Making Trades

An Ontario study finds that water quality trading is feasible.

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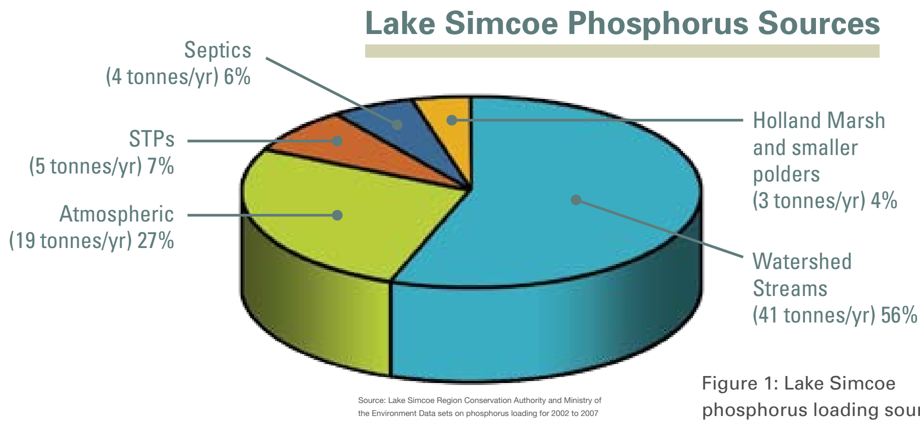

Figure 1: Lake Simcoe phosphorus loading sources.

WATER QUALITY TRADING could become a reality in the Lake Simcoe watershed if the provincial government decides to develop a water quality trading regulation following consultations on a recent report posted on Ontario's Environmental Bill of Rights registry. The report, which was commissioned to fulfil a commitment under the Lake Simcoe Protection Plan (Government of Ontario, 2009), concluded that water quality trading (WQT) is a feasible approach for cost-effectively reducing phosphorus loadings in the Lake Simcoe watershed.

WQT is a market-based approach to pollution control, in which pollutants are treated as commodities and economic incentives in the form of price and quantity controls on regulated pollutants are used to achieve environmental improvements (UNEP, UCCEE and UNCTAD, 2002). Specifically, dischargers that reduce their pollutant loadings below required levels can sell surplus reductions, called credits, to other dischargers that need to make reductions to meet compliance requirements, but who face much higher costs to achieve required reductions. The credits take on a monetary value, and it is the buying and selling of pollutant credits among dischargers to achieve an overall net reduction in loading that is the essence of WQT. For example, a sewage treatment plant (STP) facing high costs to accommodate new growth or meet lower discharge limits under a Certificate of Approval can "trade" for discharge reduction credits that are voluntarily generated by another source having lower costs, such as an agricultural operation implementing conservation practices.

WQT provides a way for dischargers that cannot realistically reduce pollutant loads immediately to comply with pollutant reduction goals in the short term, allowing time for long-term solutions to be developed. Only overall pollution control performance is measured; no specific technology is prescribed. As a result, WQT has the potential to encourage innovations in pollution management and technology.

The jurisdiction with the most WQT experience is the United States, where pollutant trading started with the Acid Rain Program for sulphur dioxide. According to the U.S. Environmental Protection Agency (EPA), the annual benefits of the Acid Rain Program are estimated at US$122 billion and costs at US$3 billion (in 2000 dollars) for the year 2010, which translates to a 40:1 benefit-cost ratio (U.S. EPA, 2009). In addition, there has been a marked improvement in air pollution control technology. This is not unexpected, since the driving force behind almost all innovation is cost savings (Environmental Defence, 2000). Based on the success of the Acid Rain Program among others, U.S. policy makers decided to apply emissions trading to water pollution control. WQT programs have successfully operated in a number of U.S. states, including Pennsylvania, Minnesota, and Connecticut.

Ontario also has experience with WQT through the Total Phosphorus Management Program operated in the South Nation River watershed. This program was introduced in 1998 to reduce discharges on a river system with total phosphorus levels many times higher than the Province's Water Quality Objectives/Guidelines. Pollutant trades take place between point sources (credit buyers are municipal STPs) and non-point sources (credit sellers are in the agricultural sector). The program was built around an existing cost-shared program and is delivered by the local Conservation Authority. The agricultural community is actively involved in delivering what's considered to be one of the most successful WQT programs in North America.

Lake Simcoe faces the same issue as the South Nation River—phosphorus levels are too high and will continue rising without significant intervention.

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Figure 1 shows phosphorus inputs to Lake Simcoe.

STPs, urban runoff, agricultural runoff and polder water collectively represent more than 66 per cent of the loadings, which total about 72 tonnes per year. Even though this loading is almost 30 per cent lower than phosphorus loadings measured in the 1980s, scientists believe 72 tonnes per year is still too high to support a self-sustaining cold water fish community, which is the suggested indicator of ecosystem health and stability for Lake Simcoe (LSSAC, 2008).

Furthermore, the lake continues to face growing pressures from an increasing human population, climate change, and other factors. The Lake Simcoe Protection Plan calls for total phosphorus inputs to Lake Simcoe to be lowered to approximately 44 tonnes per year over the long term. This level includes phosphorus from both current sources and from future population and employment growth, which is expected to be significant (Ontario Ministry of Public Infrastructure Renewal, 2006). Recognizing the challenge inherent in achieving this level of reduction, the Lake Simcoe Protection Plan identified the need for consideration of innovative solutions, including WQT.

Three measures were used to test the feasibility of WQT for application to the Lake Simcoe watershed: extensive knowledge about phosphorus loadings and behaviour; existence of incentives to encourage trading; and, presence of dischargers that would incur high costs to reduce pollution, and dischargers that would be able to cost-effectively reduce the phosphorus discharges. All three conditions are needed for WQT to be feasible.

Knowledge about phosphorus inputs to Lake Simcoe is based on 40 years of monitoring data and modelling results. The watershed is home to an extensive monitoring network, including 19 stations that monitor inflowing tributaries and the lake's outflow, six atmospheric deposition collectors, two full meteorological stations, ten open lake monitoring stations on Lake Simcoe, three monitoring stations in the mouth of the Holland River, and three monitoring stations at municipal water treatment plant intakes. Numerous studies have been conducted, most recently assimilative capacity studies that produced an extensive dataset with information about tributary loadings, the comprehensive CANWET loading analysis model, and other water quality and circulation modelling tools (Lake Simcoe Region Conservation Authority, 2006). The result is that phosphorus sources and amounts are relatively well known and understood. It is this assessment of loads and phosphorus behaviour that underpins the scientific knowledge vital to support any WQT endeavour and is necessary to be able to define the units of pollution that could potentially be traded.

The main incentive to participate in WQT is the need for dischargers to meet regulated requirements. Thus, government regulation is a main driver. In the case of Lake Simcoe, the Ontario government is proposing to further strengthen the regulation of phosphorus discharges from STPs and runoff from new urban development. In the case of STPs, strict phosphorus effluent limits and loading caps are proposed for the municipal and private STPs in the watershed. For runoff, requirements to create "phosphorus neutral" new development are proposed. Lower phosphorus loadings will be expected from the other sectors as well, namely existing urban runoff, rural and agricultural sources, and polders, but the Ontario government is not currently planning new regulations for these sectors. Instead, other incentives such as stewardship programs are planned. Thus, for the Lake Simcoe watershed, a combination of regulatory and non-regulatory incentives will be in place, and these can provide the motivation for trading in phosphorus credits.

A phosphorus reduction strategy (PRS) is proposed to achieve planned loading reductions while accommodating future growth (Government of Ontario, 2010). The proposed PRS calls for a decrease in phosphorus loadings to Lake Simcoe based on proportional reductions from all sectors, using current loadings as the baseline. For example, STPs currently contribute over five tonnes per year, equivalent to 7.3 per cent of the total phosphorus loading. Over the long term, the STP sector will be required to reduce phosphorus loadings to 7.3 per cent of 44 tonnes per year, or 3.2 tonnes per year. Existing research, however, suggests that relying on today's technology alone to reduce phosphorus loadings from STPs would be very costly. And this was borne out by a life-cycle cost analysis. The estimated life-cycle cost for STPs to comply with the strict phosphorus limits could be as high as $185 million. This translates to a cost of up to $13,100 per kilogram of phosphorus. For runoff from new urban development, the life-cycle costs of technology based compliance were estimated to be even higher, at $389 million, or $1,800 per kilogram of phosphorus.

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In contrast, reducing phosphorus from other sectors is anticipated to be less costly. Life-cycle cost estimates for retrofitting existing stormwater facilities, implementing agricultural best management practices, and treating polder water range from $170 to $1,700 per kilogram of phosphorus. The difference in costs between the sectors demonstrates there are dischargers that would incur high costs to reduce pollution, and dischargers that would be able to cost-effectively reduce the phosphorus discharges.

Based on the conclusions in the report, WQT is a feasible option for the Lake Simcoe watershed. WQT, if implemented, would result in more than just lower phosphorus loadings. Technology and best management practices aimed at reducing phosphorus loadings to Lake Simcoe will also reduce other pollutants. Additional environmental benefits, such as restored wildlife habitat, reduced sedimentation, and wetland creation, could also result. Trading would require ongoing collection of water quality data, which could in turn be used throughout the Lake Simcoe watershed by other organizations and for other projects and programs. The money saved, in the form of reduced compliance costs for regulated dischargers to meet phosphorus limits and the relatively more cost-effective and environmentally sustainable operations that accrue to agricultural operations and rural landowners that implement best management practices, could be used to support other water quality initiatives in the Lake Simcoe watershed.

Even though WQT in the Lake Simcoe watershed is feasible, this does not mean that a program will be developed; only that one could be, because the elements that are needed to operate a trading program are present. A decision on WQT in the Lake Simcoe watershed is pending, and is expected once the EBR posting period is over and comments and submissions have been reviewed. WC

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