

Summary of Recent Canadian Literature on Water Pricing

Introduction

The idea of water pricing has exploded in popularity in recent years—particularly in water-stressed regions in western Europe, the southwest US, Mexico and Australia. In Canada, the discussion over water pricing has tended to ebb and flow. In conjunction with an emerging international interest in water pricing in the late 1980s and early 1990s, there was discussion of water management and pricing at the national level in Canada. This led to the tabling of the 1987 *Federal Water Policy*. This policy initiative—while never implemented—did include pricing principles. The federal government continued to explore the matter of pricing with a particular emphasis on the municipal sector. In 1993, for example, the federal Water Planning and Management Branch of Environment Canada published its *Guidelines for Municipal Pricing*. The idea of water pricing has once again begun to attract more interest, particularly in regions of the country confronted with water supply challenges such as southern Alberta and the interior of British Columbia.

The Value of Water

Research has been undertaken to define and determine the value of water to the Canadian economy (Muller 1985). The value of water can be defined as what users are willing to pay in order to maintain their access to current water sources as opposed to losing that access and having to replace it with an alternative source. Water withdrawals in Canada are heavily concentrated in agriculture, electric power generation, municipal water and wastewater services and four manufacturing and processing areas (chemicals, petroleum, pulp and paper and primary metal extraction). These seven activities account for 13% of GDP, 9% of employment, 92% of water intake and 90% of all water consumption. Based on

these data, Muller concluded that the contribution of water to the Canadian economy in 1985 was in the range of \$7 billion to \$23 billion annually, or between 2% and 5% of GDP.

More recent work in this area has concluded that, in 2005, the annual contribution of the value of water to the Canadian economy was \$7 billion to \$19 billion (Renzetti 2005). Such efforts to pinpoint the value of water are, however, challenging. There are difficulties in establishing the value of water and this hinders comparisons and efficient water allocation. High quality water use data in Canada is lacking as well as information on the value of water. Both of these lag behind our scientific knowledge about the state of the resource (Dupont and Renzetti 2010). But, if the value of water is not measured, errors in decision-making regarding water can be expected. The areas in which we know the least are in-stream uses, the value of water in petroleum production and the costs of water contamination. All of this raises concerns over the sustainability of water use in Canada, particularly considering forces that are pushing Canada in the direction of less reliable water supplies. These forces include climate change, increasing water demand due to population growth, an expanding economy and a recognition that the environment also needs sufficient supplies of water. In short, growing water scarcity in Canada is a likely future scenario.

Pricing in the Municipal Sector

Much of the focus on water pricing research in Canada has focused on the municipal sector. The result is a rich body of literature on the state of Canada's water infrastructure and municipal water use and pricing patterns. Economists have long criticized municipal water pricing practices for ignoring well-articulated theoretical models of more efficient pricing strategies (Renzetti 1992a). Municipal water prices charged to residential and commercial users are only 37% of the estimated marginal cost of water supply (Renzetti 1999a). The average water price for residential customers in Canada is \$0.32 per m³

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while the estimated marginal cost is \$0.87 per m³. Likewise, the average price charged for wastewater service is only 66% of the estimated marginal cost of collection and treatment.

Prices in the municipal sector tend to be inefficient because of a lack of metering and because the focus remains on raising revenues to keep water operations solvent as opposed to pursuing the efficient use of water (Renzetti 1999a). Prices are not sensitive to distance or time of use, even though water supply costs vary with distance and peak periods of output. Further, the cost accounting of many municipal water suppliers is incomplete. Operating and capital costs are typically underestimated, depreciation of the capital stock is not tracked, no value is assigned to the raw water input and the external costs to the environment associated with water taking and release of effluent are not included. The idea of full cost accounting has emerged to address these challenges, but there is disagreement with how to define the concept. Few estimates exist, the impacts are not clear and there are difficulties with adding in the external social and environmental costs of water provision. Still, an intentional move to marginal cost pricing with an annual connection fee to recoup any revenue loss is a policy option worth considering.

Pricing in the Commercial, Industrial and Agricultural Sectors

The absence of a substantial amount of literature on the state of industrial and agricultural water pricing in Canada is notable, demonstrating that the nation is in the early stages of exploring pricing regimes for efficient water allocation and management. Although the water pricing in the municipal context is important, relatively little literature can be found on water pricing in the agricultural and industrial sectors. Yet, it is still widely suspected that better pricing in these sectors could yield positive benefits. For example, industrial water use has four components—intake, treatment, recirculation and discharge. The use of economic incentives like effluent fees or raw water pricing may be effective in encouraging firms to reduce total water use and increase water re-use, re-cycling and re-circulation (Renzetti 1992b).

WAVE OF THE FUTURE

In “Wave of the Future” Steven Renzetti argues that municipal water agencies have used pricing as a way to generate revenue and have ignored the role that pricing can play in signaling water scarcity, demonstrating the costs of providing water and encouraging more efficient water use. He argues that both economic theory and empirical evidence show that reforming water prices through expanding the use of water meters, moving to a full-cost accounting approach and implementing seasonal surcharges would all better reflect the marginal costs of water use and would be a huge step forward.

According to Renzetti, the consequences of mispricing water are significant. They include excessive consumption, over-extended infrastructure and diminished water quality. Researchers have been noting this for the past 30 years, but little has changed. A serious backlog of necessary infrastructure investment exists, Canadians still do not know exactly how much water is consumed, up to one-quarter of residential customers in Canada remain unmetered and water utility revenues represented only 70% of recorded expenditures in 2007. Even the recorded expenditures themselves tend to understate the real cost of providing water. For example, the capital costs of providing water are undervalued, there is no charge for the raw water that is taken and there is no accounting for the environmental costs of water use. In Canada, most municipal systems are still based on a flat rate pricing regime rather than a volumetric regime. And commercial and industrial water that is self-supplied is often under charged or not charged for at all.

Renzetti argues that there is no reason why Canada should be the cheapest supplier of water in the world. The technology required to supply water and treat wastewater is the same as in other developed countries. The Canadian climate and Canada’s low population density would seem to imply that we should have higher than average water prices. As a remedy, Renzetti argues for pursuing a pricing strategy marked by full cost accounting—setting a price that includes all the costs of supplying water. This would include an accurate accounting of all operating and capital costs, regulatory costs, opportunity costs and environmental costs. The charge for water should also be marginal—reflecting the costs of supplying one more unit. Prices should also vary by location and time of consumption. This approach will stimulate a more efficient use of water.

Source: Renzetti, Steven. 2009. “Wave of the Future: The Case for Smarter Water Policy.” *Commentary*. 281. CD Howe Institute.

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It is generally acknowledged that data on water use in the commercial, industrial and agricultural sectors are sparse and that more research is needed on water valuation and the role of water in Canada's economy. In the case of the industrial sector, for example, Canada does have a robust knowledge of industrial water use. Statistics Canada's *Industrial Water Use Survey* is considered to be one of the most comprehensive surveys in the world. Yet, information is lacking on the valuation of water by industry and the potential effects of water pricing on industrial competitiveness. Canada's water research community is vibrant and there are a variety of new initiatives underway to address this gap and increase the spectrum of water pricing literature. Examples include new initiatives such as the *Blue Economy Initiative* of the Walter and Duncan Gordon Foundation and the *Water Pricing Project* of the Canada West Foundation.

New Research and Policy Initiatives

Across the water policy community, new initiatives and research projects continue to emerge at a rapid pace. The following initiatives are just a sample of the new work that is underway.

The POLIS Project: In *Worth Every Penny: Conservation-Oriented Water Pricing in Canada*, the argument is made that "conservation-oriented" pricing should be pursued across Canada. Conservation-oriented pricing is a rate structure adopted by water service providers where costs are fully recovered. Inevitably, society has to pay for the infrastructure and services that store, treat and distribute water, yet Canadians typically pay for only a portion of these costs through regular water bills. A better approach—environmentally and economically—is to begin charging households and businesses for the real costs of water services. Most people and organizations will change their behaviours simply because they recognize that conservation will save them money. The price charged for water services should: 1) generate enough revenue for water service providers to cover the full cost of services including infrastructure maintenance and replacement; 2) signal the actual costs of supplying water and provide a financial incentive for customers to use it more efficiently; and 3) promote innovation by encouraging engineers, inventors and investors to develop more water-efficient practices and technologies. Preconditions for a progressive pricing system are individually metered water connections coupled with a volumetric charge where users pay

for the amount of water they use. Rates should be sufficiently high to influence decisions about water use and the purchase of water-efficient appliances and fixtures.

The Blue Economy Initiative: This is a collaborative effort of the Walter and Duncan Gordon Foundation, the Canadian Water Network and the Royal Bank of Canada. The purpose of the initiative is to provide information to Canadians and key decision-makers about the economic benefits of protecting Canada's freshwater and the economic risks of neglecting the health of watersheds. The larger goal is to create increased support for sustainable water management in Canada by addressing questions that so far remain unanswered. What is the value of protecting and restoring aquatic ecosystems? Can we decrease healthcare costs by reducing water pollution? Can we enhance agricultural productivity to help address the global food crisis while ensuring responsible water use? How can cities tackle the costs imposed by climate change with new and innovative forms of water infrastructure? What is the competitive advantage of Canada's relative water abundance compared with the rest of the world?

Financial and Market-Based Instruments for Sustainable Water Management: In 2010, the Alberta Water Research Institute (AWRI) produced a series of studies on how financial and market-based mechanisms such as water pricing and a regulated exchange for the trading of water use licenses could relieve water supply challenges in southern Alberta. The project resulted in the publication of numerous papers.

New Provincial Water Strategies: Across Canada, many provincial governments are stepping up attempts to secure better policies and practices for managing provincial water resources. The result has been a bevy of policy documents designed to stimulate discussion and more sustainable water use. While all of the recent documents do not necessarily emphasize valuation of water or water pricing as a key determinant of successful policy, some of them clearly do push in that direction. A sampling of new provincial strategies include *Living Water Smart* (Government of British Columbia 2010); *The Water Act Modernization Policy Proposal*; *Water for Life Strategy*; *Water for Life Renewal*; *Conserving our Water: A Water Conservation Plan*; *The Manitoba Water Strategy*; *Ontario Water Strategy*; *The Water Policy*; and *Water for Life: Nova Scotia's Water Resource Management Strategy*.

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A Strong Regional Focus

The great majority of water pricing literature in Canada is regionally focused, with the exception of various calls for a national water strategy, certain theoretical papers (Pearse 2002), and basic water primers (Policy Research Initiative 2005). As noted above, there is significant literature emerging on the current water supply situation in Alberta—specifically southern Alberta. Alberta continues to serve as a useful case study. Strides are being made in literature focused on Ontario as well, although much of this literature is a response to recent legislative changes. There is a lack of literature on water pricing on a pan-Canadian level. This largely reflects the fact that water management in Canada remains an area of provincial jurisdiction and water challenges differ from province to province as well as between certain regions within the provinces.

The Canada West Foundation has published research exploring Canadian water policy with a strong emphasis on urban water issues (McFarlane and Nilsen 2003), assessing the current state of regional water in the largest western Canadian city regions (McFarlane 2003), examining municipal water conservation policies and practices (Roach, Huynh and Dobson 2004) and identifying water conservation options that can potentially reduce demand (Wilkie 2005). A recent Foundation report explores the state of public opinion in western Canada on water issues (Roach and Sommerfeld 2011). A survey of 1,200 westerners revealed that 45% are concerned about the long-term supply of freshwater, and almost 60% are willing to pay more if it results in water conservation.

Conclusion

As demonstrated by this brief literature review, the idea of including more accurate and rational water pricing as a key component of water management is becoming a widely accepted principle across the water community. Most academics—and in particular economists—agree that water should be priced according to its value in order to encourage conservation and better ensure efficient use of the resource. The means of reaching that end, however, are widely debated. To be sure, further research is required on water pricing in terms of the industrial and agricultural sectors. Additionally, before more progress can be made on pricing, a better understanding of Canada's water inventory is required. More than a few information gaps remain to be filled.

For more information and to access the Canada West Foundation's water policy research visit: www.cwf.ca

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REFERENCES

- Adamowicz, W.L.; Percy, David; and Weber, Marian. 2010. *Alberta's Water Resource Allocation and Management System: A Review of the Current System and Evaluation of Sustainability Within the Framework*. Report prepared for the Alberta Water Research Institute's (AWRI) project on Financial and Market-Based Instruments for Sustainable Water Management. Alberta Water Research Institute.
- Blue Economy Project*. 2011. Walter and Duncan Gordon Foundation.
- Council of Canadian Academies. 2009. *The Sustainable Management of Groundwater in Canada*.
- Dupont, Diane and Renzetti, Steven. 2009. Measuring the Technical Efficiency of Municipal Water Suppliers: The Role of Environmental Factors. *Land Economics*. Volume 85, Issue 4. Pages 627-636.
- Dupont, Diane and Renzetti, Steven. 2010. *The Value of Water: Understanding the Contribution of Water to the Canadian Economy*. (Draft Final Report.) Report commissioned by the Canadian Water Network and the Walter and Duncan Gordon Foundation.
- Environment Canada. 1987. *Federal Water Policy*.
- Environment Canada: Water Planning and Management Branch. 1993. *Guidelines for Municipal Pricing*.
- Gibbins, Roger and Zehnder, Alexander. 2010. *Toward a Unique Solution: Sustainable Management of Alberta's Water Resources*. Report prepared for the Alberta Water Research Institute's (AWRI) project on Financial and Market-Based Instruments for Sustainable Water Management. Alberta Water Research Institute.
- Government of British Columbia. 2010. *Living Water Smart*.
- Government of British Columbia. 2011. *Water Act Modernization Policy Proposal*.
- Government of Alberta. 2003. *Water for Life Strategy*.
- Government of Alberta. 2008. *Water for Life Renewal*.
- Government of Manitoba. 2003. *Manitoba Water Strategy*.
- Government of Saskatchewan. 2005. *Conserving our Water: A Water Conservation Plan for Saskatchewan*.
- Government of Ontario. 2010. *Ontario Water Strategy*.
- Government of Quebec. 2002. *Water Policy*.
- Government of Nova Scotia. 2010. *Water for Life: Nova Scotia's Water Resource Management Strategy*.
- Guelph Water Management Group. 2007. *Characteristics of Water Allocation Systems in Canada*. University of Guelph.
- Horbulyk, Theodore. 2010. *Water Pricing: An Option for Improving Water Management in Alberta*. Report prepared for the Alberta Water Research Institute's (AWRI) project on Financial and Market-Based Instruments for Sustainable Water Management. Alberta Water Research Institute.
- McFarlane, Susan. 2003. *Regional Water Works: Sharing Urban Water Services*. Canada West Foundation.
- McFarlane, Susan and Nilsen, Erik. 2003. *On Tap: Urban Water Issues in Canada*. Canada West Foundation.
- Muller, Andrew. 1985. "The Value of Water in Canada." *Canadian Water Resources Journal*. Volume 10, Number 4. Canadian Water Resources Association.
- Pearse, Peter. 2002. "Pricing as an Instrument for Water Conservation." *Water and the Future of Life on Earth*. Chapter 15.1. Edited proceedings from a workshop and think tank, May 22-24, 2002.
- Policy Research Initiative. 2005a. *Economic Instruments for Water Demand Management in an Integrated Water Resources Management Framework*.
- Policy Research Initiative. 2005b. *Market-Based Instruments for Water Demand Management II: Water Markets*.
- Policy Research Initiative. 2005c. *Do European Water Abstraction Taxes Affect Competitiveness?*
- Policy Research Initiative. 2005d. *Exporting Canada's Water I: Outside of NAFTA*.

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POLIS Project on Ecological Governance. 2010. *Worth Every Penny: A Primer on Conservation-Oriented Water Pricing*. POLIS Project. University of Victoria.

Renzetti, Steven. 1992a. "Evaluating the Welfare Effects of Reforming Municipal Water Prices." *Journal of Environmental Economics and Management*. Volume 22, Issue 2. March 1992. Association of Environmental and Resource Economists.

Renzetti, Steven. 1992b. "Estimating the Structure of Industrial Water Demands: The Case of Canadian Manufacturing." *Land Economics*. Volume 68, Issue 4. Pages 396-404.

Renzetti, Steven. 1999a. *Municipal Water Supply and Sewage Treatment: Costs, Prices, and Distortions*. Department of Economics, Brock University.

Renzetti, Steven. 1999b. "An Assessment of the Impact of Charging for Water Use Permits." *Canadian Public Policy*. Volume 25, Issue 3. Pages 361-378.

Renzetti, Steven. 2004. "Full Cost Accounting for Water Supply and Sewage Treatment: Concepts and Case Application." *Canadian Water Resources Journal*. Volume 29, Number 1. Canadian Water Resources Association.

Renzetti, Steven. 2005. "A Review of Determining the Economic Value of Water: Concepts and Methods." *Environmental and Resource Economics*. Issue 32. Pages 439-441. European Association of Environmental and Resource Economists.

Renzetti, Steven. 2009. *Wave of the Future: The Case for Smarter Water Policy*. Commentary Number 281. CD Howe Institute.

Roach, Robert; Huynh, Vien; and Dobson, Sarah. 2004. *Drop by Drop: Urban Water Conservation Practices in Western Canada*. Canada West Foundation.

Roach, Robert and Sommerfeld, Larissa. 2011. *Water Worries: Western Canadian Opinions Toward Paying More for Water*. Canada West Foundation.

Sandor, Richard; Walsh, Michael; and O'Hara, Jeffrey. 2010. *The Potential Benefits of an Organized Exchange for the Sustainable Use of Water in Alberta*. Report prepared for the Alberta Water Research Institute's (AWRI) project on Financial and Market-Based Instruments for Sustainable Water Management. Alberta Water Research Institute.

Statistics Canada. 2010. *Industrial Water Use Survey (IWS)*.

Vander Ploeg, Casey. 2010. *From H₂O: Turning Alberta's Water Headache to Opportunity*. Report prepared for the Alberta Water Research Institute's (AWRI) project on Financial and Market-Based Instruments for Sustainable Water Management. Alberta Water Research Institute.

Wilkie, Karen. 2005. *Balancing Act: Water Conservation and Economic Growth*. Canada West Foundation.