

10 Environmental markets are often created through government regulation.

Environmental Market Categories

Environmental markets can vary in value and volume of trades, geographic scope, number of participants, and degree of government involvement. For the purpose of qualifying environmental markets in Southern Ontario, this report uses two categories: established markets and payment programs.

ESTABLISHED MARKET: Many of the markets considered in this report resemble traditional markets, in which there are multiple buyers and sellers trading a tangible asset. Emission allowance markets, renewable energy certificates, biodiversity offsets, carbon offset credits, and water quality trading programs fall into this category.

PAYMENT PROGRAM: Unlike established markets, payment programs are more simply structured. Usually government or other institutions pay farmers or landowners to adopt management practices that would have a positive environmental impact or reduce environmental degradation. With a less formal market structure, a buyer and a seller come together in a transaction that places a value on an ecosystem and/or the natural benefits it provides.

*Definitions for established markets and payment programs were taken from Sustainable Prosperity's Environmental Markets in Canada, 2013.

METHODOLOGY

Primary research for this report was conducted between July and December 2014. Information was obtained from reports, online sources and through in-person and telephone interviews with program administrators, government officials, market participants and academics.[11]

Unlike previous Sustainable Prosperity environmental markets reports, this report does not calculate an aggregate monetary value of environmental markets. For some markets, it was possible to obtain their value based on program reports, market participants or program operators (see Methods Appendix). However, for certain markets it was almost impossible to estimate their value as market participants are not obliged to publicly disclose their trading information.

Furthermore, a closer look at these environmental markets revealed that the total monetary value of these markets does not always capture the whole story behind their successes or failures. The South Nation River Phosphorous Trading program, for example, reported a $0 value for the past few years, though this market has been recognized as a successful example of a North American water quality trading market. In fact, contrary to the market being considered ineffective or weak, the $0 value simply reflects the fact that there has been no net increase of phosphorus in the watershed and as a result, there has been no need to offset additional nutrient loadings. The market is actually working![12]

11 While the focus of this report was to explore environmental markets in Ontario, there may be some environmental markets at the municipal level – particularly payment programs – that are not captured in this report. There may also be some national/federal level environmental markets in which Ontario-based entities participate, Federal Habitat Stewardship Program for Species at Risk, but these are outside the scope of this report.

12 For more on this market see page 30

SUMMARY OF ONTARIO'S ENVIRONMENTAL MARKETS

In total, this report identified 20 environmental markets in Ontario (see Table 1). The provincial government recently announced its intended introduction in 2017 of a cap and trade program that will limit GHG emissions. Another pending market is the Lake Simcoe Phosphorous Offset Plan.

Of the 20 active environmental markets[13], only seven markets are considered established markets. Most established markets fall within the air and carbon environmental area, while most payment programs target protection and enhancement of water and biodiversity. In the future, it will be interesting to track the development of these payment programs as they may evolve into more established markets.

13 The table shows 21 environmental markets. The Lake Simcoe Phosphorus Offset Plan has not been launched but it was included in the table since the program design details have been completed, as opposed to the recently announced cap and trade program to limit GHGs.

Table 1. Environmental Markets in Ontario

AIR AND CARBON	MARKET TYPE
Ontario Emissions Trading Registry (for sulphur dioxide and carbon monoxide)	Established Market
Carbon offsets	Established Market
Renewable Energy Certificates	Established Market

WATER	MARKET TYPE
South Nation River Total Phosphorus Management Trading System	Established Market
Lake Simcoe Phosphorus Offset Plan (not yet launched)	Established Market
Nottawasaga Valley Conservation Authority Nutrient Trading Program	Established Market
Ontario Landowner Environmental Assistance Program	Payment Program
Water's Edge Transformation Project (WET)	Payment Program

BIODIVERSITY	MARKET TYPE
Species at Risk Overall Benefit – compensatory mitigation	Established Market
Ontario Species at Risk Stewardship Fund	Payment Program
Ontario Species at Risk Farm Incentive Program	Payment Program
Land Stewardship and Habitat Restoration Program	Payment Program
Community Hatchery Program	Payment Program
Grassland Habitat Farm Incentive Program	Payment Program
ALUS Alternative Land Use Services (Ontario programs)	Payment Program
Ducks Unlimited Canada - Landowners' Wetland Restoration Program	Payment Program

MULTIPLE ECOSYSTEM SERVICES	MARKET TYPE
Growing Forward 2	Payment Program (air & carbon and biodiversity)
Lake Simcoe/ South-eastern Georgian Bay Clean-up Fund	Payment Program (water and biodiversity)
50 Million Tree Program	Payment Program (air & carbon, water and biodiversity)
Watershed Stewardship Activities under the Conservation Ontario umbrella	Payment Program (water and biodiversity)
Great Lakes Guardian Community Fund	Payment Program (water and biodiversity)

SECTION I: AIR AND CARBON MARKETS

Ontario's air quality has been progressively improving over the past two decades. Ambient concentrations and provincial emissions for major pollutants including nitrogen oxide (NO), sulphur oxide (SO) and carbon monoxide (CO)[14] have significantly decreased since 1990. Reduction of these pollutants is important because they lead to smog, acid rain and are a major contributor to respiratory and cardiovascular diseases.

Ontario's Emissions Trading System for NO and SO_2 — Canada's first emissions trading system — has been a key driver in reducing emissions in industrial sectors in a flexible way. Other complimentary non-market based measures have also contributed to the decline in pollutant emissions, including the phase-out of coal-fired electricity generation, emissions controls at Ontario smelters, and the Drive Clean emissions testing program.[15]

Similarly, greenhouse gas (GHG) emissions have also dropped. The government of Ontario recently announced that it met its short-term target of reducing GHG emissions by 6% below 1990 levels by 2014 — as established in its Climate Change Action Plan. The drop in emissions is a result of the measures described above, as well as other command-and-control policies, including Ontario's Ethanol in Gasoline Regulation, changes to Ontario's building code, and residential retrofits programs offered by different levels of government and local electricity and natural gas utilities.

1990 - 2013 Emissions Reductions:

Nitrogen Oxide (CO)	↓ 54%
Sulphur Oxide (SO)	↓ 76%
Carbon Monoxide (NO)	↓ 54%

Ontario's Climate Change Action Plan GHGs emissions Targets:

2014: 6% below 1990 levels

2020: 15% below 1990 levels

2050: 80% below 1990 levels

14 Air Pollutant Emission Data. Environment Canada. http://www.ec.gc.ca/inrp-npri/donnees-data/ap/index.cfm?lang=En

15 Federal policies that could have also contributed to emissions reductions in Ontario include: new regulations to limit air pollutants from the railway sector and more stringent emissions standards for new passenger automobiles and light trucks. Canadian Council of Ministers of the Environment. 2013. 2010-2011 Progress Report on the Canada-wide Acid Rain Strategy for Post 2000.

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However, the province risks falling short of meeting its 2020 GHG reduction target. Without further initiatives, projected reductions for Ontario will only meet 69% of the 2020 target.[16] Ontario's recent announcement to adopt a cap and trade system can help the province bridge this gap in a flexible and cost-effective way. Ontario's announcement to link its cap and trade system to California's and Quebec's trading regimes means that Ontario will be part of North America's largest carbon market. Moving forward, the specific details on how policy makers design the cap and trade scheme will have a direct impact on the system's ability to successfully reduce GHG emissions.[17]

Figure 1. Ontario's Historical and Forecast Emissions, 1990-2030[18]

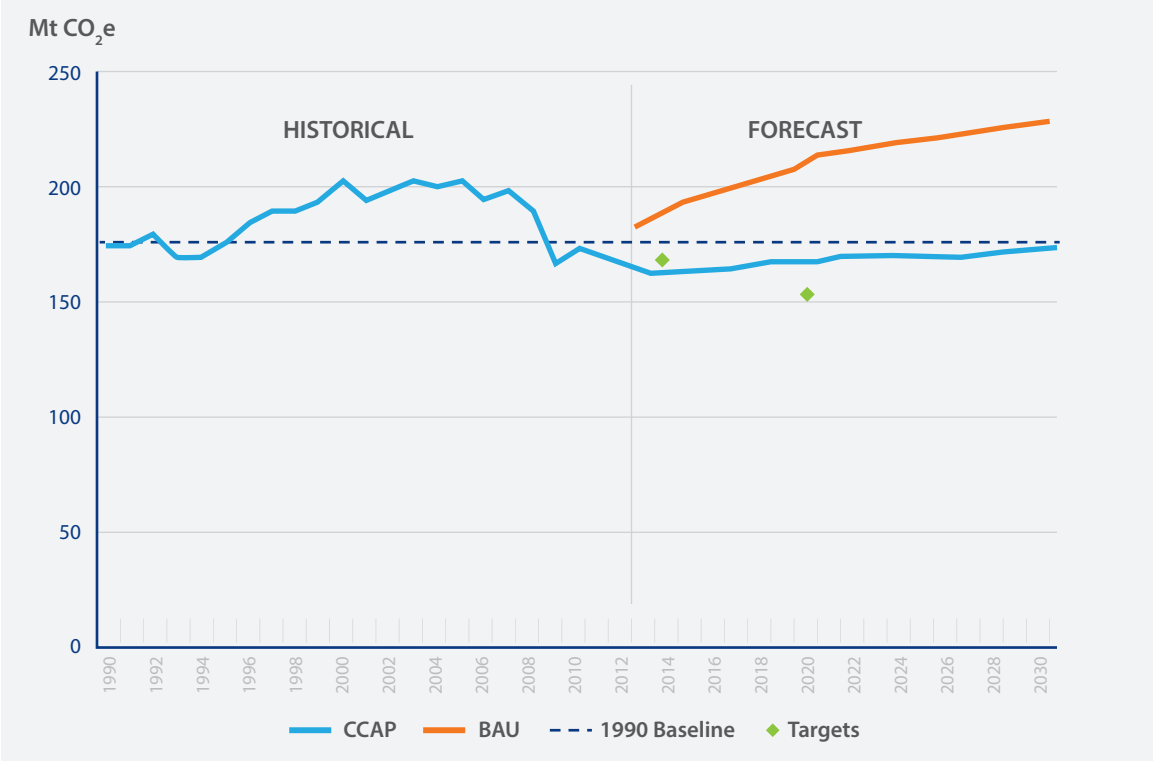

Table Legend:

CCAP: The blue trend line shows historical emissions and projected emissions that take into consideration federal and provincial policies implemented up to 2014, including policies introduced since Ontario's 2007 Climate Change Action Plan.

BAU: The red trend line shows is an estimate of what Ontario GHG emissions would have been in the absence of policies introduced since Ontario's 2007 Climate Change Action Plan.

16 Ibid.

17 In April 2015, Sustainable Prosperity provided the Ontario Government with advice on best practices on these issues as part of its response to the province's Climate Change Discussion Paper. http://www.sustainableprosperity.ca/article3971

18 Ministry of the Environment and Climate Change. 2014. Ontario's Climate Change Update 2014. Retrieved from http://www.ontario.ca/document/ontarios-climate-change-update-2014

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Existing Air and Carbon Markets in Ontario: In addition to being home to Canada's first emissions trading system — and being one of the first North American jurisdictions to implement a cap and trade system for GHGs — Ontario is also home to voluntary carbon markets. Many companies and individuals use these voluntary markets in an effort to reduce — or offset — their carbon footprint and demonstrate climate leadership. Ontario's air and carbon markets comprise:

- Emissions trading systems
- Payment programs
- Renewable energy certificate markets
- Carbon offset or credits

In total, five air and carbon markets are active in Ontario: one active air pollutant emissions trading system, two payment programs designed to sequester carbon and reduce GHG emissions (among other ecosystem services); and voluntary markets for renewable energy certificates and carbon offsets.

1.1 FOCUS AREA: EMISSIONS TRADING SYSTEMS

Emissions trading systems or schemes have the potential to reduce air contaminants, including GHGs, while also minimizing compliance costs for many firms subject to traditional command-based regulations.[19]

The most common type of emissions trading system is a cap and trade scheme. Under such a scheme, a market for an air contaminant emission is established. A cap is set to achieve a specified reduction in aggregate emissions (example: Quebec's target to reduce GHGs by 20% below 1990 by 2020). Emission permits or allowances are distributed among emitters (either freely, auctioned or a combination of both). Facilities that generate fewer emissions than their allocated permits can sell the surplus. On the other hand, emitters that exceed their allocated amount of permits must purchase additional permits to cover additional emissions.[20] The price at which permits trade is variable, but the level of emissions reductions is certain.

An alternative to a cap and trade system is the policy instrument used under Alberta's Greenhouse Gas Reduction Program. This program requires improvements in emission intensities of regulated facilities from a baseline level of emissions, specific to each emitter. Facilities that are able to lower their emission intensity beyond the required baseline, can sell this surplus — or credits — to emitters that are not able to comply with their emission intensity requirement.[21]

Emission trading systems do not necessarily replace command-based regulation. In fact, a strong and complimentary regulatory framework can make emission trading systems more

19 Another price-based approach to reducing air pollution –although not considered an environmental market – is through taxation. Unlike a cap and trade system, under a tax system the price for an air contaminant is fixed but the level of emissions reduction that can be achieved by setting that price is unknown.

20 Some systems also allow the creation of tradable credits through emissions reduction activities from sectors not covered by the regulation.

21 Regulated firms can also comply by purchasing offset credits or by paying $15 per tonne of emissions to a provincial technology fund. For more information on carbon pricing design option see Canada's Ecofiscal Commission 2015 report: The Way Forward http://ecofiscal.ca/wp-content/uploads/2015/04/Ecofiscal-Commission-Report-The-Way-Forward-April-2015.pdf

successful. The case study below demonstrates just that. Command-based regulations, complimentary to Ontario's emissions trading regulations for sulphur dioxide (SO_2) and nitrogen oxide (NO), contributed to driving emissions reductions. In some instances, these regulations helped lower emissions in sectors not covered by the trading regulations; such as the province's Drive Clean program that addressed emissions from transportation-based sources.

However, market-based regulations provide more flexibility about *how to* reduce emissions (i.e., changing inputs, production processes or adopting different technologies), and by *how much* to reduce a facility's emissions — given the price level of the contaminant. In addition, pricing instruments provide greater incentive to innovate; as it becomes more expensive to do a certain activity, individuals and firms have an incentive to search for innovative ways to minimize the new cost.

As mentioned earlier, Ontario was the first Canadian province to implement an emissions trading scheme to reduce emissions of air pollutants causing acid rain and smog (see case study below for more details on this environmental market). Until 2014, when the Quebec government introduced an emissions trading scheme to limit sources of GHGs, this was the only example of a cap and trade system in Canada. Unlike other national and sub-national jurisdictions recently implementing or considering a pricing instrument to lower GHGs, Ontario is one of the few jurisdictions in the world with experience lowering air pollutants through the use of a market-based system. The lessons learned implementing this trading regime will be useful when finalizing the details of the cap and trade program for GHGs.

Featured Market: Ontario's Air Pollutant Emissions Trading System

Ontario is home to the first cap and trade system in Canada, established in 2001. The program's goal is to facilitate the reduction of emissions that create smog and acid rain through industry caps (total emissions limits) and economic incentives that reward innovation and voluntary action.[22]

Ontario's Emissions Trading Regulations 397/01 and 194/01 cap sulphur dioxide (SO_2) and nitrogen oxide (NO) emissions from fossil-fuel power plants and seven industrial sectors.[23] These regulations also enable allowance and credit trading. Within each industrial sector, the Ministry of the Environment and Climate Change (MOECC) establishes a sub cap and allocates a set amount of emissions allowances to each facility.[24]

A facility can purchase allowances from another facility if it exceeds its annual allocated allowances. Because releasing SO_2 and NO into the atmosphere has a monetary cost (under this market), companies have an incentive to innovate and become more efficient over time. As companies gradually decrease their emissions, MOECC lowers the cap annually in order to reduce the total amount of pollutants released into the atmosphere.

22 Ontario Emissions Trading Registry. http://www.oetr.on.ca/oetr/faq/faq.jsp

23 These seven industrial sectors are comprised of pulp and paper, cement manufacturing, iron and steel, petroleum refining, glass, carbon black and non-ferrous smelters.

24 These allowances are allocated freely to regulated facilities.

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The Ontario Government established an emissions trading registry to allow owners of emissions allowances to register, track, trade, and document their transactions. However, the reporting of credit or allowance trade prices[25] is not required and brokers are not active in the market, which makes it impossible to track prices — unlike a stock exchange where prices are closely followed. For this reason, it is difficult to estimate the average price of emissions allowances or determine the overall size of this market.

Nevertheless, telephone interviews with various allowance owners revealed that, over the past years, the price for allowances has been declining. A representative from Ontario Power Generation (OPG) explained that the price per tonne of emissions sold went from $650 in 2006 to $0 in 2013. As OPG phased-out most of its coal-powered operations during that time, its facilities did not require as many allowances as they had before, and they usually have leftover allowances at the end of the year. This also seems to be the case for other market participants; several companies stated that the internal value allocated to their allowances in 2013 was $0 or very close to that amount.[26]

The significant decrease in value seems to indicate an excess supply of emissions allowances in the market. The high price per tonne of emissions — at the beginning of the capped period — sent a signal to become more efficient and pollute less. As regulated companies became more efficient over time and managed to reduce their emissions, they minimized the need to purchase allowances, thus driving down the price to $0. The initial objective of the emissions trading system — reducing harmful air pollutants — was met.

Ontario managed to reduce emissions that cause smog and acid rain at a faster rate than the rest of Canada. From 2002 until 2013,[27] SO_2[28] and NO emissions in the province declined by 55% and 44% respectively. During the same period, SO_2 and NO emissions in the rest of Canada[29] decreased by 43% and 16% respectively.[30] (see Table 2).

The Ontario Emissions Trading System has been a key driver in reducing emissions in industrial sectors in a flexible way. But there are also other complimentary efforts that helped drive down emissions during this period. Ontario's coal phase-out contributed to the substantial decline of SO_2 and NO emissions coming from the electricity sector. Control orders for Ontario's smelters contributed to SO_2 emissions reductions in the non-ferrous and iron and steel sectors. The province's Drive Clean program also helped address transportation-based sources, which are not capped by the trading system. Part of the reduction might also be attributable to shifts in the economy,

25 1 allowance= 1 tonne of NO or 1 tonne of SO_2.

26 Not all market participants (regulated facilities) disclosed the exact dollar value allocated to emissions allowances. However, they explained that their value had decreased significantly over time.

27 Cap and trade regulations were introduced in 2002.

28 The National Pollutant Release Inventory reports on sulphur oxide (SOx) instead of sulphur dioxide (SO_2), which is the compound regulated by the Government of Ontario. SOx refer to all sulphur oxides, the two major ones being sulphur dioxide (SO_2) and sulphur trioxide (SO_3). World Bank Group, 1998 http://www.ifc.org/wps/wcm/connect/5cb16d8048855c248b24db6a6515bb18/HandbookSulfurOxides.pdf?MOD=AJPERES

29 Emissions values for Canada minus emissions values for Ontario.

30 Data collected from the National Pollutant Release Inventory: Air Pollutants Emissions Data Online Data Search. Retrieved from http://www.ec.gc.ca/inrp-npri/donnees-data/ap/index.cfm?lang=En

from a predominance of manufacturing to a more diversified economy with a larger services industry.

Table 2. Emissions Reductions for the Period 2002-2012

Sulphur Oxides (SOx) Reductions				Nitrogen Oxides (NO) Reductions			
	2002 Emissions (Tonnes)	2013 Emissions (Tonnes)	% Reduction		2002 Emissions (Tonnes)	2013 Emissions (Tonnes)	% Reduction
Ontario	604,308	270,201	55%	Ontario	602,262	338,543	44%
Rest of Canada	2,289,472	960,627	43%	Rest of Canada	2,647,459	1,722,037	16%

Exposure to high levels of **sulphur dioxide (SO_2)** and **nitrogen dioxide (NO_2)*** can contribute to breathing problems, and worsening respiratory and cardiovascular illnesses. These two chemicals are the main precursors to acid rain, which contributes to the acidification of aquatic and terrestrial ecosystems. Elevated levels of **SO_2** and **NO_2** can also reduce visibility.

*All combustion in air produces oxides of nitrogen, of which NO_2 is a major product. Ontario Government, 2010 http://www.airqualityontario.com/science/pollutants/nitrogen.php

1.2 RENEWABLE ENERGY CERTIFICATES

Renewable energy certificates (RECs) are a tradable commodity that represent proof that one megawatt-hour (MWh) of electricity was generated from a renewable energy resource. When a generator produces energy from renewable sources (such as wind, solar, low-impact hydro, biomass, etc.) the electricity itself is sold to the grid at a market price. However, the environmental attribute associated to that renewable energy has its own separate value and can be sold on its own as a REC. Therefore for every unit (MWh) of power generated from a renewable source, a corresponding REC can be bought.

There are two types of markets for RECs: a compliance market, in which energy suppliers need to provide a certain percentage of renewable power to meet the requirements of renewable portfolio standard (RPS) policies, and voluntary markets where consumers seek to demonstrate they are using "green" electricity.[31]

In Ontario, the market for RECs is exclusively voluntary. Unfortunately there is no publicly available information on the quantity and value of RECs traded in Ontario. In addition, most of the new renewable power developed in the province — together with its environmental attributes — is built to satisfy the Ontario government's demand under the Feed-in Tariff (FIT) program.

31 Sustainable Prosperity. 2013. *Environmental Markets Report* 2013. Retrieved from http://www.sustainableprosperity.ca/content/environmental-markets-2013

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The FIT program allows homeowners, communities, business owners and private developers to generate electricity from renewable sources and sell it to the Ontario Power Authority (OPA) at a guaranteed price and over a pre-determined time — usually 20 years.[32] Because the FIT program already compensates most renewable power facilities for the environmental attributes associated with generating electricity from renewable sources — by agreeing to pay more per MWh hour than at the conventional grid market price — the Ontario RECs market size is quite small.

Nevertheless, there is still demand for RECs (see Table 3). While the FIT program helps increase the percentage of renewable electricity in the overall conventional supply mix, it does not supply consumers seeking 100% renewable energy. REC retailers, on the other hand, put enough renewable energy into the grid to match the amount of electricity used by their clients. These clients are usually businesses and households that voluntarily pay an additional premium on top of their electricity bills as a way to support new renewable energy projects.

Active RECs retailers include Bullfrog Power and Transalta.

Table 3. Companies Providing Renewable Energy Certificates Sourced from Ontario Facilities

REC provider	Facility	Certified	Other comments
Bullfrog Power (Retailer)	Providence Bay Wind Farm	Ecologo certified	Through a 20-year power purchase agreement with Leader Resources all the electricity produced by the new turbines will be supplied to the grid on behalf of Bullfrog's Customers.
Transalta (Producer and Retailer)	Ragged Chute Hydro Plant	Ecologo certified	Most of the renewable energy — along with its environmental attributes — generated by Transalta facilities in Ontario is captured under the FIT program. This facility is the sole exception, from which RECs are sold to willing buyers.

Environment Canada's Ecologo program established a system for certifying RECs that was finalized in 2010. It lists the types of technology and qualifying vintage, describes the process that must be carried out, and also lays out the rules for avoiding double counting. (Sustainable Prosperity, 2011. The Potential of Tradable Renewable Energy Certificates.)

32 Ontario's FIT program was launched in 2009 in conjunction with the *Clean Energy and Green Economy Act* as a way to promote and support greater use of renewable energy sources (including on-shore wind, waterpower, renewable biomass, biogas, landfill biogas and solar photovoltaic) for the generation of electricity in the province. It is the first program of its kind in North America. For more information read Sustainable Prosperity's 2010 Policy Brief: *Ontario's Feed-in Tariff for Renewable Energy: Lessons from Europe* http://www.sustainableprosperity.ca/content/ontario%E2%80%99s-feed-tariff-renewable-energy

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1.3 CARBON OFFSETS

A carbon offset or credit is a reduction in CO_2 emissions or GHGs used to compensate for an emission released elsewhere. Although carbon offset markets can exist under a compliance scheme, the market for offsets in Ontario is completely voluntary.[33] Companies and individuals purchase carbon offsets as a way to lower their carbon footprint — or even become carbon neutral.

Carbon offsets are typically measured in tonnes of CO_2 equivalents and are usually purchased and sold through offset retailers, brokers and trading platforms. This report identified at least four Canadian retailers offering carbon offsets from projects in Ontario: Coolaction, Blue Source Canada, CarbonZero Canada and Zero Footprint.

Interviews with some of these carbon offset retailers revealed that most offset buyers are corporations seeking to show themselves as an environmentally responsible company. Unfortunately, it was impossible to determine the exact market size in Ontario as offset retailers could not disclose total sale values in the province due to confidentiality reasons. Similarly, it was difficult to estimate an average offset price as these vary widely depending on project type, vintage year, and location.

The report found fourteen active carbon offset projects in Ontario, totalling 11.8 Mt of potential emissions reductions over their lifetime (see Table 4).[34] Most of these projects focus on reducing GHG emissions through landfill gas capture, waste diversion, biomass energy generation and fuel switching. Carbon offset retailers explained that, in Ontario, it is challenging to secure offsets created from the generation of electricity from renewable sources since the FIT program already captures the environmental attributes of most renewable energy facilities in the province.

Twelve of these active projects appear under the Canadian Standards Association (CSA) Clean Projects registry. The listing of an offset project in such a registry ensures that emissions reductions resulting from a project are carefully measured, third party verified, registered, and tracked. This prevents double counting of offsets and certifies the project's additionally — meaning that none of these emissions reductions would have occurred if the activity had not been implemented as an offset project.

None of the CSA registered projects include reforestation or forest conservation activities. Interviewed offset retailers explained that tree-planting projects often present challenges for a number of reasons including permanence of projects, and the potential adverse effects that fire or invasive species might have on planted and protected forests. For these reasons, it is difficult to accurately estimate and measure potential CO_2 emissions reductions over a forest project's lifetime.[35]

33 The upcoming GHG cap and trade system could allow the purchase of carbon offsets as a way to comply with emission limits.

34 Information gathered from online reports, clean project registries and interviews with carbon offset retailers, conservation authorities and sustainability services consultants in Ontario.

35 Although there are no registered reforestation or forest conservation in Ontario, both the CSA and VCS carbon offset registries listed reforestation projects elsewhere in Canada.

AIR AND CARBON MARKETS

Nevertheless, some conservation authorities[36] in Ontario have begun selling non-registered carbon offsets generated from tree-planting projects. The Rideau Valley Conservation Authority's *Carbon Neutral Program* calculates individuals' and companies' carbon footprint. It later plants native trees in their name in order to compensate for some — or all — of the carbon released from their activities. The cost per planted tree is $3. Ausable Bayfield and Maitland Valley Conservation Authorities also offer a similar service under the *Footprints to Forests Program* and charge $5.50 per planted tree.[37]

Although these tree-planting programs are not listed under the CSA registry — as this would be too costly for such small initiatives — the methodologies used to calculate CO_2 reductions associated to offset projects, and estimate their client's carbon footprints, have been independently reviewed by a third party consultant. Offset buyers generally consist of individuals and local businesses seeking to offset their carbon footprint by funding forest projects within their region.

Certification of Carbon Offsets:

The Canadian Standard Association (CSA) Clean Projects registry or the Verified Carbon Standard (VCS) registry list most large-scale voluntary Canadian carbon offsets. These two registry systems validate each individual project using internationally accepted criteria and standards to ensure every credit or unit is real, permanent, independently verified, uniquely numbered and fully traceable. Because the validation, verification and registration process is long and costly, it only makes sense for large-scale projects (those creating a large number of emissions reductions) to certify and register their carbon offsets. This also means that certified and registered carbon offsets tend to be more expensive than non-certified ones.

36 Conservation authorities are community-based watershed organizations set up to manage the natural resources of watersheds in Ontario.

37 The programs' websites contain information on prices per planted tree.

AIR AND CARBON MARKETS

Table 4. Active Carbon Offset Projects in Ontario[38]

Offset Project	Project Type	Certified & Registered under CSA	Total Project Lifetime Reductions (1000 Tonnes of CO_2)
East Landfill: Landfill Gas Recovery and Utilization Project	Landfill Gas Capture	YES	4,200
Natural Gas Combined Cycled Power Generation Plant	Electricity Generation	YES	220
AIM composting activities performed at Hamilton's Central Composting Facility for greenhouse gas emission reductions	Waste Diversion	YES	450
C & B Farms Biomass Heating Project	Biomass Energy	YES	64.5
Amaizeingly Green Products Facility Project	Fuel Switching	YES	2,280.17
Canadian Recycled Plastics Project	Waste Diversion	YES	3,000
City of Toronto's Municipal Solid Waste Diversion From Landfill to Biodigestion	Waste Diversion	YES	168
Essex-Windsor Regional Landfill Gas Capture and Destruction Project	Landfill Gas Capture	YES	600
Landfill gas capture and destruction	Landfill Gas Capture	YES	62.65
Prism Farms Biomass Heating Project	Biomass Energy	YES	105
Pyramid Farms Biomass Heating Project	Biomass Energy	YES	60
White Roof Technology	Energy Conservation	YES	600
Carbon Footprints to Forests	Reforestation	NO	N.A
Carbon Neutral Program	Reforestation	NO	N.A

38 Information gathered from desktop searches and interviews with carbon offset retailers, conservation authorities and sustainability services consultants in Ontario.

1.4 PAYMENT PROGRAMS

Two air and carbon markets in Ontario can be considered payment programs (see Table 5 below). These programs provide payments in exchange for the implementation of activities that help sequester carbon or reduce GHG emissions through the introduction of eligible best management practices (BMPs). These two programs also target biodiversity and habitat protection, and water quality improvements.

The first program, 50 Million Trees, is a partnership between Trees Ontario and the Ontario Ministry of Natural Resources and Forestry (MNRF) to plant 50 million trees by 2025. To do this, the program was designed to significantly reduce landowners' tree-planting costs and thus increase the total number of trees planted across the province. Planting agencies such as conservation authorities and local Ontario stewardship councils work directly with landowners to determine site eligibility, allocate funding and coordinate planting.

The second program, Growing Forward 2, is a federal-provincial-territorial initiative that provides financial support to the agricultural sector to encourage innovation and competiveness. While Growing Forward 2 is a national program, each province/territory has its own version of the partnership. In program year 2013-2014, the Ontario program of Growing Forward 2 supported 77 projects on farms in the Environment and Climate Change focus area, representing $1.4 million in government payments to Ontario farmers.[39] [40] Funded BMPs contributing to GHG emissions reductions include manure storage improvements and manure composting.[41]

Table 5. Air and Carbon Payment Programs

Name of Payment Program	Funding Source	Recipient	Objective
50 Million Trees	Trees Ontario and the Ontario Ministry of Natural Resources and Forestry	Landowners	Sequester carbon, enhance biodiversity, improve soil and water quality, moderate temperature and increase adaptive capacity to withstand climate change.
Growing Forward 2	federal-provincial-territorial initiative	Agriculture and agri-food sector	To support and protect Ontario's water, soil, air, and biodiversity environmental resources.

39 Personal communication with the Ontario Soil and Crop Improvement Association. August, 2014.

40 Environment and Climate Change was the most popular of the six focus areas, with 44 per cent of the total projects funded. Email communication with the Ontario Soil and Crop Improvement Association. August, 2014.

41 Growing Forward 2. Implementation Funding Assistance for Producers- Program Guide. Version 1.5.

1.5 GOING FORWARD

This section demonstrates that air and carbon markets are not new to Ontario. By using them more extensively — along with other complimentary measures — policy makers may have the opportunity to improve the province's air quality and reduce GHG emissions in a flexible and cost-effective way. There are three immediate ways through which policy makers can draw from these existing environmental markets to achieve further results:

- **Take stock of lessons learned from the implementation of the emissions trading system for SO_2 and NO when fine-tuning details for the newly announced cap and trade system.** Although emissions for these two pollutants decreased at a higher rate than for the rest of Canada, it is likely that the cap and trade system was not the only driver of emissions reductions. Technological improvements, intensity regulations and shifts in the economy may also have played a significant role. However, the trading system was a key policy in place during this time of emissions reductions. As such, when defining the operating details of the upcoming cap and trade system for GHGs, policy-makers would be wise to look at both 1) the design features of the individual system, drawing lessons from the SO_2 and NO system, and 2) the ways in which the GHG emission trading system can be made complimentary and additional to existing regulations.

- **Continue supporting payment programs in the air and carbon environmental area.** This not only creates a positive price signal among farmers and landowners to implement BMPs that contribute to GHG emissions reductions from farming practices and deforestation, it also creates awareness of the value of protecting the natural environment in their lands. Furthermore, most of the activities supported through these programs generate benefits in other environmental areas such as improved water quality and biodiversity protection. If some of these practices are eligible for carbon offset credit creation under the upcoming cap and trade regime (see the next point), policy makers will need to ensure additionality in terms of GHGs, while potentially capturing the other values (water, other air pollutants, biodiversity) in other ways.

- **Explore the possibility of integrating (currently) voluntary carbon offsets under a compliance mechanism as a way to accelerate clean innovation:** The sale and purchase of voluntary carbon offsets in Ontario has mostly focused on reducing GHGs emissions through landfill gas capture, waste diversion, biomass energy generation and fuel switching. This market has thus incentivized the development of projects that reduce GHGs through these technologies. Designers of a future provincial carbon-pricing scheme could consider the integration of voluntary carbon offsets as a compliance mechanism and as a way to accelerate and support the development of clean innovation[42] in the province.

42 Clean innovation is understood to include the implementation of new and improved technologies, processes and practices that will help solve environmental problems and resource efficiency challenges.

SECTION 2: WATER

Water is an abundant resource in Ontario. The province's more than 250,000 lakes contain about a fifth of the world's fresh water and 98% of its population lives within the Great Lakes and St. Lawrence River Basin.[43]

Despite the crucial role that Ontario's lakes, streams and rivers have played — and continue to play — in the province's economic development, this resource has been stressed over the years to a point where numerous lakes and rivers suffer from poor water quality. This is particularly true in Southern Ontario, where population density is higher and land has been extensively developed for agricultural and urban purposes.[44]

Although levels of certain contaminants[45] found in Great Lakes fish have decreased and provincial actions to minimize the damaging effects of acid rain have led to a recovery of lakes in central and Northern Ontario, population growth and other emerging issues like climate change and invasive species are adding new water quality and quantity challenges.

Some of these newer challenges include increased algal bloom incidence in many lakes across the province due to warmer summers, and nutrient redistribution into the nearshore areas of the Lower Great lakes as a result of invasive mussels. While phosphorous levels in some water bodies have declined over time in response to management actions, there is still a need to minimize phosphorous loads from sources such as fertilizers, leaking sewage systems and animal waste.

The provincial government has worked closely with its partners to improve water quality over the past decades. While action in this regard has generally been based on conventional environmental policy such as command-based measures and education and training campaigns, environmental markets can be used as a complimentary policy tool to help address these water challenges more cost-effectively and allow greater flexibility.

Existing Water Markets in Ontario: As demonstrated in this section, environmental markets are already used in Southern Ontario in order to improve water quality. However, there is the potential to use them more extensively as a way to balance urban and agricultural growth and environmental protection.

Environmental markets for water fall into three categories:[46]

- Established markets that take the form of water quality trading
- Established markets that take the form of water allocation trading
- Payment Programs

43 Ontario Government Website, Ontario Quick Facts. Retrieved from https://www.ontario.ca/government/about-ontario

44 MOECC. Water Quality in Ontario: 2012 Report. Retrieved from https://docs.google.com/file/d/0B19if6eIPJ3ubGw1ZGk5NEhoZWc/edit

45 Contaminant such as mercury, polychlorinated biphenyls, dioxins and furans

46 Sustainable Prosperity, Environmental Markets in Canada. 2013 Report. http://www.sustainableprosperity.ca/article3862

WATER

Eight environmental markets for water were identified in Ontario. Six of these are payment programs while two are water quality trading programs. In the near future, a third water quality trading program may become active: The Lake Simcoe Phosphorus Offset Plan (LSPOP). While environmental markets for water may also take the form of water allocation trading, there are no such markets in Ontario.

2.1 FOCUS AREA: WATER QUALITY TRADING

Water quality trading (WQT) is a market-based approach designed to improve water quality. Firms with high water pollution reduction costs are allowed to purchase pollution reduction credits from other dischargers in the same watershed in order to meet a regulatory standard. There are currently two WQT markets operating in Ontario. This section discusses how the province could use WQT more extensively as a way to achieve water quality improvements with more flexibility, and at lower costs than traditional regulatory approaches.

The Issue: Elevated nutrient levels have been a problem for water quality in Ontario for decades. Excessive phosphorus loadings in the water have caused an alteration of the natural nutrient balance, or eutrophication, of many ponds and lakes leading to overgrowth of green algae, which is not only unsightly and smelly, but can also threaten aquatic habitat and make water unsafe for drinking and swimming. Provincial water quality monitoring has revealed that many Ontario rivers and streams exceed the interim Provincial Water Quality Objective of 30 µg/ Litre of Phosphorus, especially in Southern regions of the province.[47] There is a need to control sources of phosphorus in these watersheds for their existing and potential in-stream impacts and because they carry this nutrient to the Great Lakes.

47 MOECC. Water Quality in Ontario: 2012 Report. Retrieved from https://docs.google.com/file/d/0B19if6eIPJ3ubGw1ZGk5NEhoZWc/edit

WATER

Phosphorus:

This naturally occurring element is essential for plant growth. However, it is often a limiting nutrient in agricultural and natural ecosystems — meaning that soil normally lacks phosphorus. As a result, phosphate rock has been used as a fertilizer and expansively applied to Ontario farmlands, particularly since the Second World War. Although plants take up some of the artificially applied phosphorus, there is lot of it that does not bind to the soil, increasing the potential run-off into water bodies. Other sources of non-naturally occurring phosphorus in the water include wastewater treatment plants (stormwater and sewage) and urban runoff.*

Concerns around excess phosphorus loadings into the Great lakes first arose in the 1960s; Lake Erie was declared "dead" due to disproportionate algal growth and oxygen depletion.**

To address this, many initiatives were undertaken, including the elimination of phosphorus in laundry detergents and technological upgrades to sewage treatment plants in Ontario. These efforts were considered successful as water quality improved in many of the great lakes. Unfortunately, since the mid 1990's the levels of phosphorus in the lakes' watersheds have been increasing again and algal blooms have become more frequent. This time, government authorities have identified nutrient loadings from farming practices as a significant source.

*Environmental Commissioner of Ontario. 2012-2013 Annual Report: Serving the Public.

**Environmental Defense. 2014. "Clean, Not Green: Tackling Algal Blooms in the Great Lakes"

The Challenge: *Ontario's Environmental Protection Act* makes it unlawful to discharge contaminants into the natural environment beyond the allowed levels regulated by the province. These regulations are normally applied to point source polluters like wastewater treatment plants and factories that discharge pollutants into the water via a pipe. However, it can be extremely difficult to identify non-point source dischargers, which include farmers and runoff from municipalities. These more diffuse pollution sources often elude regulation even though studies have shown that non-point source pollution is largely responsible for excess nutrient loads in Ontario's water bodies.

Under such circumstances, traditional regulations targeting only point sources are not just costly for the firms that need to make technological upgrades, these can also be less efficient as they only help address a small fraction of the problem. An innovative approach such as water quality trading could offer the possibility of combining regulation of point source emitters — such as wastewater treatment plants — with the creation of economic incentives for people to invest in water quality improvement projects for non-point sources.

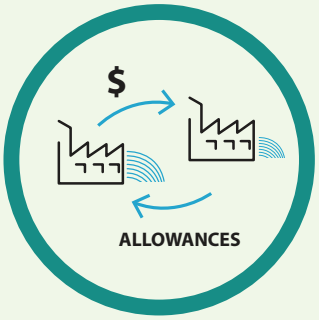
WATER

Figure 2. Closed and Open Water Quality Trading Programs

What is Water Quality Trading?

It is a marked-based approach designed to improve water quality and in which pollutantsare treated as commodities. There are two types of water quality trading markets:

CLOSED MARKET

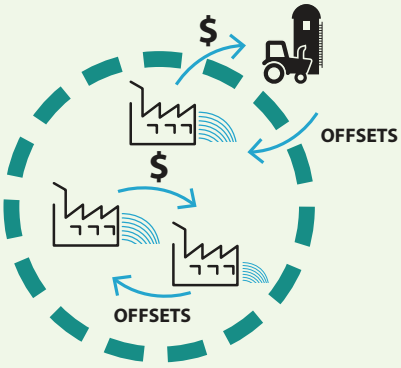


A restricted number of participants trade the allowances or permits to discharge contaminants into the water.

Regulated participants who can reduce their discharge load at a lower cost can sell the surplus allowances to participants who need to release pollutants above their allowed limit.

This system is common in areas where a large proportion of contaminants come from point sources such as factories and sewage treatment plants.

OPEN SYSTEM



In an open system emitters are allowed to use reductions- or offsets-from sources other than the regulated participants.

This system is generally applied in areas where a large proportion of contaminants originate from non-point sources, including farmers and runoff from municipalities.

WATER

Experience with Water Quality Trading in Ontario: The use of WQT as a tool to improve water quality in Ontario is rare. Nevertheless, two programs have already been successfully implemented by the South Nation River and the Nottawasaga Valley conservation authorities.[48] A third WQT program is currently being considered in the Lake Simcoe watershed.

In order to control for non-point source phosphorus discharges, the Ontario Ministry of the Environment and Climate Change (MOECC) developed a marked-based pilot incentive approach called The *South Nation River Total Phosphorus Management* program. MOECC established the program in 1999 and it represents Ontario's — and Canada's — first experience with WQT (see the Featured Market for more details on how this WQT market works).

Since then, the Nottawasaga Valley Conservation Authority has implemented a similar structure to the one in South Nation River— but on a smaller scale. Residential growth pressure in the watershed called for an expansion of the Tottenham sewage treatment plant. Additional phosphorus discharges associated with this expansion were offset by financing non-point source loadings reductions from both rural and urban projects. The cost of removing phosphorus loadings under traditional technological upgrades would have cost the municipality $10 million whereas — by funding landowner stewardship projects — the municipality can remove the same amounts of loadings at a cost of $950,000.[49]

Another WQT is currently being considered in Lake Simcoe. After conducting a feasibility study in 2010, the Lake Simcoe Conservation Authority commissioned the design of a phosphorus offset program.[50] Under the program, land developers in the watershed will purchase offsets generated by phosphorous load reductions achieved elsewhere in the watershed. In the first phase of the project, offsets would be generated by retrofitting existing urban stormwater facilities to enhance nutrient removal performance. Eligible projects include installation of new water quality control structures, water quality control enhancements to existing structures and urban low impact development (LID) retrofits. Land developers would purchase offsets through the Lake Simcoe Conservation Authority that would act as administrator. Local municipalities would own and maintain these retrofit projects.[51] To date, the project has not been implemented as the Lake Simcoe Conservation Authority is currently reviewing the legal ability to adopt a "zero discharge" (of phosphorous) policy in the watershed and determining what the offset cost should be.[52]

Regulatory Framework: Despite the successful implementation of the South Nation River WQT pilot, the provincial government did not consider developing any policy or regulation that would explicitly call for the establishment of WQT until 2008. In that year, the Ontario Legislative Assembly passed the *Lake Simcoe Protection Act* with the purpose of restoring the ecological health of the lake. Among other things, the act enables the government to establish WQT in Lake Simcoe by amending section 75 of *Ontario's Water Resource Act*; which would authorize the Lieutenant Governor in Council to prescribe where WQT can occur and the water

48 Conservation authorities are community-based watershed organizations set up to manage the natural resources of watersheds in Ontario.

49 Interview with representative from the Nottawasaga Valley Conservation Authority and information available Conservation Ontario's and Green Analytics' report "Conservation Authorities in a Changing Economy: A Green Economy Roadmap.

50 The Lake Simcoe Protection Act requires the province of Ontario to establish a protection plan for the lake. The MOECC retained a team of experts to conduct a WQT feasibility study as part of this protection plan.

51 Although retrofit projects would be funded through the sale of offsets, it is expected that ongoing operation and maintenance costs would be borne by the local municipality.

52 Telephone communication with representative form the Lake Simcoe Conservation Authority. June, 2015

quality parameters that can be traded. It would also determine who can trade and who should administer the program.

However, this amendment to *Ontario's Water Resource Act* has not yet been brought into force. If it were to be brought into force, it would mark a very important step as it would be the first time WQT is legislated in Ontario — and Canada — and could set the stage for the development of a more extensive WQT strategy in the province.

There's also an opportunity to consider WQT as part of an overall strategy to protect the Great Lakes. Under the new *Great Lakes Protection Act* — passed on October 2015 — the Minister of the environment can set targets to restrict the amount of phosphorus entering the lakes.[53] As a way to meet these targets, WQT schemes could be established in the watersheds that carry phosphorus to the lakes.

Suitability of WQT in Ontario: The use of WQT markets could be explored in other areas in Ontario — particularly in watersheds already experiencing poor water quality due to intense rural and urban development and in areas projected to experience urban expansion in the following decades such as the Greater Golden Horseshoe.[54] WQT could allow some urban growth while also supporting water quality enhancement.

As part of the Lake Simcoe Protection Plan, the MOECC retained a team of experts to complete a WQT Feasibility Study for the Lake Simcoe watershed. This study identified three necessary conditions to deem WQT feasible in the Lake Simcoe watershed and in any other watershed in the province:

1. Well-defined sources and amounts of pollution. Programs must be based on sound scientific knowledge of nutrient loadings and their particular behaviour within a watershed.

2. Presence/creation of regulatory incentives. Regulations or other policies are necessary to encourage trading.

3. Varying levels of pollution reduction costs within the same watershed. This would ensure market demand and supply, as participants with higher abatement costs (typically wastewater treatment plants and factories) will be motivated to purchase offsets or credits from participants that can reduce phosphorus at a lower cost.[55]

WQT could therefore be feasible in any watershed meeting these conditions. The bringing into force of the *Water Resources Act* amendment could provide the legal endorsement to encourage a wider adoption of WQT regulations in Ontario and thus satisfy the second feasibility condition listed above.

The text box on the following page lists top 10 lessons learned from Ontario's small – but significant – experience with WQT. The list recaps insights gained during interviews with Ontario's WQT program proposers and operators, including former policy makers and representatives from the Lake Simcoe, Nottawasaga and the South Nation conservation authorities.

53 Ontario Laws. 2015. *Bill 66*, Great Lakes Protection Act. Retrieved from http://ontla.on.ca/web/bills/bills_detail.do?locale=en&Intranet=&BillID=3115

54 Ontario Ministry of Infrastructure. Greater Golden Horseshoe Forecasts to 2041: Technical Report Addendum. 2013

55 XCG Consultants and Kieser and Associates. Water Quality Trading in the Lake Simcoe Watershed: Feasibility Study. February, 2010

WATER

Top 10 Aspects to Consider when Designing a WQT Program: Apart from meeting the basic WQT feasibility criteria, WQT program proposers and operators identified certain aspects of a program's design as crucial for the successful implementation of WQT in Ontario:

1. **Simplicity:** Unlike WQT schemes in the United States, where complex market structures have been developed including registries, multiple brokers and exchange markets, Ontario's experience suggest that simpler arrangements can also be used to deliver similar outcomes. To reduce transaction costs, program administrators act as sole intermediaries between project developers and credit generators – such as farmers. This often increases the incentives of the credit generators to participate because they do not have to spend time looking for a buyer or negotiate a credit price.

2. **Obtaining buy-in from local community:** When the MOECC first proposed WQT, many residents feared that developers and businesses would just use these programs as a license to pollute. Program proposers, including representatives from conservation authorities and the provincial government, organized numerous meetings with members of the watershed community in order to clarify misconceptions.

3. **Engagement of key stakeholders:** A crucial aspect to the South Nation River program's success was effective engagement of different parties; including provincial government officials, municipal representatives, academics, agricultural associations and farmers. In this watershed, a multi-stakeholder committee makes decisions regarding the trading program and local farmers perform all site visits and project inspections. These two factors enhance communication and trust among participants.

4. **Programs based on sound science:** For the two implemented WQT projects in Ontario — in the Nottawasaga Valley and South Nation River — and the one currently being considered for the Lake Simcoe watershed, extensive studies were conducted to determine the existing pollution levels within a watershed and identify the different sources of pollution.

5. **Programs adapted to the particular needs of each watershed:** Program proposers and operators designed each trading in a way that would respond to physical, geographic, demographic and socioeconomic conditions unique to each watershed.

WATER

6 **Need for a legal enabler:** As identified above in the feasibility criteria, regulations and policies are necessary to enable and encourage trading.

7 **Need for a Champion:** Despite the importance of a regulatory or policy driver, administrators and proponents of a WQT scheme often mentioned that without a Champion — a group or individual often in a position of authority in the government — that would advocate for trading water quality credits, these proposals would often fail to become a reality. In the Lake Simcoe watershed, the development of WQT feasibility study was in great part made possible because the provincial government invested efforts to improve the lake's water quality through the Lake Simcoe Protection Plan(external link) and supported innovative solutions — like WQT — to reduce nutrient loadings through its Showcasing Water Innovation(external link) program.

8 **Clear definition of roles and responsibilities:** A key document in the successful achievement of the trading program in the South Nation River was the "The Statement of Roles and Responsibilities", which was signed by local agricultural organizations, the provincial government and SNC. The document clearly defined the roles and responsibilities of each group, which provided transparency and enhanced the public's trust in the program.

9 **Important role for trusted conservation authorities:** Conservation authorities administer the two WQT schemes implemented in Ontario. These organizations have worked within the watersheds for many decades and have built trust with local landowners by working together on a wide range of conservation projects. They also have professional expertise in implementing non-point source water quality improvement projects. With their experience and credibility it is reasonable that the provincial government would select them to deliver WQT programs.

10 **WQT programs used together with other policies and regulations:** Like all other market-based mechanisms, WQT should not be considered as an alternative to regulation but rather as an economic instrument that policy-makers can use to compliment and build on other environmental regulations and policies.

These lessons are by no means ranked in any order of preference or importance.

WATER

Featured Market: South Nation River Total Phosphorus Management Trading System

In the 1990s, phosphorus levels in the South Nation River were well in excess of provincial water quality objectives. As a result, in 1998, the government of Ontario stopped issuing new permits to point source dischargers in the watershed (such as municipal wastewater treatment plants and factories).[56] However, this government policy was impossible to implement given the population growth in the area, which required an expansion of municipal wastewater treatment plants and an increase in the demand of additional permits to discharge phosphorus into the watercourse. An innovative and practical solution had to be found to allow residential expansion without further degrading the water quality of the South Nation River.

Technological upgrades by point source polluters were not just costly, but also considered an ineffective way to improve water quality. Non-point sources such as agricultural lands, golf courses, and municipal runoff are responsible for 90% of phosphorus loads.[57] In light of this, the provincial government introduced a WQT pilot called Total Phosphorus Management (TPM) in an effort to remove excess nutrient loads from wastewater dischargers.[58] Under the program, municipal wastewater plants have the option to either increase their levels of treatment to minimize phosphorus loadings or offset any additional nutrient loads by funding less costly projects to reduce phosphorus from non-point sources.

The program is administered by the South Nation Conservation Authority (SNC), which oversees market transactions. The SNC uses the money paid by wastewater plants to fund non-point source dischargers in the form of grants. These non-point source emitters generate credits by installing phosphorus reduction strategies called Best Management Practices (BMPs), which include upgrades to manure storage, septic systems, and milk house wastewater, livestock access restriction and barnyard runoff control.[59]

One of the biggest obstacles encountered at the early stages of the program was obtaining the community agreement or buy-in for trading. Many rural landowners had the perception that the TPM was designed to save urban people money and not clean up the river. They were also weary of the system as they did not want to be blamed for the poor water quality. The SNC asked the Ontario's Ministry of Agriculture, Food and Rural Affairs (OMAFRA), which had the confidence of the agricultural community, to take the lead on finding a solution. OMAFRA finally achieved a consensus through extensive consultation sessions with various partners involved in the trading program. This process produced a key document "Statement of Roles and Responsibilities", which clearly defined the roles and responsibilities of each group and absolved the supplier of the credit — normally the farmer — from liability should the buyer of credits be in non-compliance due to inadequate phosphorus reductions. In addition,

56 In-person communication with representative from the South Nation Conservation Authority. July, 2014.

57 McNeil, Richard. Water Quality Trading in Ontario. 2013.

58 Ibid.

59 SNC funds BMPs projects through its Clean Water Program, only some of these funded projects are selected to generate phosphorous offset credits for the Total Phosphorous Management WQT program.

WATER

SNC hired local farmers to act as field representatives to monitor projects, which enhanced the agricultural community's trust in WQT.[60]

The Statement also established a 4:1 ratio to address discharge. For every kg of phosphorus emitted by a point source discharger, 4 kg of the same nutrient must be removed elsewhere in the watershed by a non-point source to be in compliance with the regulatory standard. A high trading ratio is used to account for uncertainty since different BMPs can have varying levels of success in removing phosphorus from the water.[61]

Example of a TPM trade

In this fictional example, a municipal wastewater treatment plant needs to expand its capacity to be able to serve growing residential need, which means it will discharge an additional 20 kg of phosphorus annually to the River. In order to be in compliance with the regulatory standard, it can either reduce loading by making technological upgrades to the treatment plant or it can purchase phosphorus reduction credits from SNC. The calculation for how much the plant would have to pay if it chooses the credit option is as follows:

Additional annual phosphorus to be discharged= 20 kg

Cost of reducing one 1kg of phosphorus*= $400

Ratio: 4:1

Cost of offsetting 20 kg through TPM= 20*4*$400= $32,000.00

*$400 is the 2009 cost of removing 1kg of phosphorus, determined by the SNC based on historical costs of delivering projects. This figure is reviewed annually and adjusted for inflation. This cost has been accepted by wastewater plant operators, farmers and MOECC.

The economic advantage of adopting a WQT system can be appreciated when comparing the costs of upgrading wastewater treatment plants to the costs of using the TPM program. Table 6 on the following page illustrates this comparison; the program's costs can be 1.5 to 11 times cheaper than controlling for point source pollution.

60 O'Grady, Dennis. Sociopolitical Conditions for Successful Water Quality Trading in the South Nation River Watershed, Ontario, Canada. 2011
61 Ibid.

WATER

Table 6. Cost Comparison, Total Phosphorus Management Program (WQT) vs. Lagoon Treatment

This table was reproduced from a paper written by Dennis O'Grady, SNC's General Manager

Municipality	TPM Removal Target	TPM Cost	Approx. Cost for Treatment for Phosphorous Removal	TPM Cost Savings
North Stormont – Finch	225 kg/yr	$80,400	$225,000	$144,600
North Dundas – Winchester	640 kg/yr	$192,000	$640,000	$448,000
Casselman	1282 kg/yr	$384,600	$1.2 million	$815,400
Nation – Limoges	772 kg/yr	$127,612	$1.5 million	$1.37 million

Since the program was introduced in 1999, 287 trades have been completed and it is estimated that over 12,144 kg of phosphorus has been removed from the watershed through the use of the TPM program.[62] In 2004, SNC hired an independent firm to conduct an evaluation of the trading program. The evaluation included a telephone survey, in which 89 landowners were contacted and 68 responded. The survey results revealed that the majority of landowners and partners were satisfied with the program. A high percentage of respondents also expressed that — in addition to achieving phosphorus reductions — the program had also help improved their opinion SNC and MOECC and increased their respect for the environment.[63]

62 SNC. TPM Summary of Annual Credits and Dollars (2000-2013)

63 Kassirer, Jay. South Nation Conservation Total Phosphorus Management Program Review: Survey Results. 2005

WATER

2.2 WATER ALLOCATION MARKETS

There are currently no water allocation markets in Ontario. Section 34 of the *Water Resources Act* and regulation 387/04 govern water taking permits in Ontario. The legislation requires anyone taking more than 50,000 litres of water a day to obtain a permit from the Director appointed by the Environment Minister for this purpose.[64] This current regulatory framework is not favourable to the development of a water allocation market. On one hand, the regulation grants the Director a large amount of discretionary power to issue, refuse, alter or revoke permits. On the other hand, permits are not transferable under any circumstances and their duration must not exceed 10 years.[65] These factors reduce the security of permit possession and make it impossible to develop markets for tradeable water allocations. Significant reforms to water allocation rules would be needed in order to enable water allocation trading to occur in Ontario.[66]

2.3 PAYMENT PROGRAMS

This report identified six payment-based programs targeting water quality improvements across Ontario (see Table 7). The provincial and federal government generally fund these programs and partner with agricultural associations and conservation authorities to administer them. In addition to funding water quality and watershed enhancement projects, four of these six programs also target biodiversity protection.

The payment programs provide an economic incentive for landowners — often farmers — to undertake activities that will help protect or enhance the ecological health of a watershed and thus improve water quality. Programs are usually time-limited, meaning funding is only available for a few years or until it is exhausted. As a result of these short-term price signals, the programs are limited in their ability to encourage the creation of a more developed market for water protection.

Nevertheless, there is the potential to transform some of these payment programs into more formal water quality trading programs, particularly in stressed watersheds. Program administrators could link payment recipients to potential credit purchasers — like wastewater treatment plants — in need of offsetting their pollutant discharges.

64 Government of Ontario. Permits to Take Water. Retrieved from https://www.ontario.ca/environment-and-energy/permits-take-water

65 Rob Loë et al. Water Allocation and Water Security in Canada: Initiating a Policy Dialogue for the 21 century. 2007. 13-16

66 The administrative fee paid by businesses and individuals requiring a permit to take water is fixed and is not reflective of the amount of water used by the permit holder. However, municipalities do pay by amount of water used.

WATER

Table 7. Water Payment Program

Name of Payment Program	Funding Source	Recipient	Objective
Ontario Landowner Environmental Assistance Program	Municipal partners and the support of the York, Durham, and Simcoe chapters of the Ontario Federation of Agriculture through the Lake Simcoe Region Conservation Authority	Landowners	To improve water quality of the Lake Simcoe watershed.
Water's Edge Transformation Project (WET)	Ontario Ministry of Agriculture and Food through Ontario Soil and Crop Improvement Association	Farmers	To improve water quality of the Lake Simcoe watershed.
50 Million Trees	Trees Ontario and the Ontario Ministry of Natural Resources and Forestry	Landowners	Sequester carbon, enhance biodiversity, improve soil and water quality, moderate temperature and increase adaptive capacity to withstand climate change.
Lake Simcoe/ South-eastern Georgian Bay Clean-up Fund	Federal Government	Multiple groups	To reduce phosphorous inputs from urban and rural sources, restore fish and aquatic wildlife habitat, and address nearshore toxic and nuisance algae growth.
Watershed Stewardship Activities under the Conservation Ontario umbrella	Local Municipalities through Conservation Authorities	Private landowners	To Improve water quality, protect and restore wildlife habitat and improve health of watersheds.
Great Lakes Guardian Community Fund	Ministry of the Environment and Climate Change	Community groups	To protect water quality, habitat and species, as well as improve wetlands, beaches and coastal areas.

WATER

2.4 GOING FORWARD

In Ontario, water markets have been used to a limited extent and their application has generally been localized. Although several payment programs exist — administered either by the government (provincial or regional) or conservation authorities — only two WQT programs have been implemented. There are no water quality allocation markets in Ontario due — in part — to the current regulatory framework governing water takings in the province, which does not provide long-term security of water holdings.

There are certain steps that policy makers can take right now to maximise the potential of environmental markets for water:

- **Develop a province-wide watershed protection framework where water markets are considered:** In recent years, the Government of Ontario enacted a site-specific legislation to increase environmental protection in the Lake Simcoe area under The *Lake Simcoe Protection Act*, 2008. After this act was passed, a protection plan was devised under which the feasibility of WQT was examined and a payment program was introduced in order to restore the ecological health of the lake. Although the actions taken to address environmental issues in this watershed are praiseworthy, these activities are site-specific and fail to address similar water quality issues present in other watersheds, particularly the southern regions in the province. The development of similar legislation and protection plans — but on a province-wide scale — would help enhance and protect the ecological health of many other stressed watersheds in Ontario. The adoption of market-based tools such as payment programs and WQT could be included as part of this broader watershed protection strategy. Existing water payment programs could be considered as the first step in developing more established water markets.

- **Build a strong WQT knowledge base:** Despite the potential benefits attributed to WQT, their low adoption rate suggests that there is distrust surrounding the use of market-based instruments to improve water quality in the province. Increased knowledge on the use of WQT, supporting legislation, and the study of existing case studies would contribute to a more extensive use of WQT as part of a broader water quality improvement strategy.

- **Examine the use of WQT as a way to meet targets under the new *Great Lakes Protection Act*:** In line with the previous point, the passing of *The Great Lakes Protection Act* presents an opportunity to consider the use of water markets more extensively. As a way to meet the water quality targets established by the Minister of the environment, WQT schemes could be established in the watersheds that carry phosphorus to the lakes.

- **Bring into force legislation to allow WQT:** Although WQT has already been implemented in the province without the existence of any laws explicitly allowing this practice, the bringing into force of the amendment to section 75 of the *Water Resources Act* could become the legal enabler necessary for a more extensive use of WQT in Ontario. In addition, the development of province-wide WQT policies and guidelines could provide guidance on when and where WQT should be considered and determine who should deliver such programs.

SECTION 3: BIODIVERSITY

Ontario is home to a rich biodiversity, from the Carolinian forests in the South of the province to the tundra of the Hudson Bay lowlands in the North. Ninety percent of the province has natural cover in the form of forests, wetlands, lakes, and streams.[67]

This habitat and the biodiversity it shelters provide Ontarians with a wide range of social and economic benefits and services, which include provisioning of food and raw materials; climate regulation and flood prevention; habitat, pollination and soil support; as well as social and cultural services that offer recreational, aesthetic and even spiritual benefits.[68]

Despite the importance of these benefits and services, nature provides most of these for free — while the price we pay for food and timber can reflect the value of some of these services, there are many other ecosystem services whose value is much harder to quantify in market prices.

A 2008 study estimated that the Greater Golden Horseshoe Greenbelt provides ecosystem services worth $2.6 billion annually.[69] Similarly, a more recent TD Economics study valued Toronto's urban forest at $80 million per year (see table below). However, since market prices often exclude the value of all these services, this can often lead to an unsustainable and wasteful use of nature's resources.

The Value of Trees in Urban Spaces: Toronto's Urban Forest

In 2014 TD Bank released a special report detailing the importance and value of Toronto's urban forest — including trees in private properties, city streets, and natural areas such as parks and ravines. The study estimated that Toronto's urban forest provides $80 million — or about $8 per tree — worth of annual environmental benefits including wet weather flow, air quality, energy savings, carbon sequestration and energy emission abatement.

*This figure only represents a portion of the overall value as other benefits are more difficult to quantify – aesthetic values, recreational spaces, community importance – and were therefore not included in the valuation. TD Economic, June 9, 2014. Urban Forests: The Value of Trees in the City of Toronto. http://www.td.com/document/PDF/economics/special/UrbanForests.pdf

Although the link between biodiversity and the provision of ecosystem services is complex, Ontarians cannot deny the benefits — both economic and social — derived from nature. Yet, the Ontario Biodiversity Council reported in 2010 that Ontarians are placing large demands on the province's biological resources and that biodiversity losses are occurring — particularly

67 Government of Ontario. 2012. Biodiversity: It's in Our Nature – Ontario Government Plan to Conserve Biodiversity (2012-2020)

68 The benefits that humans derive from biodiversity are generally known as ecosystem services and are divided into four main categories: Provisioning services, supporting services, regulating services and cultural/social services. (Ontario Biodiversity Council. 2005. *Ontario's Biodiversity Strategy*. Retrieved from http://snobeanobc.com/OBC2015/wp-content/uploads/2012/03/OBS_2005.pdf)

69 David Suzuki Foundation. 2008. Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-services.

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in Southern Ontario where 68% of the region is made up of built-up areas, agriculture, roads and other unnatural cover.[70] As the province's population continues to increase, so will the use of natural resources, which will alter more landscapes and potentially lead to more biodiversity loss. In addition, climate change and invasive species also pose a threat to Ontario's biodiversity.

To address this, in 2012 the Government of Ontario released an action plan to conserve biodiversity. This bold government strategy engages multiple stakeholders — including several provincial ministries — and sets out 24 actions and 115 specific supporting activities that will be undertaken or are already being implemented to mitigate biodiversity loss.

One of these actions is to develop economic tools that encourage biodiversity conservation, which include exploring the use of economic instruments in support of biodiversity conservation, improving the methods and tools for calculating and integrating the value of biodiversity and ecosystems services into decision-making, and assessing opportunities to develop a biodiversity conservation market.

Since the province's population is projected to grow by almost 5 million by 2036,[71] the adoption and implementation of this comprehensive conservation plan presents an opportunity for Ontario to establish biodiversity goals and choose the set of policy tools to best avoid and reduce biodiversity loss before the next decades of economic development. The use of biodiversity markets as one of these policy tools can create economic incentives to conserve biodiversity while also providing greater flexibility in achieving these goals.

Existing Biodiversity Markets in Ontario: Biodiversity markets have already been used in Ontario but experience with them is relatively new. The report found thirteen biodiversity markets in Ontario. Twelve of these markets provide direct payments for voluntary conservation actions and changes to agricultural land-use practices to enhance biodiversity in the form of payment programs. There is one established compensatory mitigation market; a biodiversity offset market, where developers can compensate for species at risk's habitat loss in one area, by recreating or improving habitat for that species elsewhere.

70 Ontario's Biodiversity Council. 2010. State of Ontario's Biodiversity: A report of the Ontario's Biodiversity Council.

71 Ontario Biodiversity Council. The State of Ontario's Biodiversity 2010.

BIODIVERSITY

3.1 FOCUS AREA: BIODIVERSITY OFFSETS

By putting a price on environmental loss and degradation, biodiversity offsets[72] help internalize environmental costs of business projects and operations into decision-making. The most often used definition of this concept comes from the Business and Biodiversity Offset Programme (BBOP):[73]

Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken.

Simply put, environmental degradation caused by the development of one site will be compensated by an equivalent — or even greater — enhancement in another site. The final goal of biodiversity offsets — as set out by the BBOP — is to achieve no net loss or preferably a net gain of biodiversity on the ground as it refers to species composition, habitat structure, ecosystem functions, and people's use and values associated with it.

As explained in *Biodiversity Offsets: A primer for Canada (2014)*, when a developer is held responsible for the implementation of an offset, he or she has to take on the cost of the loss of biodiversity, which was previously borne by all who benefitted from its ecosystem goods and services. By internalizing this into the cost of project development, the developer will be motivated to avoid and minimize the impact of the development on nature. In this way, biodiversity offsets can be used as a tool to help account for the true cost of development activities.

Nevertheless, given that our understanding of nature is limited and our ability to fully recreate ecosystem functions is far from perfect, it is important to recognize that biodiversity offsets — although useful — are just one tool. Normally, offset policies require that offsets should be turned to as a last resort and only used to address the residual adverse impacts that remain when everything has been done to avoid and mitigate negative impacts.

The sequence avoid-minimize-offset is known as the mitigation hierarchy (figure 3).[74]

72 As explained in Sustainable Prosperity's 2014 *Biodiversity Offsets: A Primer for Canada*, biodiversity offsets are known by many other names including conservation offsets (Canadians often use this term), compensatory mitigation (used in the United States), and *conservation allowance* (recently added by Environment Canada), among others. All these terms are synonymous.

73 Business and Biodiversity Offset Programme, *To No Net Loss and Beyond: an Overview of the Business and Biodiversity Offsets Programme* (Washington: Forest Trends, 2013) at 4, online: BBOP <http://www.forest-trends.org/biodiversityoffsetprogram/guidelines/Overview_II.pdf>. The Business and Biodiversity Offset Programme ("BBOP") is an international collaboration of more than eighty companies, financial institutions, government agencies, researchers, and civil society organizations working to establish and promote best practices in the use of the mitigation hierarchy to achieve no net loss, or a net gain, to biodiversity.

74 For more information on biodiversity offsets read Sustainable Prosperity's *Getting Biodiversity Offsets Right: A Research Agenda for Canada (2014)*. http://www.sustainableprosperity.ca/article3927.

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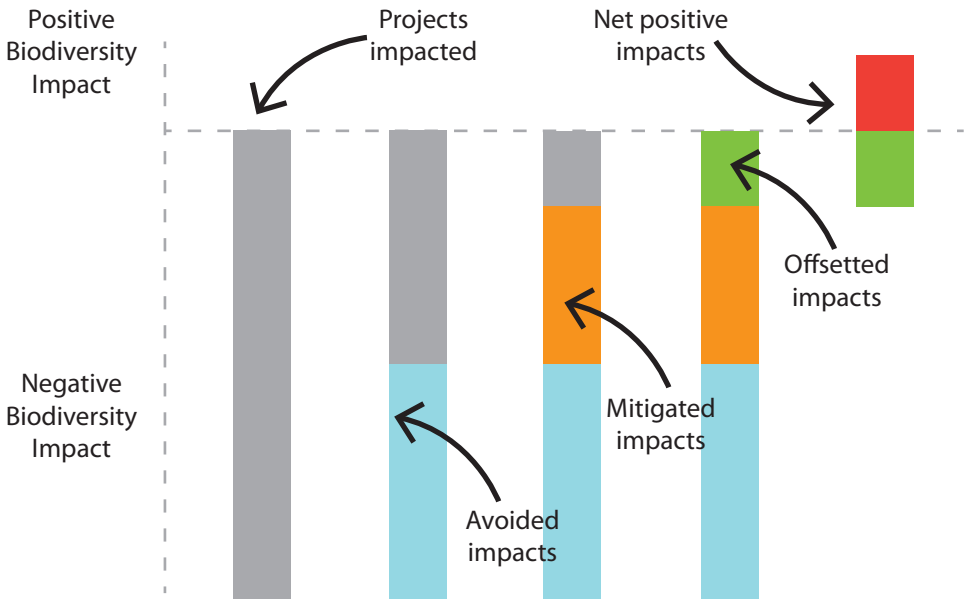
Figure 3: Steps in the Mitigation Hierarchy. Taken from Sustainable Prosperity's Policy Brief: Getting Biodiversity Offsets Right: A Research Agenda for Canada.



Experience with Biodiversity Offsetting in Ontario: In Ontario a form of offsetting is allowed through the issuance of an "overall benefit permit" for species at risk. Although *Ontario's Endangered Species at Risk Act*[75] prohibits the harm and harassment of protected species and damage and destruction to their habitat, a permit can be issued to perform an activity that would have otherwise not been permitted under the act (Section 17 of the act).

According to the Ministry of Natural Resources and Forestry (MNRF), website 31 overall benefit permits have been granted since 2007.[76] To date, developers have sought an overall benefit permit to alter the habitat of eight different species.[77] Most permits have been granted to achieve an overall benefit to bird species (such as the Eastern meadowlark, Bobolink and Whip-poor-will), followed by trees species (such as the American Chestnut and the Butternut.)[78] Ontario's online Environmental Registry publishes each overall benefit proposal and invites the public to comment on them before a final decision is made. These proposals follow the steps described in the mitigation hierarchy.

75 Passed by the Ontario Legislative Assembly in 2007.

76 Endangered Species Act permits and authorizations (List and locations). Retrieved from http://www.ontario.ca/environment-and-energy/endangered-species-act-permits-and-authorizations-list-and-locations

77 The MNRF's Species at Risk list identifies 218 different species.

78 Apart from the permits granted to achieve an overall benefit to the bird and tree species mentioned above, other developers have also sought permits to impact the habitat of the Wavy-rayed Lampmussel, Fowler's toad and the Woodland Caribou.

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For each individual permit application, the developer must propose measures to avoid and minimize any adverse impact that a particular activity might have on the affected species. Finally — and assuming that all other measures mentioned above are implemented — the developer also proposes specific actions to achieve an overall benefit to the species at risk.

Although the Act does not specify a particular overall benefit ratio, the permits issued to date have generally required developers to compensate at a 1:1 ratio. For every unit of impacted habitat (e.g., tree, metre or acre), developers must compensate this loss by creating or enhancing one unit elsewhere.[79]

Similarly, the act does not prescribe the location of the restored or recreated habitat. However, based on the Guiding Principles established by the MNRF, permit issuers should assess an overall benefit proposal in a contextual basis (species by species and activity by activity), and outcomes should involve consideration of where the greatest overall benefit can be achieved for the species. This means that compensation should preferably take place in a location where the species is most likely to thrive.

Permit holders can undertake activities to achieve the overall benefit themselves but given the complexities associated with the matching and exchange of ecological features between the impacted site and the offset site, permit holders often hire third parties to undertake the offset work. Third parties are usually hired due to their specialized expertise in designing and implementing conservation projects and because this can often lead to a selection of better offset sites. By hiring third parties, a monetary value is assigned to biodiversity offsets, which creates a price signal for the developers trying to reduce their project costs and those interested in restoring and managing conservation sites. To date, third parties have included conservation authorities like South Nation Conservation Authority and Toronto Region Conservation Authority, land trusts, and other environmental organizations such as The Nature Conservancy. Recently, private landowners have expressed interest in participating in this emerging offset market — particularly farmers, which are particularly interested in conservation projects for grassland birds.

79 Interview with representative of MNRF.

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Featured Market: SARBEX: Species at Risk Benefit Exchange

There is currently no platform to link developers required to compensate for adverse impact to species at risk (buyers) with third parties offering to undertake conservation projects (sellers). However, as a result of the Bobolink Roundtable discussions*, a recommendation was made to create a Species at Risk Exchange platform. Such a platform could help proponents meet their conditions for overall benefit permits while also supporting the development of a market for conservation activities by linking private resources with the protection of species at risk.

Stakeholder interviews — which included developers and landowners — revealed that there is an interest for such an exchange to exist in order to facilitate exchanges and reduce transaction costs. The provincial government is exploring the possibility of establishing and managing such an exchange platform, though there is also the option that a third party — including conservation or agricultural organization or an alliance of these groups — could adopt this role.

*When the Bobolink was added to the list of threatened species under the Ontario's *Endangered Species Act*, this raised concern among the agricultural community as these birds are known to nest and rear in hayfields during the summer (which coincides with the hay harvest). As a result, the provincial government established the Bobolink Roundtable – bringing together farmers and other stakeholders – in order to discuss issues and mechanisms associated to the protection of this species and other grassland birds (Deloitte & MNRF. Building a Species at Risk Benefit Exchange in Ontario. 2013).

Biodiversity offsets discussions in Ontario: Recently, there have been many discussions surrounding the use of biodiversity offsets in Ontario. In February 2014, the Institute of the Environment — based at the University of Ottawa — hosted a two-day conference on biodiversity offsets where scientific, legal, economic and policy issues related to this conservation tool where discussed.

In that same year, Ontario Nature held several sector-based workshops, bringing together conservationists, farmers and representatives from farm organizations, business leaders, consultants, as well as First Nation groups. The objective of these workshops was to enhance the collective understanding of both the risks and the benefits so that these can be accounted for adequately in biodiversity projects and policy.

The events hosted by both the Institute of the Environment and Ontario Nature showed that there is a growing interest to learn more about this marked-based approach to conservation. These events raised similar issues related to program design including equivalency, additionality, monitoring, timing & duration, limits to the appropriate use of offsets, and management of risks and uncertainty.

As biodiversity offset programs advance in Ontario, it is important that the lessons learned from past experiences and the issues and principles raised and discussed in these multi-stakeholder discussions are taken into account. This will increase the likelihood of designing good policies that protect biodiversity and habitat.

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Concerns related to the use biodiversity offsets in Ontario: Farmers, farming organizations, and conservation groups raised several concerns during telephone interviews conducted by Sustainable Prosperity as part of the research stage of this report. Although some of these are common to all groups involved, some concerns varied depending on the type of stakeholder group interviewed.

Concerns raised by conservation groups (not-for-profit conservation organizations, land trusts and conservation authorities):

- **Biodiversity offsets might not ensure a net gain:** Because provincial experience with biodiversity offsets is so new, there is still uncertainty regarding the final outcome of a restoration project. Some people interviewed were also concerned that most of the overall benefit permits issued to date have only required compensation at a 1:1 ratio, which may not be enough to minimize the uncertainty inherent to the creation and reconstruction of ecological functions and habitats. This is particularly relevant in Ontario since endangered species is a risky application of biodiversity offsets. When dealing with an endangered species, a like-for-like conservation approach may not be sufficient to guarantee an overall improvement in a species' population size and health.

- **Private landowners engaged in the provision of offsets may not carry out conservation projects appropriately:** Some conservation organizations worry that as private landowners increase their participation in biodiversity offset markets, the quality of the conservation projects will suffer as they do not have the necessary expertise to undertake these types of activities. However, in many cases agricultural associations and conservation authorities work closely with farmers and other landowners in the design, implementation, and monitoring of these projects. Regular measurement, monitoring and reporting of environmental outcomes can help lower this concern.

Concerns raised by farmers:

- **Offset duration and flexibility:** If a species at risk inhabits an area as a result of habitat restoration efforts the farmer may face additional restrictions under the *Endangered Species Act*. To mitigate this concern and encourage farmers' participation in biodiversity offsetting, Ontario Nature has been working with the provincial government, farmers, private landowners and conservation groups on drafting a safe harbour agreement where landowners have the option of undoing actions at a later date, without penalty. During the Ontario Nature workshops, there was consensus among farmers that this should be an option for offset providers but some individual participants suggested that these agreements should be limited with regard to species, sectors and circumstances for which they are used.[80]

Common Challenge:

- **Lack of market value:** Because there is no market value to guide negotiations regarding biodiversity offsets in Ontario, it is difficult to establish a price that will guarantee the best environmental outcome in the long-term. Offset providers in Ontario normally base their cost calculations on approximate rental values of the land where the offset will

80 Ontario Nature. 2014. Insights into Biodiversity Offsetting in Ontario http://www.ontarionature.org/discover/resources/PDFs/reports/Biodiversity_Offsetting_Ontario.pdf

take place and the cost of restoring and managing that land for the number of years specified under the overall benefit permit. However, it is difficult to anticipate what these costs will be and how they will vary throughout the lifetime of the project. There is also the related concern that some offset providers — particularly those that do not have an environmental goal as their organizational or business mission — might be willing to drive down the price of an offset in order to obtain funding at the expense of appropriate biodiversity conservation.

3.2 PAYMENT PROGRAMS

Programs in this section are classified as markets because they include payments in exchange for agreements to undertake activities that will protect or enhance biodiversity and habitat. This report identified twelve such programs in Ontario (see Table 8).

The table below shows that payment programs vary widely as funding comes from various sources — including private and public funds — and financial compensation is provided to conserve different types of habitat. Fund recipients also differ according to the payment program, but they usually include farmers, private landowners, aboriginal groups and not-for-profit organizations. In addition to funding biodiversity and habitat conservation, five out of these twelve programs also target water and watershed improvements and carbon sequestration through forestation (see the multiple ecosystem services category in the Methods Appendix).

Most of these payment programs are targeted to private landowners, creating an economic incentive for biodiversity and habitat conservation to take place beyond protected crown land. This is particularly important in Southern Ontario where there is little crown land due to historic high levels of population settlement. Financial incentives could thus play a significant role in encouraging stewardship on private land.

Four of these programs directly target agricultural lands. These programs present an interesting case where farmers are paid for the ecosystem services they produce as a result of changes to agricultural land-use practices. The premise underlying many of these programs is that farmers should not only be compensated for the food they produce but also for the multiple ecosystem services that are produced when farmers apply Best Management Practices.[81]

However, these payment programs — like water payment programs — are usually limited in both funds and time, which does not secure project continuity nor guarantee a positive impact in the long term.

81 Best Management Practices or BMPs has been defined by OMAFRA as "a practical, affordable approach to conserving a farm's soil and water resources without sacrificing productivity." Retrieved from http://www.omafra.gov.on.ca/english/environment/bmp/series.htm

BIODIVERSITY

Table 8. Biodiversity & Habitat Payment Programs

Name of payment Program	Funding Source	Recipient	Type of Habitat Being Enhanced or Protected
Ontario Species at Risk Stewardship Fund	Ontario Ministry of Natural Resources and Forestry	Multiple groups	Multiple Habitats (Species at Risk)
Ontario Species at Risk Farm Incentive Program	Ontario Ministry of Natural Resources and Forestry	Farmers	Multiple Habitats (Species at Risk)
Land Stewardship and Habitat Restoration Program	Ontario Ministry of Natural Resources and Forestry	Multiple groups	Multiple Habitats
Community Hatchery Program	Ontario Federation of Anglers and Hunters (OFAH), in partnership with the Ontario Ministry of Natural Resources and Forestry	Community hatcheries	Fisheries
Grassland Habitat Farm Incentive Program	Federal Government Through the Ontario Soil & Crop Improvement Association (OSCIA)	Farmers	Grassland Birds' habitat
ALUS (Alternative Land Use Services) (Ontario programs)	Multiple public and private donors through ALUS	Farmers	Agricultural Land
Ducks Unlimited Canada - Landowners' Wetland Restoration Program	Multiple public and private donors through Ducks Unlimited Canada	Private Landowners	Wetlands
Growing Forward	Federal Provincial governments	Farmers	Agricultural Land
Lake Simcoe/ South-eastern Georgian Bay Clean-up Fund	Federal Government	Multiple groups	Great Lakes/ Watersheds
50 Million Tree Program	Ontario Ministry of Natural Resources and Forestry	Private Landowners	Multiple habitats
Watershed Stewardship Activities under the Conservation Ontario umbrella	Local Municipalities through Conservation Authorities	Private Landowners	Watersheds
Great Lakes Guardian Community Fund	Ministry of the Environment and Climate Change	Community Groups	Great Lakes/ Watersheds

BIODIVERSITY

Featured Market: Alternative Land Use Services Program in Ontario

Alternative Land Use Services* (ALUS) started in Manitoba in 2006. Since then, it has expanded to various Canadian provinces, including Ontario where it has projects in Norfolk County, Grey-Bruce, Bayham and eastern Ontario. The program compensates farmers for the provision of ecological services from their land with the goal of creating a healthy landscape that sustains agriculture, wildlife, and natural spaces for all Canadians.

The program creates an opportunity to actively engage those who own and manage large amounts of land in Southern Ontario in addressing biodiversity and habitat degradation. Farmers receive payments to restore and conserve natural spaces such as wetlands, grasslands, riparian areas, and trees. The objective of these actions is to enhance life-supporting processes such as nutrient cycling, water filtration, carbon sequestration and wildlife habitat rehabilitation.

To date, this community-developed and farmer-delivered program has managed to engage over 200 farms and enrolled around 1500 acres of land in Southern Ontario. ALUS staff monitors all projects and third party organizations regularly conduct independent audits. Funding comes from multiple sources including provincial and federal government, private foundations and non-profit environmental organizations. Payments for individual projects are usually based on the average land rental rates in the region and agreements with farmers are made for three to five years. Total payments through this program in Ontario are usually under $300,000 per year.

Program managers are currently exploring the possibility of expanding its funding sources to individuals and organizations looking to purchase pollution reduction credits and biodiversity offsets. These could include organizations looking to voluntarily mitigate their environmental footprint, as well as developers and municipalities in need of compensating for negative impacts to species at risk. (See earlier section on biodiversity offsets.) ALUS would therefore expand from its current payment program structure to also provide a link between developers — looking to offset biodiversity losses — and farmers willing to supply these offsets for them.

*ALUS started as a vision of Keystone Agricultural Producers – Manitoba's largest farmer organization – and Delta Waterfowl Foundation. These two organizations proposed farmers get paid for providing ecological goods and services from their farms and that the projects be delivered through community based organizations.

3.3 GOING FORWARD

As Ontario's economy and population continue to grow, it is important that decision makers put in place the necessary, policies, guidelines and programs to help protect biodiversity. The use of environmental markets could help internalize the cost of biodiversity loss and the benefits of biodiversity protection into the decision-making process of policy makers, project developers and private landowners.

Ontario has experience valuing biodiversity protection through the use of payment programs, and more recently, it has also started to put a price on biodiversity loss through the use of biodiversity offsets for endangered species. There are some steps that can be taken right now to ensure that environmental markets for biodiversity really translate into a positive gain for nature:

- **Engage community and stakeholder groups:** With both payment programs and biodiversity offsets, it is important to ensure that as environmental markets for biodiversity move forward in Ontario, stakeholders and citizens are engaged in their development as well as in the design of related policies.

- **Build a strong knowledge base:** There is still need to better understand how biodiversity offsets can be used. Building a strong knowledge base could support continuous improvement of biodiversity offset policies, guidelines and structures. In late 2014, Sustainable Prosperity published a policy brief on biodiversity offsets where it proposed a 10-point research agenda. This research agenda was based on the contributions made by participants during the *Biodiversity Offsets Conference in Canada: Making it Right, Making a Difference* held in Ottawa in February, 2014. It provides a good starting base from which to initiate discussions regarding research priorities regarding biodiversity offsets.

- **Consider the use of biodiversity offsets beyond endangered species:** New and expanding urban centres can have a substantial negative impact on Southern Ontario's natural environment. The provincial government could explore the use of biodiversity offsets beyond endangered species as a tool to conserve biodiversity. There is an opportunity now, before development, to set biodiversity conservation goals and policies that address the environmental impacts of urban growth and land use change.

- **Continue studying the possibility of establishing a biodiversity offsets exchange platform:** This platform would link project developers with offset providers, lowering transactions costs for both parties. It could also be a useful way to establish a market value that could guide negotiations between buyers and sellers of offsets. Such platform could either be managed by the provincial government or by a third party.

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- **Explore the use of biodiversity banks:** Conservation banks are larger areas of protected land that serve to offset the loss of biodiversity elsewhere. The conservation project can be established in advance of a development project and the assessed and accredited offsets later be sold to developers who might require them in order to comply with a regulatory requirement. Biodiversity banks could help address concerns that the use offsets might not lead to an immediate net gain. These banks could avoid the temporary loss of biodiversity when a conservation project is not planned until a developer causes a negative impact to nature on another site. Such banks can also provide greater ecological benefits than multiple scattered offset plans. Conservation planners can select bank locations based on a broader land-use plan and biodiversity strategy.

CONCLUSION

This report shows that numerous environmental markets already exist in Ontario, varying in value and volume of trades, number and type of participants, environmental objective, geographic location, and stage of development. These markets either create a value for protecting and improving our natural environment or put a cost on activities that degrade the quality of Ontario's air, water or biodiversity. Some markets even provide benefits in more than one of these environmental areas such as the Growing Forward 2 and the 50 Million Tree programs. While some are well developed and look like traditional markets — with multiple buyers and sellers trading a commodity — others are simpler and take the form of payment programs.

Despite these differences, interviews with program operators highlighted the importance of three factors that can, not only boost the use of environmental markets as a policy tool, but also guarantee their effectiveness and robustness. The first one is the prerequisite to have a sound natural science understanding of the environment and human activity's impact as the base to any environmental market design. The second element is the need to engage all relevant stakeholders and provide avenues for collaboration; there is the need to build a common understanding of what these markets are — and what they are not — and how they can help achieve a more sustainable economic development. Finally, the development — and passing — of legislation to enable and encourage environmental markets is crucial to the expansion of these markets in Ontario.

Ontario's recent announcement regarding the development of yet another environmental market — a cap and trade system for GHGs — is commendable. The challenge now remains on getting the details right; the specific design choices made in the coming months will have a direct impact on the program's success (ensuring that the trading scheme delivers the necessary emissions reductions, but that it does this at the lowest cost to the overall economy). Luckily, Ontario has programs that it can look to for insight on what does and does not work.

This big move in carbon markets sets the stage for additional use of environmental markets. Ontario could build on this momentum and continue exploring the use of such markets in other environmental areas. Water quality trading is an obvious market mechanism to explore further. Successfully implemented markets like the South Nation River water quality trading program have demonstrated that these markets can reduce pollution levels while dramatically bringing down the cost of obtaining environmental objectives.

Similarly, there is an opportunity to consider the use of biodiversity offsets beyond endangered species. Along with other conservation policies, these can help mitigate biodiversity loss caused by urban development and increased economic activity. However, there is a foundational need for enhanced research on species and ecosystems to ensure that the policies supporting this market-based tool are stringent enough to protect Ontario's biodiversity.

In addition to established markets, there are opportunities for Ontario to further explore payment programs. Programs like the Ontario Species at Risk Stewardship fund and Ontario's ALUS have helped farmers and landowners recognize the value in conserving natural habitat and wetlands as these programs compensate them for protecting these natural environments.

This report thus finds that there is an untapped potential to use environmental markets more broadly in Ontario. Used in conjunction with other policies, environmental markets can help deliver desired environmental outcomes in a more flexible and cost-effective way.

METHODS APPENDIX

	Market Name[82]	Market Type	Value	Description	Objective	Methodology & Source
AIR & CARBON	Ontario Emissions Trading Registry	Established Market	NA	Ontario's Emissions Trading Regulations 397/01 and 194/01 cap sulphur dioxide (SO_2) and nitrogen oxide (NO) emissions from fossil-fuel power plants and seven industrial sectors. These regulations also enable allowance and credit trading of SO_2 and NO. Within each industrial sector, the Ministry of the Environment and Climate Change (MOECC) establishes a sub cap and allocates a set amount of emissions allowances to each facility.	To reduce smog and acid rain caused by the electricity and industrial sources.	Telephone communications with Ontario Power Authority and other regulated companies revealed that since the phase-out of coal powered operations, the value of allowances has significantly declined. Some representatives gave a $0 value for allowances. Others did not fully disclose the value allocated to their allowances but they admitted it was a very low value. The total allowances in 2013 were 47,928 Tonnes of NO and 36,1103 Tonnes of SO_2.http://www.oetr.on.ca/oetr/allowances/search_alloted_applications.jsp
	Renewable Energy Certificates	Established Market	NA	Renewable energy certificates (RECs) are a tradable commodity that represent proof that one megawatt-hour (MWh) of electricity was generated from a renewable energy resource. In Ontario, the market for RECs is exclusively voluntary. RECs retailers supply consumers seeking 100% renewable energy. Companies providing RECs from Ontario facilities include Bullfrog Power and Transalta.	To increase the level of electricity generated by renewable sources.	There is no publicly available information on the quantity and value of RECs traded in Ontario.
	Registered Carbon Offsets	Established Market	NA	A carbon offset or credit is a reduction in CO_2 emissions or other GHGs used to compensate for an emission released elsewhere. The market for offsets in Ontario is completely voluntary. Companies and individuals purchase carbon offsets as a way to lower their carbon footprint — or even become carbon neutral. There are 12 registered carbon offset projects in Ontario. The Canadian Standard Association (CSA) Clean Projects registry or the Verified Carbon Standard (VCS) registry list most large-scale voluntary Canadian carbon offsets.	To compensate for an emission released elsewhere by funding projects that help lower CO_2 emissions	It was impossible to determine the exact market size in Ontario as offset retailers could not disclose total sale values in the province due to confidentiality reasons. Similarly, it was difficult to estimate an average offset price as these vary widely depending on project type, vintage year, and location. By looking at the CSA and VCS clean projects registry, 12 active projects were identified in Ontario. http://www.csaregistries.ca/cleanprojects/masterprojects_e.cfm http://www.vcsprojectdatabase.org/#/home

82 For some markets, it was possible to obtain their value based on program reports, market participants or program operators. For others, its value was calculated by aggregating volume and price listed for individual trades or projects funded. However, for certain markets it was impossible to estimate their value as market participants are not obliged to publicly disclose their trading information. Where information is available, values cover the 2013 or 2013-2014 fiscal year. "

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
AIR & CARBON	Carbon Offsets (non-registered): Carbon Footprints to Forests	Established Market	NA	Voluntary carbon offsets. Ausable Bayfield Conservation Authority and Maitland Valley Conservation Authority have recently established a fund that enables donors to calculate their carbon footprint and then compensate for annual GHG emissions by planting trees. No values for 2013 because program was initiated at the end of 2014.	To Compensate for GHG emissions by planting trees.	Communication with Ausable Bayfield Conservation Authority.
	Carbon Offsets (non-registered) Rideau Valley CA Carbon Neutral Program	Established Market	$15,000	Voluntary carbon offsets. Since 2010 the Rideau Valley Conservation Foundation (RVCF) has operated a fund that enables donors to calculate their carbon footprint and then compensate for annual Greenhouse gas emissions by planting trees.	To Compensate for greenhouse gas emissions by planting trees.	Value provided by the Rideau Valley Conservation Authority (telephone communication).
WATER	South Nation River Total Phosphorus Management Trading System	Established Market	$0	The South Nation River watershed has a regulated water quality trading program; wastewater dischargers have the option to reduce their phosphorus loading by upgrading their treatment plants or offsetting discharges by purchasing reduction credits from non-point sources.	To improve the water quality of the South Nation River watershed through credit trading. Mainly reduce phosphorus levels in the watershed.	Value provided by the South Nation Conservation Authority (site visit and telephone communication).
	Lake Simcoe Phosphorus Offset Plan (Not yet launched)	Established Market	NA	Land developers in the watershed will purchase offsets generated by phosphorous load reductions achieved elsewhere in the watershed. Offsets will be generated by retrofitting existing urban storm water facilities in order to enhance nutrient removal performance. Eligible projects include installation of new water quality control structures, water quality control enhancements to existing structures and urban low impact development retrofits.	To improve the water quality of Lake Simcoe watershed through trading (primarily to reduce phosphorus levels in the watershed)	Communication with the Lake Simcoe Region Conservation.

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
WATER	Nottawasaga Valley Conservation Authority Nutrient Trading Program	Established Market	$70,000	The trading program is designed to offset additional phosphorus loadings from new residential developments in the town of New Tecumseth. The 3-year program will allocate approximately $950,000. An offset ratio of 4:1 is used for agricultural projects (I.e. 4kg of P per year must be removed by a non-point source agricultural project for every 1 kg of P released by the local municipality-point source) whereas as a ratio of 2:1 is used for stormwater management pond projects. These ratios were calculated by the University of Guelph based on an extensive literature review (higher ratios are usually calculated to account for nutrient-flow uncertainty in best management practices).	To improve the water quality of the Nottawasaga watershed through trading (primarily to reduce phosphorus levels in the watershed.)	Value provided by the Nottawasaga Valley Conservation Authority (Telephone communication).
	Ontario Landowner Environmental Assistance Program	Payment Program	$175,000	The Landowner Environmental Assistance Program (LEAP) provides landowners with funding and technical assistance for environmental projects on their land. LEAP is administered by the Lake Simcoe Region Conservation Authority and made possible by funding from municipal partners and the support of the York, Durham, and Simcoe chapters of the Ontario Federation of Agriculture.	To improve water quality of the Lake Simcoe watershed.	Lake Simcoe Region Conservation Authority's 2013 Annual Report. http://www.lsrca.on.ca/pdf/reports/annual_report_2013.pdf In 2013 the program supported 132 projects.
	Water's Edge Transformation Project (WET)	Payment Program	NA	This two-year program provides technical and financial support to farmers in the Lake Simcoe, Nottawasaga and Severn Sound watersheds to implement Best Management Practices that will help reduce the risk of nutrients entering fresh water sources. Funding is provided by the Ontario Ministry of Agriculture and Food and the program is delivered by the Ontario Soil and Crop Improvement Association.	To improve water quality of the Lake Simcoe watershed.	Value provided by the Ontario Soil and Crop Improvement Association (email and telephone communication).

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
HABITAT AND BIODIVERSITY	Species at Risk Overall Benefit – Compensatory Mitigation	Established Market	N.A	Third parties offset endangered species' habitat loss, resulting from specific development projects, in order to achieve an overall benefit to that species. Biodiversity degradation or loss caused by the development of one site will be compensated by an equivalent – or even greater – enhancement in another site.	To obtain an overall benefit in terms of biodiversity in Ontario.	Communication with the Ontario Ministry of Natural Resources and Forestry (telephone communication). No information available on the amount of money paid to third parties for undertaking compensatory mitigation. Offset providers do not publicly disclose this information.
	Ontario Species at Risk Stewardship Fund	Payment Program	$4,000,000	The Species at Risk Stewardship Fund promotes protection and recovery through stewardship activities. The fund is open to individuals and groups across Ontario, including: aboriginal communities, academic institutions, conservation authorities, farmers and landowners, individual businesses, industry organizations, municipalities and NGOs.	To protect and recover species at risk through stewardship activities.	Value provided by the Ontario Ministry of Natural Resources and Forestry (email communication).
	Ontario Species at Risk Farm Incentive Program	Payment Program	$302,727	A cost-share program available to farm businesses across Ontario. It provides funding for producers implementing Best Management Practices that enhance and protect natural spaces on farms, supporting sustainable production.	To protect and recover species at risk through stewardship activities in private farms.	Value provided by the Ontario Soil and Crop Improvement Association (email communication).
	Land Stewardship and Habitat Restoration Program	Payment Program	$250,000	An aboriginal organization, conservation organization, business, municipal government or NGO can get up to $20,000 in matching funds to implement a conservation project. Eligible projects include: stream restoration (e.g., fencing, shoreline planting), upland or terrestrial improvements (e.g., tree planting, windbreaks and corridors), wetland restoration (e.g., water control, plantings and excavation), invasive species control through mechanical or ecological means, or site modifications, and native species reintroduction.	To maintain and restore habitats that benefit fish, animals and/or plants.	Value provided by the Ontario Ministry of Natural Resources and Forestry (email communication).

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
HABITAT AND BIODIVERSITY	Community Hatchery Program	Payment Program	$144,580.02	Provide financial support to eligible community hatcheries and offer strategic and targeted support for Ontario's community fish culture and stocking efforts.	To improve health of fisheries.	Value provided by Ontario Federation of Anglers and Hunters (email communication).
	Grassland Habitat Farm Incentive Program	Payment Program	$397,864.47	The program offers funding to complete farm projects that will strengthen farmers' operations while also supporting grassland birds. Funding has been provided by the Government of Canada and is delivered by the Ontario Soil and Crop Improvement Association.	To restore and conserve grassland habitat for birds.	Value provided by the Ontario Soil and Crop Improvement Association (email communication).
	ALUS (Alternative Land Use Services) (Ontario programs)	Payment Program	$300,000	Farmers receive payments to restore and conserve natural areas such as wetlands, grasslands, riparian areas and trees. Funding comes from multiple sources including provincial and federal government, private foundations and non-profit environmental organizations.	To create a healthy landscape that sustains agriculture, wildlife and natural spaces.	Value provided by ALUS Ontario (telephone communication).
	Ducks Unlimited Canada: Landowners' Wetland Restoration Program	Payment Program	NA	Ducks Unlimited Canada delivers on-the-ground habitat conservation projects to protect, restore and manage wetlands. Payment programs operate on a cost-share basis (Ducks Unlimited cover 50%-90% of conservation projects).	To protect and restore wetland habitat.	Unable to obtain a value for payment services. (Telephone conversation with Ducks Unlimited).

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
MULTIPLE ECOSYSTEM SERVICES	Growing Forward 2	Payment Program	$1,400,000	Growing Forward is a federal-provincial-territorial initiative designed to encourage innovation, competitiveness and market development in Canada's agri-food and agri-products sector through cost share funding opportunities. In the 2013-2014 program year, Growing Forward 2 supported 77 projects on farms in the Environment and Climate Change focus area, representing $1.4 million in government funding contribution. Environment and Climate Change was the most popular of the six focus areas, with 44 per cent of the total projects funded. Through cost-share funding to improve manure management, cover crops and erosion, nutrient recovery, fuel storage, irrigation water efficiency, water well management and habitats, producers can improve their overall environmental performance related to air and soil quality, water quality and quantity and biodiversity.	To support and protect Ontario's water, soil, air, and biodiversity environmental resources.	Value provided by the Ontario Soil and Crop Improvement Association (email communication).
	Lake Simcoe/ South-eastern Georgian Bay Clean-up Fund	Payment Program	$630,000	Funded by Environment Canada. The fund provides support to community-based projects focused on priority areas such as reducing phosphorous inputs from urban and rural sources, restoring fish and aquatic wildlife habitat, and addressing nearshore toxic and nuisance algae growth.	To reduce phosphorous inputs from urban and rural sources, restore fish and aquatic wildlife habitat, and address nearshore toxic and nuisance algae growth.	Communication with Environment Canada's Ontario Regional Director General's Office and information on website.

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
MULTIPLE ECOSYSTEM SERVICES	50 Million Tree Program	Payment Program	$4,050,000	Trees Ontario and the Ontario Ministry of Natural Resources and Forestry have partnered to plant 50 million trees by 2020. Landowners wanting to plant one hectare or more can receive up to 75% in financial incentives for their planting projects.	To sequester carbon; enhance and diversify southern Ontario's landscape; increase adaptive capacity to withstand climate change; moderate local climate by providing shade, moderating temperature extremes and reducing the effects of storms; increase wildlife habitat; increase soil and water conservation, and provide local economic opportunities.	Value provided by Trees Ontario (telephone communication).
	Watershed Stewardship Activities under the Conservation Ontario umbrella	Payment Program	NA	Conservation Ontario is the network of 36 Conservation Authorities that deliver services and programs that protect and manage water and other natural resources in partnership with government, landowners and other organizations. Many of these conservation authorities operate payment programs to help landowners and farmers protect and improve the health of the watersheds where they live. Funded projects include tree plantings activities, best management farming practices, retrofitting septic tanks, and shoreline restoration.	To Improve water quality, protect and restore wildlife habitat and improve health of watersheds.	Value(s) for most recent year(s) (2013 or 2014) was not available.

	Market Name	Market Type	Value	Description	Objective	Methodology & Source
MULTIPLE ECOSYSTEM SERVICES	Great Lakes Guardian Community Fund	Payment Program	$1,350,450	As part of Ontario's Great Lakes Strategy, the Great Lakes Guardian Community Fund was set up to help people take action to protect and restore their corner of the Great Lakes. Funded projects include: strengthening riverbanks to reduce erosion, restoring wetlands to manage storm water runoff, building fences to keep livestock out of waterways, helping property owners maintain septic systems, youth planting native grasses to restore sand dunes, rehabilitating coastal wetlands by restoring fish habitats, organizing community events to clean-up shorelines, restoring wetlands using traditional ecological knowledge, among others.	To protect water quality, habitat and species, as well as improve wetlands, beaches and coastal areas.	Value from Ontario Ministry of the Environment: Great Lakes Guardian Community Fund Recipients (Data for 2012 and 2013) https://www.ontario.ca/environment-and-energy/great-lakes-guardian-community-fund-recipients Only projects that had a direct impact on environment were included in the calculations.

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