Sustainable Prosperity

PRICE WORKS

Toronto's Water Policy and Water Consumption Decline

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Sustainable Prosperity's **Price Works** series features research showing how environmental price reform can work to provide both economic and environmental benefit to Canadians.

Sustainable Prosperity is a national research and policy network, based at the University of Ottawa. SP focuses on market-based approaches to build a stronger, greener, more competitive economy. It brings together business, policy and academic leaders to help innovative ideas inform policy development.

Canadian municipalities are continually seeking ways to address high water infrastructure costs while encouraging water conservation behaviour. New research shows that pricing water could help municipalities realize these objectives simultaneously.[1] As prices for water use increased in Toronto by 6% to 10.8% over the last decade, residential water use declined by 24% on a per capita basis during the same time period.[2] The research concludes that the price of water can have an impact on residential water consumption, and that water pricing is an effective tool for achieving water conservation goals.

Water Conservation in Canada

In light of environmental concerns and infrastructure costs, water management continues to be a priority for many Canadian municipalities. While Canada has one of the largest renewable supplies of water in the world, Canadians are also among the highest per capita water users.[3] High water consumption is a concern not only because of resulting ecological implications, but for municipalities who must invest in water infrastructure and have a responsibility to provide water services to urban residents and businesses.

Costs of Water Consumption

Even though water is considered a renewable resource, pressure on Canada's freshwater resource is growing.[4] As water resources decrease, it is becoming clear that water is not a free good. The costs of overconsumption can be measured in a number of ways. Water use stresses existing water and sewage infrastructure, and municipalities are already concerned with the high costs of maintaining and replacing aging infrastructure. For example, recent estimates cite Canada's municipal water infrastructure deficit at more than $80 billion.[5] Other costs municipalities face are costs of treating and removing polluted wastewater from freshwater sources. Excessive consumption has significant ecological costs, such as the loss of ecosystem services that nature provides for free.

1 This Research Note is based on the conclusions from the Master's thesis entitled: Price Works: Seasonality and Determinants of Toronto's Amazing Decline in Water Demand by Jeff Bennett, Department of Economics, University of Ottawa. Available at: http://sustainableprosperity.ca/dl1060

2 Note: further study needs to be conducted to measure a direct causal link between these two variables.

3 Organization for Economic Co-operation and Development (OECD). (2001). Environmental Indicators: Towards Sustainable Development. Paris.

4 World Wildlife Federation. (2011). Canada's Rivers at Risk: Environmental Flows and Canada's Freshwater Future. Retrieved from http://awsassets.wwf.ca/downloads/wwf_rivers_risk_2011.pdf

5 Canadian Construction Association, the Canadian Public Works Association, the Canadian Society for Civil Engineering, and the Federation of Canadian Municipalities. (2012). 2012 Canadian Infrastructure Report Card. Retrieved from http://www.canadainfrastructure.ca/downloads/Canadian_Infrastructure_Report_Card_EN.pdf

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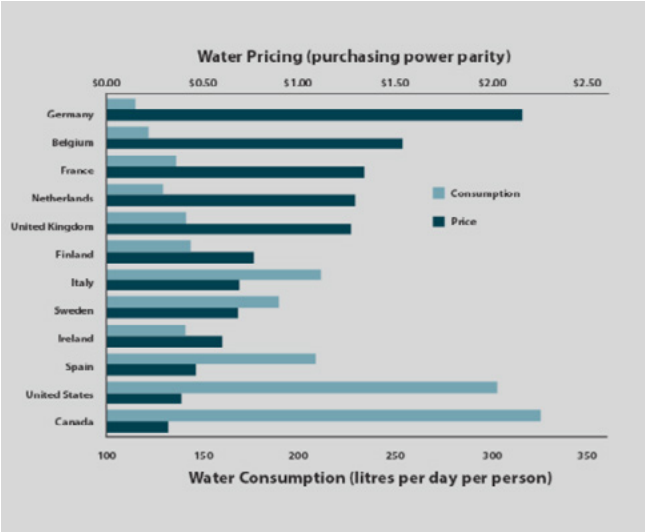
Currently, Canadians pay relatively little for the water they use, yet consumption remains high when compared to other international jurisdictions (Figure 1).[6]



Canadians have some of the highest rates of water use, yet the lowest rates of water pricing. Low water prices offer an implicit subsidy and an incentive to use water unsustainably.[7] Removing the implicit subsidies through appropriate water pricing can be an effective tool to both encourage conservation and help balance municipal finances.

Toronto's Water Conservation Achievements

Recent experience in the City of Toronto demonstrates that price continues to be an effective tool to reduce residential water consumption.

Between 2005 and 2012, water consumption declined by 14% **overall** and by 24% on a per capita basis.

As the largest city in Canada, Toronto has a unique challenge of providing safe, potable water to over 3.3 million residences and businesses in the region. Recently, Toronto has made significant gains in reducing overall water use. Between 2005 and 2012, Toronto experienced a dramatic drop in both its absolute and per capita water consumption rates – water consumption declined by 14% overall and by 24% on a per capita basis. This is despite the fact that Toronto's population was growing at a rate of 4.5% over the period of the study.

The Power of Prices

Water is a necessary good and it is generally assumed that consumers won't change their purchasing behaviour significantly if the price of water changes. But new econometric analysis demonstrates the majority of Toronto's decline in water consumption is attributable to its increasing price of water.[8] Two datasets from Water Toronto were examined to determine the effects of weather and seasonal variation, infrastructure improvements, and varying price structure to determine the specific causes

6 Council of Canadian Academies. (2009).The Sustainable Management of Groundwater in Canada: Report on the Expert panel on Groundwater. Retrieved from http://www.scienceadvice.ca/en/assessments/completed/groundwater.aspx

7 Ibid

8 This Research Note is based on the conclusions from the Master's thesis entitled: Price Works: Seasonality and Determinants of Toronto's Amazing Decline in Water Demand by Jeff Bennett, Department of Economics, University of Ottawa. Available at http://sustainableprosperity.ca/dl1060

of the decline of overall water use.

Importantly, statistical analysis shows that variations in weather and infrastructure improvements are unable to fully explain the downward trend in water consumption.[9] This suggests that common alternative explanations are not driving the reduction in water consumption and that water price increases are the primary contributing factor to the decline in residential water consumption. Residential consumers of water appeared to be moderately responsive to increases in water prices, despite the fact that water is a necessary good. Other factors such as technological improvements may explain some of the reduced consumption yet the statistical methodology applied provides confidence that increased prices do influence households' water consumption.

Toronto has significantly altered its water pricing policies in the last decade. The price of water was previously determined by a seven-step block rate pricing structure. Following a review of the block pricing policy, Toronto drafted new policy which eliminated the block pricing mechanism and set a general rate for all consumers using less than 6,000 m^3. A second rate was set for industrial consumers using more than 6,000 m^3.

Residential water prices have increased approximately 70% since 2003.

While reformulating its water pricing structure simplified the billing structure for residents, the main story in Toronto's large decline in water consumption is its aggressive pricing strategy. Since 2003, the price of water has increased annually at rates ranging from 6% to 10.8%. For example, the price of water has increased from \$1.35/m^3 in 2005 to \$2.28/m^3 in 2011 for residential customers, which represents a price increase of approximately 70% over seven years. As of January 2013, the residential price is listed at \$2.71/m^3, reflecting an additional 9% increase year-over-year.[10]

Implications for Policy

Municipal governments are on the front lines for addressing water conservation in cities, and effective water policies are important tools for decision makers. As urban populations grow, existing water infrastructure and water resources will be placed under growing pressure. Managing water consumption is an important consideration for municipal governments, both for prudent economic management of limited municipal funds, but also to ensure that water use is sustainable over time.

Toronto's water pricing strategy demonstrates that the behaviour of residential water uses is influenced by changing price signals. Among the policy options for municipal governments to consider such as subsidies for low-flow toilets or general information campaigns, pricing water remains one of the most effective water conservation policies available. Other municipal governments can learn from Toronto's leadership to ensure that water policies are effective to achieve water efficiency gains and ensure that water conservation goals are reached.

9 For further discussion on the statistical assumptions supporting this finding, please review Price Works: Seasonality and Determinants of Toronto's Amazing Decline in Water Demand by Jeff Bennett, Department of Economics, University of Ottawa. Available at http://sustainableprosperity.ca/dl1060

10 City of Toronto. 2013 Water Rate Structure. Retrieved from http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=a916ff0e43db1410VgnVCM10000071d60f89RCRD&vgnextchannel=f554fc2beecb1410VgnVCM10000071d60f89RCRD&vgnextfmt=default