

7-1-2017

# WaterRight: An Examination of Drinking Water, Tax Policy, and Water Affordability in Southwestern Ontario

Robert Sharon  
*Western University*

Follow this and additional works at: <https://ir.lib.uwo.ca/lgp-mrps>



Part of the [Public Administration Commons](#)

---

## Recommended Citation

Sharon, Robert, "WaterRight: An Examination of Drinking Water, Tax Policy, and Water Affordability in Southwestern Ontario" (2017). *MPA Major Research Papers*. 173.  
<https://ir.lib.uwo.ca/lgp-mrps/173>

This Major Research Paper is brought to you for free and open access by the Local Government Program at Scholarship@Western. It has been accepted for inclusion in MPA Major Research Papers by an authorized administrator of Scholarship@Western. For more information, please contact [tadam@uwo.ca](mailto:tadam@uwo.ca), [wlsadmin@uwo.ca](mailto:wlsadmin@uwo.ca).

**WaterRight:**

**An Examination of Drinking Water, Tax Policy, and Water Affordability in  
Southwestern Ontario**

**MPA Research Report**

**Submitted to:**

**The Local Government Program  
Department of Political Science  
The University of Western Ontario**

**Robert Sharon, 250052526  
July, 2017**

## Preface

If we hold to the conviction all Canadians are equal, deserving of the same rights and privileges, opportunities and obligations; if we truly believe those things to be self-evident, then we must accept, embrace and pursue public policies which promote income equality and wealth redistribution. Once it is generally accepted that the wealthy should share more of their wealth with the poor through increased taxation burden, and by paying a greater share of the costs of supplying public goods and services, opportunities to implement public policy that achieve these outcomes are vast and far reaching.

A recent study has revealed that there is great discrepancy in what Canadians believe the ideal distribution of wealth should be in Canada, what they perceive the current distribution of wealth to be, and the actual distribution of wealth (Broadbent Institute, 2014). In short, Canadians desire the distribution of wealth to be much fairer than they thought it was currently, and the wealth inequality currently is greater than most Canadians thought it to be. The table below was developed from data published in this study.

<b>Wealth Distribution Category</b>	<b>Poorest 20% of Canadians</b>	<b>Middle 60% of Canadians</b>	<b>Wealthiest 20% of Canadians</b>
Canadians ideal wealth distribution	11.5%	58.5%	30%
Canadians perception of wealth distribution	6%	38.5	55.5%
The actual distribution of wealth in Canada	<1%	29%	70%

Additionally, the study indicated that the bottom 50% of Canadians own less than 6% of the wealth, the top 50% own the remaining 94%, and the wealthiest 1% of Canadians own 20% of the country's wealth. This data suggests Canada is far from the socially progressive nation it generally claims to be. As citizens, we can collectively determine public policy decisions that redistribute the wealth in our country and in our local communities.

Far too often local governments hide behind the premise that income and wealth redistribution is a responsibility of the Federal and Provincial Government, achieved through the use of more appropriate redistributive revenue sources such as income and commodity taxes. As a result of ignorance, or a general disregard for the ability to impact change, local governments fail to acknowledge the role they can play in advancing social equity through progressive local government public policy.

Canadians enjoy some of the most accessible and affordable drinking water in the world, but the opportunity for progressive pricing policy should not be ignored as a result. The title of this paper, WaterRight, is an adaptation of the title of a report which examined the state of drinking water systems and provided advice on the organization and long-term financing of Ontario's water and wastewater systems (*WaterTight: The case for change in Ontario's water*

*and wastewater sector*”). The purpose of this report however will be to discuss the human right to safe, clean and affordable drinking water, and local government influence in improving affordability through progressive public policy (an area the WaterTight report generally dismissed in the pursuit of regulatory compliance, quality assurance, and financial sustainability of water systems).

By examining the cost of water in a cluster of communities in Southwestern Ontario in relation to the average incomes in those communities, this report will answer the question: How affordable is drinking water in Ontario communities, and how can municipal pricing strategies improve affordability and advance social equity?

## Table of Contents

Preface .....	2
List of Tables .....	5
Executive Summary.....	6
Part 1: The Right to Water, Water Pricing, and Poverty.....	7
1.1 Introduction .....	7
1.2 Water and Poverty .....	12
1.3 The Human Right to Water .....	13
1.4 The History of the supply of drinking water in Ontario .....	15
1.4.1 In the Beginning .....	15
1.4.2 Ontario Water Resources Commission.....	16
1.4.3 The Impact of the Walkerton Water Crisis .....	17
1.4.5 The Clean Water Act and Financial Plans for Municipal Water Systems.....	19
1.5 Water Pricing Models .....	20
1.5.1 No direct charges to users .....	20
1.5.2 Flat Fee per connection .....	21
1.5.3 Volumetric Charges.....	22
Flat rate volumetric charge.....	22
Inclining Block Tariff.....	23
Declining Block Tariff .....	23
Humpback Tariff.....	24
A Mix of Fixed Charges and Volumetric Charges .....	24
1.6 Public Goods and Services, Taxation and User Fees.....	26
1.6.1 Property Taxation .....	28
1.6.2 User Fees.....	34
Part 2: The Affordability of Water in Windsor and Essex County.....	35
2.1 Literature Review .....	35
2.2 The Affordability of Water in Southwestern Ontario .....	39
2.3 The Affordability of Water for the Poor in Southwestern Ontario.....	43
2.3.1 Defining the Poor .....	43

2.3.2 Examination of Affordability of Water for the poor in Southwestern Ontario .....	45
Part 3: Improving Affordability and Equity through Water Pricing Methodology .....	48
3.1 Recommendation #1: Use Alternative Revenue Sources to Cover Costs.....	49
3.2 Recommendation #2: Use Strategic Inclining Block Tariff Structures .....	50
3.3 Recommendation # 3: Reduce Fixed Charges .....	51
3.4 Conclusion.....	51
Bibliography .....	53

## List of Tables

Table 1: Ontario Municipal Water Rate Structures.....	25
Table 2: Legislative Authority in Canada.....	27
Table 3: The Ontario System of Property Assessment and Taxation.....	30
Table 4: Average Annual Cost of Water per Household.....	40
Table 5: Average Annual Sewer Surcharge per Household.....	42
Table 6: Water, Wastewater, and Combined Costs as a Percentage of Household Income.....	43
Table 7: Comparison of Minimum Annual Income for Social Assistance Programs in Ontario...	45
Table 8: Affordability of Water for the Poor.....	46

## Executive Summary

There is an extensive regulatory framework embodying the operational supply of drinking water in Ontario, including the need for all municipalities to provide a self-sustaining financial plan for their system. This has resulted in the price of water in Ontario significantly outpacing the Consumer Price Index and general property taxation rates. This cost increase is impacting Ontario residents, causing poorer residents to pay a larger percentage of their disposable income on water required for basic human needs.

At the local level, water pricing is often established with little attention to how water rate policy impacts affordability. While provincial regulation is thorough from a quality assurance approach, it is silent on the matter of ensuring residential water affordability. Beyond aggregate financial data collection and reporting through annual benchmarking and data collection initiatives such as the annual BMA Management Consulting Inc. Municipal Competitiveness Study (BMA Study), there is very little published work examining current water pricing, pricing methodologies, and the affordability of water for Ontario residents.

Actual water rate data collected and examined from the eight most Southern municipalities in Southwestern Ontario revealed:

- There is great variation in water pricing between neighbouring communities.
- Water can be considered very affordable in all communities examined, failing to reach even 1% of average household income in all cases.
- Water can be considered affordable in most cases for residents that rely on the basic minimum income subsidies associated with the three main social support mechanisms in Ontario (ODSP, Ontario Works, Guaranteed income supplement).

How governments elect to charge for public goods and services, the tools utilized to recover costs, and the way in which those cost recovery tools are structured can have a profound impact on the both public policy outcomes, as well as the share of financial burden assumed by different groups in a community.

Municipalities wishing to implement intelligent and strategic tax policy to improve affordability and social equity in their communities, can establish water rate models to achieve the desired outcomes. In developing a more equitable pricing framework, municipalities can:

- Use alternative revenue sources to cover the cost of supply water
- Use strategic inclining block tariff structures to charge for water consumed
- Minimize the fixed charges portion of residential water bills

Despite the general affordability of water, municipalities can determine pricing strategies that shift some of the cost burden from those with the least ability to pay, to those with a greater ability to pay, through the implementation of intelligent tax policy developed under a strategically planned tax policy framework.

## Part 1: The Right to Water, Water Pricing, and Poverty

### 1.1 Introduction

As the treatment and supply of drinking water in Ontario is now almost entirely the responsibility of local governments (primarily municipalities), the method of determining how residents pay to access clean drinking water is quite diverse and locally determined. This diversity in rate structure inevitably results in a variation of outcomes impacting water affordability for residents, and has a variety of consequences that affect social equity. One such consequence is that poorer residents end up paying a larger percentage of their disposable income on water required for basic human needs (Wasimi & Hassa, 2012) (OECD, 2002). As the concept of social equity can vary given the associated context, this paper will generally rely on the National Academy of Public Administration definition, which defines social equity in governance as: *“The fair, just and equitable management of all institutions serving the public directly or by contract; the fair, just and equitable distribution of public services and implementation of public policy; and the commitment to promote fairness, justice, and equity in the formation of public policy”* (National Academy of Public Administration, 2017).

The lack of competition for the delivery of drinking water demands a level of diligent financial oversight to ensure affordability, if not through provincial regulation, then checked by way of popular opinion and balanced through election cycles. However, water pricing at the local level is often established with little attention to how water rate policy impacts affordability, leaving the real rates charged for water (or worse, the year over year cost increase), to dominate the public debate (what little exists) on the matter. Provincial regulation



is thorough from a quality assurance approach, and mandates water system financial plans, but is silent on the matter of ensuring residential water affordability (Safe Drinking Water Act, 2002).

There is an extensive regulatory framework embodying the operational supply of drinking water in Ontario, including the need for all municipalities to provide a self-sustaining financial plan for their system. Depending on where one lives in the province, they may pay drastically different prices for residential drinking water (BMA, 2015), determined under different sets of factors used to calculate that price. Even more perverse, neighbouring municipal water utilities within the same region, often with similar water supply management organization, charge substantially different rates for drinking water. The different 'sets of rules', or 'rate models', impact residential water affordability in different ways, and influence social equity in different ways. One such way is to change the percentage of disposable income Ontario residents spend on drinking water.

The aim of the research paper is to examine this variation in pricing and pricing methodologies, to examine affordability generally and affordability for the poor in Ontario specifically, and to make recommendations on the approach to water pricing policy in Ontario that can improve affordability and advance social equity. Through examining the existing water rates and water rate models implemented by a cluster of municipalities in Southwestern Ontario, the variations can be used to compare, contrast, and examine these policy decisions through a lens of affordability and social equity.

It is critical to initiate and participate in dialogue on matters of public importance. In the context of affordable drinking water, this is true for all politicians and administrators who carry

the burden of governance. In addition to the utilization of regressive water rate models used by most municipalities, the price of water in Ontario is significantly outpacing the Consumer Price Index and general property taxation rates; this is exacerbating the affordability concern. In the period between 2005 and 2015 average water prices in Ontario rose 3.8% in major municipalities (Di Matteo, 2016). Very little research has examined the impact this is having on Ontario's poor, with an eye to improving water pricing models to minimize the regressive effects.

There are many public goods and quasi-public goods supplied by local governments in Ontario that are funded through general property taxation; road services, parks services, policing, fire services and recreation services to name a few. Property tax is a more regressive tax tool than other forms of taxation, such as income tax, as the ability to pay the tax has less correlation to the amount of tax charged. Additionally, property tax has shortcomings when conceptualized as a 'wealth tax', since there is often great disparity in the market value of property (from which the tax payable is calculated in Ontario) and the owned equity in the property (Thompson, 2014). However, property taxation can be considered more progressive than flat user fees, as people with higher incomes typically own more valuable homes (SACES, 2004). User fees on the other hand blatantly discriminate between the wealthy and the poor unless they are linked to some form of income based subsidy.

The research conducted as part of this paper will examine the use of volumetric fees, in conjunction with or as opposed to fixed user fees, and rely on the literature to further evaluate this practice from a social equity perspective. One possibility is that the reliance on user fees is linked more strongly to the ease and simplicity of measuring water consumption (water is

supplied under pressure and every home can be easily equipped with a device to measure exactly how much water is consumed), than to a sophisticated determination of appropriate public policy or the appropriateness of user fees over general taxation. In other words, the mechanisms used to recover the cost of supplying drinking water (user fees over taxation) seem to be established more as a matter of convenience, than through strategic public policy development. While social equity and affordability of water has received much attention in the academic literature, the ability to pay typically plays a small role in the determination of water rates in practice in Ontario.

This paper will also examine the affordability of water in the eight municipalities of Windsor and Essex County. Using actual water rate data collected from the municipalities, affordability will be measured using an internationally recognized drinking water affordability threshold. This examination will occur both for income of the average household in the community, as well as for the poorest residents, whose incomes are dependent on the guaranteed minimum incomes established for the three primary income support programs in the Province of Ontario. The cost of water, when compared against income and measured against an affordability threshold, will reveal the level of affordability of drinking water in these communities. The 2015 BMA Management Consulting Inc., Municipal Competitiveness Study (BMA Study) will be used to examine the actual rate methodologies currently utilized by a large sample of Ontario municipalities. By examining these pricing methodologies against the expected policy outcomes of each model, insight can be gained into the level of sophistication and fairness of the pricing models currently used in practice.

Beyond aggregate financial data collection and reporting through annual benchmarking and data collection initiatives such as the annual BMA Study, there is very little published work examining current water pricing and pricing models in Ontario. Furthermore, literature examining water rates from a social equity perspective in an Ontario context is even scarcer. Most of the published literature examining water pricing in Canada is focused on the need to establish pricing models that result in full cost recovery, though defining 'cost' can be rather subjective as will be discussed later. Efforts during the literature review of this paper failed to identify any research in the Canadian context that examined water rates through the lens of affordability and social equity, though a number of studies of this nature have been conducted in Europe, Australia, and other jurisdictions.

Every province in Canada has a unique model for the delivery of the provision of public goods. How the costs of providing public goods and services are shared by the various levels of governments (who pays for what and under what tax/revenue tool), will impact on the preferred method of water pricing. As each component of the provision of service does not exist in a vacuum, but forms an interrelated basket of public goods and support services, an Ontario centric approach to the policy examination is of the utmost importance.

Water rate models instituted at the local level do have societal impact; some models are progressive in nature, others are regressive. The poor spend a disproportionate amount of their disposable income on buying drinking water compared to the wealthy. Municipalities have great influence on the lessening or the worsening of this phenomena; the municipal sector must understand this reality in order to make informed public policy decisions.

## 1.2 Water and Poverty

The lack of access to clean, safe drinking water is a global crisis. Each day, over 2,000 children die from water borne illness (Liu & et al, 2012). This is one of the reasons why the international community, and the UN has made access to drinking water a declared human right (UNGA, 2010), and the expansion of drinking water systems, especially in the developing world, a global humanitarian initiative. Beyond access, affordability of drinking water is also a major global concern. Increased regulation, aging first and second generation water treatment systems, difficulties in treating ever more polluted water, and the effects of global warming are all driving up the cost of water for the consumer.

The global crisis of access and affordability of drinking water is not universally distributed. As can be expected, some nations of the world, such as many countries on the continent of Africa, and most in the Middle East, have significant access challenges, while other nations, such as Canada, the United States and Brazil have an abundance of fresh water supply (UN Office of the High Commissioner for Human Rights, 2010). Similarly, some countries have significant affordability challenges related to drinking water, while others have been recognized as having no problems or concerns with water affordability (OECD, 2002). As an example, water charges in Europe are on average four times higher than they are in Canada, making affordability a much greater concern for European public policy makers (Vander Ploeg, 2011). However, the relative affordability of Canadian drinking water should not preclude policy makers from examining the impacts that pricing methodology, formed as part of an intelligent tax policy framework, can have on advancing social equity and improving affordability for those

who can least afford to pay. This paper will rely on the United Nations Development Programme (UNDP) affordability threshold of requiring water cost to be less than 3% of household income to be considered affordable (UN Office of the High Commissioner for Human Rights, 2010).

Given that Canada is a nation that has been generally recognized as having neither access or affordability challenges (when compared to other nations), it can be easy to assume that access, and more relevant to this paper, affordability, is not a matter worthy of further discussion or public policy consideration; such is not the case. Access to clean water on Canadian First Nations reserves has been declared a crisis by Human Rights Watch (Human Rights Watch, 2016). What general affordability indicators fail to recognize is the water affordability challenges for the poorest Canadians. This paper will examine water affordability for the poorest Canadians living in the province of Ontario. To do this, the basic minimum subsidies associated with the three main social support mechanisms (ODSP, Ontario Works, Guaranteed income supplement) will be examined to determine the amount of income that these groups must devote to drinking water and sanitation. Regardless of the general affordability of water, pricing methodologies can still be implemented to lessen the impacts of the regressive nature of user fees, and shift costs from lower income households to higher income households and to commercial enterprises.

### 1.3 The Human Right to Water

In 2010, the United Nations General Assembly recognized the Human Right to Water as being essential to the full enjoyment of life (UNGA, 2010). The consequence of this resolution is

to recognize that access to safe drinking water is a legal entitlement rather than a commodity or service, and to make available the United Nations human rights system to monitor the progress of nations in realizing the right to water while holding governments accountable (UN-Water Decade Programme on Advocacy and Communication and Water Supply and Sanitation Collaborative Council, 2011). In defining how the Human Right to water was to be determined, the following five criteria were established: availability; accessibility; quality and safety; affordability; and acceptability. With regards to affordability, the United Nations Development Programme (UNDP) has identified water as affordable if costs do not exceed 3 per cent of household income.

The concept of water as a human right brings forth the need to examine other characteristics, such as; examining water as a public good, determining responsibilities for providing service and owning infrastructure, the design of associated financial models, and providing access to water for individuals with an inability to pay (Brown, Neves-Silva, & Hellor, 2016). It is primarily for these considerations, and the desire for sovereignty in managing their own resources, that Canada elected to abstain from voting on the UN resolution (Water Canada, 2010).

Ontario has some of the strictest water quality assurance regulations in the world (SDWA, 2002), but the supply of drinking water is much different for First Nations indigenous peoples living on reserves. Currently, there are no binding regulations for the treatment and supply of drinking water on First Nations Reserves in Canada (Human Rights Watch, 2016). As can be expected, this has led to drastic underfunding of water treatment systems (where they do exist), illness resulting from drinking inadequately treated water, and severe access issues on

First Nations Reserves (Human Rights Watch, 2016). A staggering 73% of First Nations Water Systems in Canada are at high to medium risk for contamination (The Council of Canadians, 2017). While 10% of people living in off-reserve communities in Ontario get their drinking water from private wells (Environment Canada, 2011), that number doubles to 20% of households living on reserves (Human Rights Watch, 2016). The crisis related to the lack of access to clean drinking water on First Nations Reserves, described as being comparable to ‘third world conditions’ (Levasseur & Marcoux, 2015), is considered by many to be a violation of the human right to water (Suzuki, 2017), (Human Rights Watch, 2016). While this paper will not examine the current state of water systems on First Nations Reserves, it must be acknowledged that there are two very distinct narratives regarding the supply of drinking water in Canada; one for indigenous peoples living on reserves, and another for everyone else.

Despite the United Nations resolution identifying clean drinking water as human right essential to the full enjoyment of life and all other human rights, Canadian regulatory requirements that mandate the delivery of all the criteria identified in UN declaration, and affordability in particular, do not exist. Thus the organizations providing drinking water to Ontario residents are not legally bound to ensure measures of affordability within their pricing methodology.

## 1.4 The History of the Supply of Drinking Water in Ontario

### 1.4.1 In the Beginning

Like many utility corporations that are now considered to be a predominately government owned or highly regulated industry, the first waterworks infrastructures built in



cities in the Province of Ontario were developed under private ownership and were profit generating ventures (Sancton, 2015). These systems typically served two purposes; to bring a supply of untreated raw drinking water from lakes, and to provide a means to fight urban fires. (OSWCA, 2001) The first water systems in Ontario were built in Toronto in the 1840's (City of Toronto, 2017). In the decades that followed, local and central governments saw the need to be involved in the supply of water for the greater good of the people.

It took over a half a century for the two most significant pieces of provincial legislation of the era affecting the safe supply of drinking water to be passed in the Province. The Municipal Waterworks Act (1882) and the Public Health Act (1884) permitted the creation of municipal water treatment facilities that could be paid for through property taxation, and the establishment of the Public Health Board respectively. The Public Health Board used the Public Health Act to manage matters that impacted water quality such as sanitary sewage disposal and industrial discharge (OSWCA, 2001). As time progressed throughout the first half of the twentieth century, research and advancement within the scientific and medical communities identified the consumption of untreated water as a source of human illness, and water treatment as a method for disease prevention.

#### 1.4.2 Ontario Water Resources Commission

In the face of overwhelming evidence of the importance of safe clean drinking water on human health, the polluting of the great lakes and the lack of a coordinated effort to build, maintain and renew adequate water and wastewater facilities, the province of Ontario passed the Ontario Water Resources Commission Act (1956) which established the Ontario Water

Resources Commission. The Ontario Water Resource Commission, among other things, was charged with regulating water treatment and supply in the province. The Commission financed, built and operated water and wastewater systems and regulated the use of Ontario's water resources (Scott, 1969). It was through the OWRC that the first comprehensive inspection and testing programs were developed in the province. Additionally, the OWRC developed the first training, testing and licensing of water system operators (OSWCA, 2001).

Since the establishment of the OWRC (1956-1973), Ministry of the Environment ownership, management and regulation (1973-1993), and the development of the Ontario Clean Water Agency (a crown corporation established to address a regulator-owner/operator conflict of the MOE, 1993-present), a provincial body has existed to provide drinking water oversight responsibility and operational services to municipalities. Provincial involvement still exists today in all aspects except infrastructure ownership which has been primarily the responsibility of Ontario Municipalities in the years that followed the Water and Sewer Services Improvement Act, 1997. The almost exclusive municipal ownership presented a localized approach to water management, pricing and quality assurance; the latter resulting in a tragedy of failed stewardship: the Walkerton Water Crisis.

### 1.4.3 The Impact of the Walkerton Water Crisis

A discussion on the provision of the delivery of water services by municipalities in Ontario would be remiss if it did not include at least a brief discussion on the events surrounding the Walkerton, Ontario water crisis. While this paper is primarily intended to examine affordability and equity in water pricing, the Walkerton tragedy has played a dramatic role in expanding the

quality assurance aspects of Ontario's water system. This quality assurance program has impacted water pricing. While it should not be argued that system safety should come at the expense of affordable pricing, it should be recognized that the expanded regulatory environment has led to greater operating expenses, and an expanded focus on sustainability. This has in turn resulted in the rapid acceleration of water price increases at the local level.

In May 2000, the drinking water system of Walkerton Ontario, became contaminated with a virulent strain of E. coli. Waste from a local cattle farm was washed into a shallow well located near the farm as a result of heavy rains. Both the equipment installed to treat the water, as well as the staff hired to manage the quality of the water, failed to deliver on the expectations, though for very different reasons. In this town of 4,800 people, located within Bruce County, 2,300 people became ill and seven died. Many of those who survived suffered permanent damage to their health (Ministry of Public Infrastructure Renewal, 2005).

In the aftermath of the Walkerton crisis, inquiries were conducted and expert panels assembled. In response to the recommendations of the inquiries, the Safe Drinking Water Act was passed in 2002. The stated purpose of the Safe Drinking Water Act, 2002 is:

- 1. To recognize that the people of Ontario are entitled to expect their drinking water to be safe.*
- 2. To provide for the protection of human health and the prevention of drinking water health hazards through the control and regulation of drinking water systems and drinking water testing (SDWA, 2002).*

One of the main requirements of the Act is the mandatory licensing of municipal water providers. While the regulatory framework has improved the quality assurance and regulatory aspects of drinking water systems, it has also increased the cost of providing drinking water. In the period between 2005 and 2015, average water prices in Ontario rose 3.8% in major municipalities, outpacing both CPI as well as property taxation (Di Matteo, 2016). It would be difficult to determine the exact impact the Walkerton water crisis (and the resulting legislation and regulatory regime) had on water system affordability. However, the rapid acceleration of regulatory requirements, the associated costs of compliance, the mandated financial planning and sustainability requirements, coupled with the lack of general oversight with regards to affordability, has generally resulted in increased costs to operate systems and thus increased the cost of water for residents.

#### 1.4.5 The Clean Water Act and Financial Plans for Municipal Water Systems

After the events of the Walkerton, ON water tragedy briefly explored earlier, the Ontario government passed the Safe Drinking Water Act (SDWA), 2002 in order to more effectively control and regulate drinking water systems. In 2007, the Province of Ontario enacted Regulation 453/07 under the SWDA. This regulation required all municipal drinking water systems to develop a financial plan, in accordance with the regulation, prior to obtaining or renewing their drinking water license.

The Financial Plans of a Municipal Drinking Water System must:

- i) include a statement that the financial impacts of the drinking water system have been considered
- ii) apply for a period of at least six years

- iii) include details of the proposed or projected financial operations of the drinking water system
- iv) projected financial position of the drinking water system
- v) proposed or projected gross cash receipts and gross cash payments
- vi) be available to members of the public
- vii) give a copy of the financial plans to the Ministry of Municipal Affairs and Housing.

As can be seen from the seven mandatory requirements, much discretion is afforded to local municipalities in determining the means to a financially sustainable end. Mandatory financial plans require municipalities to price water such that the water system is sustainable in both the short and long term. How municipalities typically determine the method to determine pricing is explored below.

## 1.5 Water Pricing Models

When a government supplies drinking water to their residents, there are a number of different pricing models they can implement to recover the cost of operating the system. While if estimated accurately, these models can all be used to collect enough revenue to cover costs, these models impact affordability, equity, and water conservation in different ways. Most pricing models will generally fall into one of the following categories:

### 1.5.1 No Direct Charges to Users

Some governments have elected to not charge for drinking water directly, instead electing to cover the cost of drinking water through other taxation mechanisms. This can either be a result of the lack of sophistication of the drinking water treatment or supply system (many poorer nations), or because of specific public policy decisions not to charge. As an example, the

country of Ireland did not directly charge for drinking water until 2014 (The Irish Times, 2014). Public policy makers in Ireland chose instead to fund the cost of drinking water through other taxation mechanisms. If it were not for the austerity measures imposed on Ireland by the European Union and the International Monetary Fund under terms of the 2009 bailout package (which required Ireland to begin charging for water and wastewater services), the model of no direct charges would likely still be in place today (McIntyre, 2014).

### 1.5.2 Flat Fee Per Connection

The least sophisticated of all pricing models is the flat fee pricing model. Every user is charged a fee for their connection and access to water, based on the type of connection (i.e. residential, commercial, industrial). Under this pricing model, there are no meters installed and therefore no volumetric charges. This results in very high volume users of water paying the same cost for access and usage as very small volume users of water. To achieve financial sustainability, the total cost of supplying drinking water in a given municipality is divided by the number of users, and the result determines the cost the user will pay for access to water. The benefits of this model are primarily related to the simplicity in development and management. The shortcomings include the lack of incentive to conserve and unfairness (as cost is not tied to consumption). With regards to conservation, residential users in Canada under a flat user rate system consume 65% more water on average per capita than users with meters and volumetric charges (Environment Canada, 2011).

The flat fee per connection model can be illustrated as follows:

$$F = TC/U$$

F=Fee per User; TC=Total Cost of Water; U=Number of users of the system

### 1.5.3 Volumetric Charges

To have a fee system based on volumetric charges, each user must be connected to a meter which measures the volume of consumption and charges users a fee based on the amount of water they consume. Most water systems that utilize a volumetric pricing strategy, also incorporate a fixed charge(s) in addition to the volumetric charge. The fixed charge component is intended to provide a degree of revenue stability for system operators. The value of the fixed charge in relation to the volumetric charges and ultimately the total bill is a matter of local policy. It is important to note however that the greater the fixed charge in relation to volumetric charges, the less incentive there is to conserve water through less consumption, and the lesser the degree of control a user has over the relative cost of water. In the examination of municipal billing structures discussed later in this paper, the municipalities reviewed had a fixed charge component ranging from a low of 24% to a high of 62%. While a 62% fixed charge provides greater revenue stability, it discourages conservation and increases the average cost of water for lower volume water users.

Within the volumetric charge pricing framework, there are different approaches to pricing each unit (typically a cubic meter in Canada), of water consumed. These approaches include the following:

#### **Flat Rate Volumetric Charge**

In a flat rate volumetric charge approach, every volumetric unit consumed is billed out at the same rate or price regardless of the total volume consumed. This can include a model that charges all users of the system the same price per unit, or a model that differentiates users by

class (i.e. residential, commercial, industrial) and establishes a rate for each class that may or may not be the same as the other classes.

### **Inclining Block Tariff**

Inclining block tariff structures increase the cost per unit of water as consumption rises beyond established thresholds. This model is generally considered to be the most effective model to promote conservation as users pay a higher fee for a volumetric unit of water once certain consumption volume thresholds are surpassed. Additionally, equity in pricing is improved in this model as higher volume users pay more on average per unit of consumption than do lower volume users. Since high income households consume more water than low income households (Wasimi & Hassa, 2012), wealthier users contribute more to covering the costs of operating the water system by paying a higher average unit of cost than poorer users.

### **Declining Block Tariff**

Declining block tariff structure decreases the cost per unit of water as consumption rises beyond established thresholds (similar to inclining block tariff, only in reverse). The rates charged per unit of water begins with the most expensive rate, then declines as consumption increases, ending in the least expensive rate per unit being the last unit consumed. While this model is generally recognized to have efficiency benefits typically associated with volume discount incentives, it is the least effective at managing the conservation aspect of water use. Fixed charges are able to be spread over more units with the promotion of a greater consumption, thus decreasing the average rate charged as consumption volumes increase. The



implementation of this pricing structure places system revenue maximization above conservation or pricing equity.

### Humpback Tariff

The humpback tariff model utilizes both an inclining block structure for the first blocks of consumption, until eventual price plateauing, followed by a declining block structure for very large volume users. This structure is implemented with the intent of promoting conservation for most users of the system (typically residential), while providing volume discounts for large users (industrial, commercial) of the system to recognize the declining incremental cost of supplying an additional unit of water to the user.

### A Mix of Fixed Charges and Volumetric Charges

To try and address the revenue volatility associated with the sole use of volumetric charges, most municipalities utilize a combination of fixed monthly fees, in addition to volumetric charges (based typically on one of the four volumetric charge methodologies discussed above). As municipalities have large fixed costs associated with the treatment and distribution of drinking water, fixed charges help to guarantee a base amount of annual expected income. Thus for many water consumers in Ontario, there will be a minimum monthly charge (the fixed charge component), in addition to volumetric charges. Determining the ratio between fixed and volumetric charges varies from water provider to water provider, and is determined through local policy decisions. The higher the ratio of fixed fees, the more the system will resemble a flat fee pricing method, and the less the incentive to conserve (though revenue certainty for the utility increases). With a low ratio of fixed charges to volumetric

charges, the greater amount of the household water bill will be linked to consumption, the greater incentive to conserve, and the user will more control over the amount of the bill.

A 2015 survey of water rate structures of 100 Ontario municipalities revealed that 89% of municipalities have a fixed charge component built in to their pricing methodology. Of the 100 municipalities, the fixed charge component of the bill ranged from 100% (flat fee per connection) of the bill to 0% (all volumetric charges) of the bill (BMA, 2015). Overwhelmingly, the preferred billing methodology is a volumetric charge methodology (97%), with a fixed charge component (89%), using a uniform/flat rate volumetric charge per unit (65%). Additional details regarding the way in which municipalities are charging for water (and wastewater), are found in Table 1 below.

**Table 1: Ontario Municipal Water Rate Structures: 2015**

Water Rate Billing Structure	Water Rate Structure - Res.	Water Rate Structure - Non-Res.	WW Rate Structure - Res.	WW Rate Structure - Non-Res.
Uniform	65%	66%	67%	68%
Declining	12%	14%	12%	13%
Inclining	9%	7%	7%	6%
Humpback	11%	11%	11%	11%
Flat	3%	2%	3%	2%

\*Source: 2015 BMA Study

The fact that only 3% of municipalities surveyed are using the flat fee per connection is a signal that Ontario municipalities are becoming more sophisticated in the management and pricing of their water systems. As was discussed earlier, charging for water based on volume consumed will lead to water conservation. Of the 97% using volumetric billing structures however, only 32% have implemented the next level of sophistication (inclining, declining and

humpback), in an attempt to strategically manage consumer consumption, user cost sharing, and to achieve specific public policy outcomes.

## 1.6 Public Goods and Services, Taxation and User Fees

How governments elect to charge for public goods and services, the tools utilized to recover costs, and the way in which those cost recovery tools are structured can have a profound impact on both public policy outcomes, as well as the share of financial burden assumed by different groups in a community. The relatively recent push towards water system financial sustainability has driven most municipal systems to recover the cost of providing drinking water through a user fee system. As flat user fees are blatantly indiscriminate between the rich and the poor, a strategic approach must be taken to develop a more intelligent user fee system which can have positive policy outcomes.

There are a vast array of public goods and services provided by the Federal government, Provincial/Territorial governments, and Municipal governments in Canada. Sections 91-95 of the 1867 Constitution determined jurisdictional authority through the distribution of legislative powers over goods and services supplied to the Canadian people, and which level; federal or provincial, has jurisdiction in that sphere (Beaudoin, 1990). Municipalities are not constitutionally guaranteed in Canada, but are created, and afforded the ability to exist, through provincial legislation. All authorities to act are granted to municipalities through provincial legislation. In Ontario, the primary piece of legislation is the Ontario Municipal Act, 2001, though there are many other Acts that grant powers and demand obligations of Ontario municipal corporations.

The chart below illustrates some of the more important public goods and services provided to Canadian residents, and the level of government designated jurisdictional authority under the Constitution. Again, all municipal authority is actually an authority of the provincial government, delegated to municipalities through provincial legislation.

**Table 2: Legislative Authority in Canada**

Federal jurisdiction	Provincial jurisdiction	Shared jurisdiction
<ul style="list-style-type: none"> <li>• Trade</li> <li>• Taxes</li> <li>• Postal service</li> <li>• Militia and defence</li> <li>• Currency and banks</li> <li>• Indian policies</li> <li>• Criminal law</li> <li>• Residual powers (not defined in the British North America Act)</li> <li>• Right of disallowance over the provinces</li> </ul>	<ul style="list-style-type: none"> <li>• Public lands and forests</li> <li>• Health system</li> <li>• Municipal institutions</li> <li>• Marriage</li> <li>• Property and civil rights</li> <li>• Education</li> <li>• Business licences</li> <li>• Provincial constitution</li> <li>• Shared jurisdiction</li> </ul>	<ul style="list-style-type: none"> <li>• Agriculture</li> <li>• Companies and economic development</li> <li>• Prisons and justice</li> <li>• Fishing</li> <li>• Public works</li> <li>• Transportations and communications</li> <li>• Immigration</li> </ul>

Source: (University of Ottawa, 2017). [https://slmc.uottawa.ca/?q=laws\\_canada\\_legal](https://slmc.uottawa.ca/?q=laws_canada_legal)

With the exception of targeted Federal and Provincial grants and transfer payments, as well as restrictions on the use of some charges levied upon residents, developers and business for specific purposes, municipalities have relative freedom in determining how to fund the cost of supplying goods and services to residents. The primary sources of revenue under the direct control of municipalities include property taxation, and user fees and charges. The policy decisions that municipal Councils make regarding what goods and services will be funded from what revenue source, and how those user fees and taxation rates are determined, can have an

impact on social equity (either positively or negatively) and make goods and services available and affordable to a broader range of residents. The policy decisions can also limit the access to goods and services due to unaffordability, and create excessive burden on the poorest residents. The two primary own source revenue tools available to municipalities will now be explored in more detail.

### 1.6.1 Property Taxation

#### **The History of Property Tax**

The concept of taxing property is far from a modern phenomenon. Some of the earliest documented practices of systematic property taxation came from the ancient Egyptians (5000 B.C.), who applied taxation policies associated with production value of privately owned lands (on items such as crop yields and livestock production) (Carlson, 2005). During medieval times in western civilizations, taxes on land, production resulting from land, and taxes on personal property were levied by both church and state (who in many respects were indistinguishable from one another during that era). In more modern times, one of the first forms of property taxation in the 'new world' was implemented by the Puritans in Boston, who levied property tax to pay for the church and the religious education of their children. It was in Boston that some of the first modern practices of levying property tax to pay for local services such as policing, education, defense and various forms of public infrastructure, were implemented in North America (Carlson, 2005).

This very brief historical review of property tax is intended to illustrate that the act of taxing property has been used since the dawn of civilization, and continues to be used today

almost everywhere in the developed world. It should be expected that the practice of taxing property will exist well into the foreseeable future, and property taxation is expected to remain the primary source of revenue for municipalities.

### **Property Tax in Ontario**

Despite property tax representing only 10.5% of the total tax burden of the average Canadian family, property tax is commonly recognized as a very unpopular form of taxation. At 10.5%, property tax ranks fourth, behind income tax (30.6%), payroll and health taxes (21.5%), and sales/commodity tax (14.4%) (Fraser Institute, 2015). Despite this relatively small share of the overall tax burden, property tax funds a large breadth of direct public services to residents. It has been suggested that the incremental nature of other taxes, such as a weekly payroll deduction of income tax or a percentage mark up on the purchase of goods and services in the form of a sales tax, makes other forms of taxation less visible to the taxpayer (Slack, 2002). In contrast, a limited number of large installments (as is the process for most property tax billing cycles), results in much larger and more impactful payment process. This process is also accompanied by a limited time to pay and in most cases, significant penalties for late payment.

Economists seem to dislike property taxes for different reasons altogether. Some view property tax as a tax on capital, often considered the worst type of taxation in terms of harming economic activity (Bird & Slack, 2002). Others will argue the regressive nature of property taxation, citing the fact that lower income earners pay a higher percentage of their income on property tax than do higher income earners (Thompson, 2014). Additionally, the ability to pay property taxes, despite the owned 'wealth' associated with the value of property, is a major shortcoming of taxing property based on assessed market value. This is especially true in

jurisdictions where market conditions have increased property values without a corresponding rise in property owner incomes.

The property tax system in Ontario today includes a number of organizations and stakeholders, with specific areas of authority and responsibility as outlined in Table 3 below.

**Table 3: The Ontario System of Property Assessment and Taxation**

Organization:	Responsibility:
The Province of Ontario	Determine Provincial property tax policy, impose legislation to support tax policy.
The Municipal Property Assessment Corporation	Determine assessment value and tax classification of properties.
Municipalities	Determine local tax policy, set tax rates, tax ratios, administer property tax collection and inter-governmental distribution.
The Assessment Review Board	Independent adjudicative tribunal to hear appeals of assessed value, tax class, tax appeals.
Property Owner	Pay the levy imposed based on the assessed value of the property.

Source: (MPAC, 2016)

### **Municipal Tax Policy and Policy Framework:**

Whether explicitly stated, adequately planned, or competently implemented, any municipal mechanism that raises financial resources for the delivery of services should be considered tax policy. In its simplest form, *"a policy is a course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems"* (Pal, 2010). Thus any decision to tax, raise funds or charge fees, can be interpreted as tax policy. It is not the individual tax policy decisions that are of significance, rather it is the adequacy and comprehensiveness of the municipal approach to tax policy framework development,

implementation, and analysis that has the greatest impact on shaping the future of a municipality. Unlike 'policy', which can reflect the narrowest of decisions made by a municipality, a 'policy framework' is a visionary approach that provides the rationale and philosophy to guide policy and program development (Province of British Columbia, 2000).

A municipal tax policy framework is intimately related to each and every other policy framework developed within a municipality. Taxation allows for the delivery of a social policy framework (quality of life considerations, equality, etc.), of an infrastructure policy framework (sustainability, development, environmentalism, etc.), or any other policy framework established by the municipality. As the lack of formal tax policy framework development and analysis often leads to economically inefficient taxation, (Kennedy & McAllister, 2005) a formal policy framework will aid in avoiding haphazard and unguided taxation decisions.

A tax policy framework will act as the cornerstone for establishing individual tax policy decisions, as is demonstrated by exploring the setting of user fees for a recreation complex. At one extreme, the recreation complex could be used by residents at no charge, thus funding operations entirely through the general tax levy. This inclusionary approach would open access to the facility for all members of the community, a truly progressive approach to providing recreational services. At the other extreme, a municipal recreation complex could be mandated to be financially self-sustaining, generating enough revenues through high user fees to cover all expenses. This approach would create exclusivity of access, benefitting those that can afford to pay high the fees, and excluding those that cannot. The reality is most municipalities have a tax policy model that establishes fees somewhere in between, relying on user fees to cover a portion of the expenses and taxation to cover the remainder. Determining the balance of



taxation funded versus user fee funded is a matter of tax policy. The push towards self-sustaining financial plans for water services has led to a greater reliance on direct user fees, increasing the relative cost burden for poorer residents.

Municipal tax policy developed under a comprehensive framework will be less susceptible to a ‘flavor of the day’ approach to policy development, and will be more resistant to the negative aspects of policy diffusion. Policy diffusion, where policies spread from one municipality to another, is not always positive (Shipman & Volden, 2012). The imitation and coercion mechanisms of policy diffusion can produce unintended consequences for the policy adopter, leading to unintended consequences such as a race to the bottom and the erosion of social equity programs (Shipman & Volden, 2012).

### **Intelligent Tax Policy**

The public expects government to make intelligent decisions, not just decisions (Pal, 2010).

*“Intelligent decisions come from operating within some consistent framework, however general..... the very nature of intelligent and accountable governance in a democracy demands more than mere decisions-it demands decision making guided by a framework. In short, we expect that our governments have policies” (Pal, 2010).*

Through establishing tax policies, municipalities have the opportunity to shape the structure and future of their communities (Kennedy & McAllister, 2005). The annual budget document is the way in which municipalities typically set tax policy in practice. While the annual budget is in fact a policy document as defined above, there is an important distinction between decisions

and intelligent decisions as noted by Pal. Without an established policy framework, intelligent policy decisions contained in the budget can only occur through happenstance and it is unlikely that the most appropriate tax policy decisions will be made in the absence of a framework. It is not enough to participate in a process of annual expenditure allocation, service level review, and tax rate and user fee determination. While establishing tax rates and collecting funds to pay for goods and services does represent tax policy (as illustrated above), these decisions must all flow from a pre-established tax policy framework in order to be considered intelligent. As is the case for income tax policies, modern evidence and experiences must be considered when analyzing existing property tax policy and developing policy goals for the future (Milligan, 2014).

#### **Dedicated Resources and Research Blueprints:**

One of the challenges facing municipalities in developing a tax policy framework is rooted in the complexity of the policy considerations, and the resources needed to adequately analyze and predict expected outcomes. At the Federal level, the Department of Finance has a dedicated tax policy branch. This branch is responsible for researching and analyzing the expected outcomes of various tax policy considerations, and for generating suggested alternative tax policy considerations (Ernewein & Horsman, 2013).

There appears to be minimal policy research that can be relied upon by municipalities to understand and anticipate the outcomes of their tax policy decisions. As a result, there is a lack of appropriate analysis, development, documentation and publication of tax policy decisions. This in turn results in very little strategic tax policy decisions at the municipal level beyond short term financial sustainability found in the annual budget process.

## 1.6.2 User Fees

Perhaps the greatest threat to progressiveness in municipal tax policy frameworks is the ever increasing reliance on user fees, a phenomenon that has been occurring in the drinking water sector. Property taxes are often cited as problematic due to the regressive nature of the tax, with a lack of association between the amount of tax paid, and the income of the payer. While the progressive nature of income tax improved income equality in Canada by 11%, the effect of property tax eroded the income inequality achieved by income tax by 2% (Chawla & Wannell, 2003). Further, households with an income below \$20,000 paid over 10% of their household income on property tax, while households with incomes above \$100,000 paid less than 2% (Palameta & Macredie, 2005). Unlike income taxes in Ontario, where the tax rate applied increases with greater amount of income earned, the *Municipal Act, 2001* only permits graduated property tax rates on commercial and industrial property classes. Thus a home valued at \$1 million will pay the same property tax rate as a \$100,000 home in the same municipality (though 10 times the total tax). Despite concerns related to property taxes and the ability to pay, there is at least a positive correlation between income and home values (Hancock, 2004), and thus an outcome where wealthier people, who own more valuable homes, pay more property tax. Such is not the case with flat user fees.

Flat user fees charge the same fee per household regardless of the consumption or use of the good. This would be reflected in the 'Flat Fee' water pricing model discussed earlier. This results in the wealthiest of residents paying the same for public services, such as for the supply of drinking water, as the poorest residents. This outcome makes flat user fees the most regressive income source for local government revenues. There are user fee models for

drinking water that improve the progressivity of user fees when they are linked to volumetric consumption and utilize inclining block pricing that provides at a very low cost (or no cost at all) a volume of water required for basic human needs.

## Part 2: The Affordability of Water in Windsor and Essex County

### 2.1 Literature Review

The published literature which explores the nature of water services, the affordability of water and the ways in which water should be priced, and the concept of social equity and fairness in water pricing, is quite extensive. This literature seems to suggest a consensus recognition of the trade-off between equity and efficiency in pricing the provision of the water services. In addressing, (or failing to address) this trade-off, the research typically takes one of three approaches. The approach depends greatly on whether water is being defined primarily as a private good (efficiency is dominant), as a public good (equity is dominant), or if the author(s) strives to address both economic efficiency with equity (equity and efficiency are balanced).

**Efficiency is dominant:** much of this line of research chooses to ignore the social equity consideration, focusing instead on pure economic and financial considerations in the pricing of water as a commodity. This research focuses on either capturing the 'full-cost' of providing water services and recommends a correlating pricing model that covers this cost, or by empirically suggesting that the current price being charged for water in the study area fails to even address direct cost of providing service. In the former, this includes capturing more abstract cost concepts in the provision of water services such as a rate of return on capital,

environmental costs such as pollution, raw water costs, and costing similar externalities associated with the consumption of energy in the supply of water (Renzetti & Kushner, Full Cost Accounting for Water Supply and Sewage Treatment: Concepts and Case Application, 2004) (Dupont & Renzetti, 2008). The latter examines actual cost recoveries through rates against the required revenues to maintain full cost recovery, concluding that rates are too low which results in over-consumption and a general lack of conservation.

**Equity is dominant:** Interpreting water as more of a public good results in various research conclusions supporting matters such as the human right to water in an affordable and socially equitable manner (Meier & et al, 2014) (Butts & Gasteyer, 2011). Similar research focuses less on determining whether the price charged for water is adequate to cover costs of providing the service, as is the case when efficiency is dominant, and instead determines the *affordability* of water for poor citizens, the ability to pay, and the benefit received (Pashardes & Hajispyrou, 2002). Building on the importance of water affordability, the research examines water pricing models, both utilized in practice or conceptualized in theory, that improve the affordability of water and improve social equity (Butts & Gasteyer, 2011) (Teodoro M. P., 2005) (Barberan & Arbues, 2009) (Wasimi & Hassa, 2012) (Goffa & Crow, 2014).

**Equity and efficiency are balanced:** Still other research examines the issue of water pricing while attempting to strike a balance between equity and efficiency in water pricing determination. This research explores the social considerations of affordability, ability to pay and benefit received, against efficiency measures such as full cost recovery, price, marginal benefit and cost parity, and conservation (Rogersa & et al, 2002) (Porcher, 2014) (Renzetti & et al, 2015).

Efficiency trade-offs and the externalities related to matters of conservation and preservation, cannot be ignored and must form part of any pragmatic and responsible water pricing model. A short description of existing literature aligning closely to this research paper includes the following:

**Organization for Economic Development and Co-Operation, *Social Issues in the Provision and Pricing of Water Services, 2002, Paris.***

The Organization for Economic Development and Cooperation examined the links between social issues and the pricing of water services. The report examined many aspects of the provision of water services provided by member countries, focused on the affordability of water services, and examined the social measures used by participating countries to address the issue of water affordability.

The report identified:

- i) The increasing cost of water service and the prediction of continued cost increases
- ii) The formal evidence of water affordability problems for low income households given income levels and the burden of water costs. The report suggested affordability problems in half of the member countries, either now or in the foreseeable future
- iii) The two main policy categories being implemented to address affordability challenges; income support and tariff adjustment, and the different ways in which both policy options were being used to address water affordability concerns.
- iv) As the cost of water continues to rise, there will be an increasing need for governments to address the affordability challenges through the use of the income support and tariff adjustment.

**Teodoro, Manuel P., *Measuring Fairness: Assessing the Equity of Municipal Water Rates*. American Water Works Association, 97 (4) 2005.**

This research developed metrics to measure water rate equity. The stated goal of the research was to provide information and education to those charged with determining water rates, and to provide additional tools in the rate setting process. The research identifies equity scores for individual water customers, as well as progressivity indexes for various water rate structures.

**Wasimi, S. A. and Hassa, S., *"Social Considerations in Domestic Water Pricing: A Case Study of Perth, Western Australia"*. Australian Journal of Water Resources, 15(2) 2012.**

The researcher conducted an in-depth examination of the existing Increasing Block Tariff (IBT) water rate structure of the City of Perth, Australia, in an attempt to identify a water rate structure that optimizes social equity. The researchers used an optimization tool to determine recommended block sizes and pricing tiers, while considering economic, environmental and social factors. Social considerations were operationalized into variables such as household size, incomes, etc. The pricing scheme was operationalized into fixed portions, various consumption blocks, and associated pricing blocks. The researchers were able to suggest a socially optimal IBT pricing model for the Perth water system through their research.

**Ramón Barberán, Fernando Arbués. *"Equity in Domestic Water Rates Design"*, Water Resources Management, 23(10) 2009.**

The stated objective of this paper was to examine the operational effectiveness of the equity criterion in domestic water rate design. Much like the intent of this research paper, the

authors were interested in contributing to a solution to the equity problems caused by the application of water rates. In particular, the authors were examining the impact of the increasing block tariff rate structure in relation to household size. The paper establishes and defines normative criteria used in determining equitable water pricing as follows:

- i) *Full Cost Recovery*: Revenues collected through the water rate design should cover expenditures resulting in a self-sustaining financial model or 'budget self-sufficiency'.
- ii) *Efficiency*: The maximizing of net community benefit, such that users will buy water in a quantity that gives a marginal benefit higher than the marginal cost, often adjusted for environmental considerations.
- iii) *Equity*: Includes philosophical and social considerations as well as value judgements. Approaches to equity include the benefit principle and the ability to pay principle. The former establishes pricing based on the benefit received, and is more suitable when the consumer has options, the latter better suited for public goods.
- iv) *Simplicity*: Rate structures should be cost-efficient to implement and manage, and the users of the system need to understand the system and the consequence of their actions.

The author then conducts a case study on Zaragoza, Spain. Based on an analysis and using the normative criteria, the article then proposes a design for a more equitable increasing block tariff water rate that ensures individuals will be able to meet their basic water needs at the same cost, regardless of the size of the household in which they live.

## 2.2 The Affordability of Water in Southwestern Ontario

Canada is globally recognized as having both accessible and affordable water for its citizens (Vander Ploeg, 2011). The access and affordability achievements are not universal however, with remote and indigenous communities struggling to build, operate and maintain adequate treatment facilities (Human Rights Watch, 2016). Furthermore, while affordability may be, on average, well within the range of affordability targets for the average population,



rising water rates may be posing affordability challenges for the poor of Ontario. This research will examine this consideration in more detail.

In order to examine water affordability in Southwestern Ontario, actual water rate data, both the rate model used, as well as the actual charges, was collected from the eight most Southern municipalities in Southwestern Ontario which make up the County of Essex and the City of Windsor. These municipalities include the Town of Amherstburg (Amherstburg), the Town of Kingsville (Kingsville) the Town of Lakeshore (Lakeshore), the Town of LaSalle (LaSalle) the Town of Tecumseh (Tecumseh), the Town of Essex (Essex), the City of Windsor (Windsor) and the Municipality of Leamington (Leamington).

The average water used per person per day in Canada; 251 liters (Environment Canada, 2014) multiplied by the average persons per household in Ontario; 2.6 (Statistics Canada, 2011), reveals the average Ontario household consumes just under 20 cubic meters of water per month. The 20 cubic meter average monthly water consumption was then used to calculate the average annual water bill for the nine communities examined using published 2016 Water Rates for the communities. The results are noted in Table 4 below:

**Table 4: Average Annual Cost of Water per Household**

Municipality	Monthly Fixed Charge	Cost / M3	Cubic Meters/ Person / Year	Average Persons / Household	Average Annual Cost / Household
Kingsville	\$ 5.67	\$ 0.90	92	2.6	\$ 282
LaSalle	\$ 15.00	\$ 0.87	92	2.6	\$ 387
Tecumseh	\$ 12.62	\$ 1.13	92	2.6	\$ 421
Leamington	\$ 21.06	\$ 0.79	92	2.6	\$ 441
Windsor	\$ 24.42	\$ 0.52	92	2.6	\$ 472
Amherstburg	\$ 20.05	\$ 1.06	92	2.6	\$ 493
Lakeshore	\$ 19.62	\$ 1.44	92	2.6	\$ 578
Essex	\$ 18.92	\$ 1.48	92	2.6	\$ 580

As is demonstrated above, there is great variation in water pricing, even within this cluster of communities in Southwestern Ontario. The highest annual cost (Essex) is over twice the cost of the lowest cost municipality (Kingsville).

While this paper is primarily examining the affordability of water services, a brief look at costs to provide sanitary services should also be explored in this section. The gross cost for the average Ontario household reviewed above does not take into account associated sewer surcharge costs. While one could argue that the sewer surcharge is applied for a completely different municipal service, most municipalities, including all of those examined in Southwestern Ontario, apply a mandatory sewer surcharge to user water bills, most of which is calculated based on water consumption. From a payment perspective, these public utilities treat the charges as one in the same. If a resident is to be supplied water, they must also pay a mandatory sewer surcharge if the service is available to them. This charge typically pays for the cost to collect, convey, and treat sanitary sewage. Much like the regressive nature of water charges, sanitary surcharges are the same for all residential users of the system, charging low income households the same rates as high income households. Table 5 indicates annual sewer surcharge costs in the subject municipalities.

**Table 5: Average Annual Sewer Surcharge per Household**

Municipality	Monthly Fixed Charge	Cost / M3	Cubic Meters/ Person / Year	Average Persons / Household	Average Annual Cost / Household
Kingsville*	\$ 24.52	-	92	2.6	\$ 294
LaSalle	\$ 6.00	\$ 0.87	92	2.6	\$ 279
Tecumseh	\$ 12.62	\$ 1.16	92	2.6	\$ 428
Leamington**	\$ 42.19	-	92	2.6	\$ 506
Windsor	\$ 15.87	\$ 2.35	92	2.6	\$ 750
Amherstburg	\$ 30.46	\$ 2.06	92	2.6	\$ 856
Lakeshore	\$ 15.07	\$ 1.30	92	2.6	\$ 490
Essex	\$ 19.16	\$ 1.68	92	2.6	\$ 630

\*Billing structure includes only fixed charges

\*\* 21 m3 per month included in fix charge. Average Consumption above < 21m3 per month.

The gross costs examined in tables 4 and 5 provide simply that, average cost of the service. In order to understand affordability of water generally, these costs must be compared against household income, and examined using a measure of affordability. Therefore Table 6 below introduces average household income to the examination of gross water costs to determine the average percentage of household income currently allocated to the purchase of drinking water in these communities. The United Nations Development Programme (UNDP) affordability threshold of requiring water cost to be less than 3 % of household income to be considered affordable, will be relied upon to determine affordability (UN Office of the High Commissioner for Human Rights, 2010).

The UN-Water Decade Programme on Advocacy and Communication and Water Supply and Sanitation Collaborative Council has determined that the cost for water and sanitation facilities and services should not exceed 5% of a household's income. If this is achieved, it should not affect the ability to purchase other services such as food, housing, health and education. (UN-Water Decade Programme on Advocacy and Communication and Water Supply and Sanitation Collaborative Council, 2011).

**TABLE 6: Water, Wastewater, and Combined Costs as a Percentage of Household Income**

Municipality	Average Annual Water Cost (See Table 4)	Average Household Income*	Water Cost as a % of Income	Average Annual Sanitary Sewer Cost (See Table 5)	Combined Water and Sanitary Sewer Costs	Combined Costs as a % of Income
Kingsville	\$ 282	78,942	0.36%	\$ 294	577	0.73%
LaSalle	\$ 387	103,034	0.38%	\$ 279	666	0.65%
Tecumseh	\$ 421	99,800	0.42%	\$ 428	849	0.85%
Leamington	\$ 441	65,713	0.67%	\$ 506	947	1.44%
Windsor	\$ 472	62,175	0.76%	\$ 750	1,223	1.97%
Amherstburg	\$ 493	86,116	0.57%	\$ 856	1,349	1.57%
Lakeshore	\$ 578	95,625	0.60%	\$ 490	1,069	1.12%
Essex	\$ 580	74,902	0.77%	\$ 630	1,210	1.62%

\* (Statistics Canada, 2011)

As is illustrated in Table 6, in all eight communities examined in Southwestern Ontario, water can be considered affordable for the average household. However, this consideration looks at average income, and does not measure impact on the poorest residents, who must pay the same price for drinking water as the wealthy. Water affordability will now be examined against the minimum income amounts of Ontario's three most prevalent income support programs (ODSP, OW, and Guaranteed Income Supplement).

## 2.3 The Affordability of Water for the Poor in Southwestern Ontario

### 2.3.1 Defining the Poor

Ontario has established three primary income support programs for the poorest of Ontario residents. While there are inevitably some residents who choose not to take advantage of the guaranteed minimum income supplements associated with these programs, for the purpose of this research, only the minimum income amounts under these

programs will be examined. Thus if an eligible individual(s) elected not to take advantage of the social assistance programs, they may survive on less than the minimum income amounts discussed below.

### **Ontario Works**

In the Province of Ontario, if a household does not have sufficient financial resources to meet basic living expenses, they will be eligible for financial assistance through the Ontario Works program. This income support is intended to help with the costs of basic needs, like food, clothing and shelter (Ontario Ministry of Community and Social Services, 2016). This program can be considered the basic social assistance or 'welfare' program in Ontario. The amount of financial assistance available will vary depending on the size of the family, the location, and various living expenses.

### **Guaranteed Income Supplement (GIS)**

To ensure a minimum income threshold for seniors in Canada, the Canadian Federal Government provides a Guaranteed Income Supplement (GIS) program to low income seniors (over the age of 65) who are also receiving the Old Age Security (OAS) benefit. The Guaranteed Income Supplement ensures that each and every Canadian over the age of 65 receives no less than \$17,544 in annual income (\$1,462 per month). Seniors earning less than \$17,544 will receive the supplement to raise their income to this minimum amount. Seniors with an income greater than \$17,544 will not receive the GIS (Government of Canada, 2016).

### iii) Ontario Disability Support Program (ODSP)

The Ontario Disability Support Program (ODSP) provides income support for disabled individuals living in Ontario who need financial help with basic living expenses. Much like OW and GIS discussed above, the ODSP social assistance program is means tested, and ensures a basic minimum amount of income for individuals with a disability.

A comparison of the minimum income amounts of the three main social assistance programs in the province of Ontario, is provided below:

**Table 7: Comparison of Minimum Annual Income for Social Assistance Programs in Ontario**

Social Assistance Program	Single	Couple	Single- 1 Child	Single- 2 Children	Couple- 1 Child	Couple-2 Children
GIS/GAINS	\$17,544	\$23,184	X	X	X	X
OW	\$8,472	\$13,140	\$12,948	\$14,940	\$15,132	\$17,172
ODSP	\$13,536	\$19,896	\$22,008	\$20,256	\$22,365	\$24,564

Source: (Income Security Advocacy Centre, 2016), (Government of Canada, 2016)

### 2.3.2 Examination of Affordability of Water for the Poor in Southwestern Ontario

In Table 8 below, the minimum income amounts identified in Table 7 are used to determine the affordability of water in the eight subject municipalities in Southwestern Ontario. The total annual estimated cost of water in each municipality identified in Table 8, is calculated using the actual 2016 water billing rate models for each municipality.

Table 8: Affordability of Water for the Poor

<b>Affordability of Water by Municipality (See Appendix A for further detail)</b>					
<b>Social Assistance Program</b>	<b>Income</b>	<b>Leamington</b>	<b>% of Income</b>	<b>Amherstburg</b>	<b>% of Income</b>
<b>GIS/Gains</b>					
Single	\$ 17,544	\$ 325	1.9%	\$ 338	1.9%
Couple	\$ 23,184	\$ 397	1.7%	\$ 435	1.9%
<b>OW</b>					
Single	\$ 8,472	\$ 325	3.8%	\$ 338	4.0%
Couple	\$ 13,140	\$ 397	3.0%	\$ 435	3.3%
Single- 1 Child	\$ 12,948	\$ 325	2.5%	\$ 435	3.4%
Single- 2 Children	\$ 14,940	\$ 470	3.1%	\$ 532	3.6%
Couple- 1 Child	\$ 15,132	\$ 470	3.1%	\$ 532	3.5%
Couple-2 Children	\$ 17,172	\$ 542	3.2%	\$ 629	3.7%
<b>ODSP</b>					
Single	\$ 13,536	\$ 325	2.4%	\$ 338	2.5%
Couple	\$ 19,896	\$ 397	2.0%	\$ 435	2.2%
Single- 1 Child	\$ 22,008	\$ 325	1.5%	\$ 435	2.0%
Single- 2 Children	\$ 20,256	\$ 470	2.3%	\$ 532	2.6%
Couple- 1 Child	\$ 22,365	\$ 470	2.1%	\$ 532	2.4%
Couple-2 Children	\$ 24,564	\$ 542	2.2%	\$ 629	2.6%

<b>Affordability of Water by Municipality (See Appendix A for further detail)</b>					
<b>Social Assistance Program</b>	<b>Income</b>	<b>Tecumseh</b>	<b>% of Income</b>	<b>Lakeshore</b>	<b>% of Income</b>
<b>GIS/Gains</b>					
Single	\$ 17,544	\$ 255	1.5%	\$ 367	2.1%
Couple	\$ 23,184	\$ 359	1.5%	\$ 499	2.2%
<b>OW</b>					
Single	\$ 8,472	\$ 255	3.0%	\$ 367	4.3%
Couple	\$ 13,140	\$ 359	2.7%	\$ 499	3.8%
Single- 1 Child	\$ 12,948	\$ 359	2.8%	\$ 499	3.9%
Single- 2 Children	\$ 14,940	\$ 463	3.1%	\$ 631	4.2%
Couple- 1 Child	\$ 15,132	\$ 463	3.1%	\$ 631	4.2%
Couple-2 Children	\$ 17,172	\$ 566	3.3%	\$ 763	4.4%
<b>ODSP</b>					
Single	\$ 13,536	\$ 255	1.9%	\$ 367	2.7%
Couple	\$ 19,896	\$ 359	1.8%	\$ 499	2.5%
Single- 1 Child	\$ 22,008	\$ 359	1.6%	\$ 499	2.3%
Single- 2 Children	\$ 20,256	\$ 463	2.3%	\$ 631	3.1%
Couple- 1 Child	\$ 22,365	\$ 463	2.1%	\$ 631	2.8%
Couple-2 Children	\$ 24,564	\$ 566	2.3%	\$ 763	3.1%

Table 8 Continued:

<b>Affordability of Water by Municipality (See Appendix A for further detail)</b>					
<b>Social Assistance Program</b>	<b>Income</b>	<b>Essex</b>	<b>% of Income</b>	<b>LaSalle</b>	<b>% of Income</b>
<b>GIS/Gains</b>					
Single	\$ 17,544	\$ 363	2.1%	\$ 260	1.5%
Couple	\$ 23,184	\$ 498	2.1%	\$ 339	1.5%
<b>OW</b>					
Single	\$ 8,472	\$ 363	4.3%	\$ 260	3.1%
Couple	\$ 13,140	\$ 498	3.8%	\$ 339	2.6%
Single- 1 Child	\$ 12,948	\$ 498	3.8%	\$ 339	2.6%
Single- 2 Children	\$ 14,940	\$ 634	4.2%	\$ 419	2.8%
Couple- 1 Child	\$ 15,132	\$ 634	4.2%	\$ 419	2.8%
Couple-2 Children	\$ 17,172	\$ 769	4.5%	\$ 499	2.9%
<b>ODSP</b>					
Single	\$ 13,536	\$ 363	2.7%	\$ 260	1.9%
Couple	\$ 19,896	\$ 498	2.5%	\$ 339	1.7%
Single- 1 Child	\$ 22,008	\$ 498	2.3%	\$ 339	1.5%
Single- 2 Children	\$ 20,256	\$ 634	3.1%	\$ 419	2.1%
Couple- 1 Child	\$ 22,365	\$ 634	2.8%	\$ 419	1.9%
Couple-2 Children	\$ 24,564	\$ 769	3.1%	\$ 499	2.0%

<b>Affordability of Water by Municipality (See Appendix A for further detail)</b>					
<b>Social Assistance Program</b>	<b>Income</b>	<b>Kingsville</b>	<b>% of Income</b>	<b>Windsor</b>	<b>% of Income</b>
<b>GIS/Gains</b>					
Single	\$ 17,544	\$ 150	0.9%	\$ 362	2.1%
Couple	\$ 23,184	\$ 233	1.0%	\$ 431	1.9%
<b>OW</b>					
Single	\$ 8,472	\$ 150	1.8%	\$ 362	4.3%
Couple	\$ 13,140	\$ 233	1.8%	\$ 431	3.3%
Single- 1 Child	\$ 12,948	\$ 233	1.8%	\$ 431	3.3%
Single- 2 Children	\$ 14,940	\$ 315	2.1%	\$ 500	3.3%
Couple- 1 Child	\$ 15,132	\$ 315	2.1%	\$ 500	3.3%
Couple-2 Children	\$ 17,172	\$ 398	2.3%	\$ 569	3.3%
<b>ODSP</b>					
Single	\$ 13,536	\$ 150	1.1%	\$ 362	2.7%
Couple	\$ 19,896	\$ 233	1.2%	\$ 431	2.2%
Single- 1 Child	\$ 22,008	\$ 233	1.1%	\$ 431	2.0%
Single- 2 Children	\$ 20,256	\$ 315	1.6%	\$ 500	2.5%
Couple- 1 Child	\$ 22,365	\$ 315	1.4%	\$ 500	2.2%
Couple-2 Children	\$ 24,564	\$ 398	1.6%	\$ 569	2.3%



The results of the affordability examination of the eight subject municipalities in Southwestern Ontario has revealed that the cost of water in these municipalities can, in almost all circumstances, also be considered affordable. The only exceptions were identified in the Ontario Works incomes as identified by the shaded cells.

### **Part 3: Improving Affordability and Equity through Water Pricing Methodology**

Municipalities wishing to implement intelligent and strategic tax policy to improve affordability and social equity in their communities, can establish water rate models to achieve the desired outcomes. While some rather unique water pricing methodologies have been examined and implemented worldwide to improve social equity in water pricing, such as inclining block tariff structures that are influenced by income and household size (Wasimi & Hassa, 2012), (Barberán & Arbués, 2009), such an approach would likely prove impractical in Ontario. Given the separation of jurisdictional authority between the Province of Ontario and Ontario municipalities, attempting to collect, maintain, and verify this additional customer information by municipalities for the sole purpose of determining household water rates would prove complicated and administratively burdensome. As a result, it is suggested that the three recommendations below would be practical and realistic considerations for Ontario municipalities wishing to adopt a more equitable manner in which to charge for water and to make water more affordable for those with the least ability to pay.

### 3.1 Recommendation #1: Use Alternative Revenue Sources to Cover Costs

The generally accepted principle, and legislative requirement in Ontario (Safe Drinking Water Act, 2002), that drinking water supply systems must have a fully sustainable financial model is often misinterpreted to mean that direct user fees must be set at a value to achieve full cost recovery. The notion that water supply systems must be fully self-sustaining through rates alone, and that direct fees charged for the delivery of water must cover all costs, is not a requirement in Ontario (Safe Drinking Water Act, 2002). Improving water affordability for low income households could involve moving some of the costs of the treatment and supply of drinking water away from user fees, and on to general taxation. There exists a long list of publicly supplied goods and services which have characteristics similar to that of drinking water, but that draw their funding from general taxation revenues such as property taxation, income tax revenues, commodity taxes, etc. In the local government context, this includes services such as recreation, sanitation, roads, and parks services. As a result, municipalities have the ability to use other revenue sources, such as property taxation revenue or provincial transfer payments (such as the unencumbered Ontario Municipal Partnership Fund (OMPF) for northern and rural communities), to reduce the price of water for residential consumers. While property tax is not typically considered progressive taxation, since property tax imposes taxes on the market value of the home as opposed to the income of the homeowner and does not consider the ability to pay, there nonetheless exists a correlation between the value of a home and the income of the homeowner (Hancock, 2004).

Water should not be isolated and treated as a distinct public good simply because consumption is easily measured. Much like the greater societal benefits derived from a publicly

funded health care system, providing clean, safe drinking water to residents has far reaching societal benefits and should not be approached as a commercial business transaction.

### 3.2 Recommendation #2: Use Strategic Inclining Block Tariff Structures

Only 9% of Ontario Municipalities are currently using inclining block tariff structures, while 65% use a uniform rate model (BMA, 2015). Inclining block structures have the benefit of permitting those with the least ability to pay, to consume less water and pay a lower rate for the water they consume. Wealthier customers, who consume more water than the poor (Wasimi & Hassa, 2012), would pay a higher cost for the water consumed above established thresholds.

It has been suggested that the water required to meet basic human needs and promote health is 50 liters(L) per person per day (5L drinking water, 20L sanitation, 15L bathing, 10L food preparation) (Gleick, 1999). Given that the average Canadian consumes over five times this amount at 251 liters per person per day (Environment Canada, 2011), it is clear that Canadians are excessive users of water. Despite this, and in recognition of the basic human right to water, it is recommended that a lifeline volume of water should be provided to each residential customer at minimal, to no charge. The lifeline quantity could be established at 130L per household day, or 4 cubic meters of water per residential customer per month (50 liters\*2.6 persons\*30days). Beyond this lifeline amount, the cost and volume included in the various block structures can be strategically established to promote conservation and give those with the least ability to pay to control their water consumption if they wish to do so.

### 3.3 Recommendation #3: Reduce Fixed Charges

High fixed charges reduce the incentive to conserve and results in those using less water per billing cycle, paying a higher average cost per unit of water consumed (the fixed costs are spread over less units consumed) . Residential customers that pay a fixed fee for water, as opposed to metered charges, use 65% more water per capita (Environment Canada, 2014). The higher the fixed fees, the more the billing structure will resemble a fixed fee model. As a result, fixed charges should make up a very minimal part of the average residential water bill. While determining the recommended fixed charge percentage of the bill is beyond the scope of this paper, it is suggested that a municipality's tolerance for managing revenue instability will play a large role in that determination. The higher the tolerance for revenue instability, the greater the ability to establish lower fixed charges. Of the eight municipalities examined in this paper, fixed costs made up 45% of the water bill on average (Table 4).

### 3.4 Conclusion

This paper has demonstrated that in the eight communities examined in Southwestern Ontario, residential drinking water can be considered quite affordable for the average household, and generally affordable even for the poorest households. Despite this affordability, this paper has also demonstrated that through establishing and implementing intelligent tax policy, municipalities can determine pricing strategies that shift some of the cost burden from those with the least ability to pay, to those with a greater ability to pay.

Further research topics related to this report include examining and identifying the optimal percentage of fixed fees in relation to the total average cost of water. This optimal

percentage would promote conservation and improve affordability for those with the least ability to pay. Additionally, defining the optimal 'blocks' in the inclining block ratio model, both from a volumetric as well as a cost perspective, will aid municipalities in determining a cost structure most likely to result in their desired policy outcomes. Understanding the factors that influenced municipalities to adopt more sophisticated pricing strategies, like the 32% of the 100 municipalities surveyed in the 2015 BMA Study who have adopted inclining , declining and humpback tariff pricing, would assist decision makers in advancing their own public policy agenda. Finally, research that examines what social factors, if any, Ontario municipalities have considered historically when establishing water pricing models, will help gain an appreciation for the current level of sophistication in the process of establishing municipal tax policy in this area.

While affordability examines the ability to pay, equity examines the fairness in the cost structure. With so much focus on quality assurance and regulatory compliance in the water sector in Ontario in the aftermath of the Walkerton tragedy, it is important to engage in conversation regarding access to water, affordability of water, intelligent tax policy, and equity in water pricing.

## Bibliography

- Barberan, R., & Arbues, F. (2009). Equity in Domestic Water Rate Design. *Water Resource Management, 23*(10), 2101-2118.
- Beaudoin, G.-A. (1990). *The Constitution of Canada*. Montreal: Wilson and Lafleur.
- Bird, R. M., & Slack, E. (2002). Land and Property Taxation: A Review. *World Bank Land Workshop, April 3-6, Budapest, Hungary*. Toronto: University of Toronto.
- BMA. (2015). *Municipal Study- 2015*. Hamilton: BMA Management Consultants.
- Broadbent Institute. (2014). *The Wealth Gap, Perceptions and Misconceptions in Canada*. Ottawa: Broadbent Institute.
- Brooks, N. (2002). The Second Decade- 1963-1972. *Canadian Tax Journal, 50*(2).
- Brown, C., Neves-Silva, P., & Hellor, L. (2016). The Human Right to water and sanitation: A new perspective for public policies. *Ciencia & Saude Coletiva, 21*(3), 661-670.
- Butts, R., & Gasteyer, S. (2011). More Cost per Drop: Water Rates, Structural Inequality and Race in the United States- The Case of Michigan. *Environmental Practice, 13*(4).
- Carlson, R. (2005, February). A Brief History of Property Tax. *Fair & Equitable, 3-10*.
- Chawla, R. K., & Wannell, T. (2003, July). Property Taxes. *Perspectives on Labour and Income, 4*(7), July 2003 Online Edition.
- City of Toronto. (2017). *Water Supply, Toronto's Water Supply History*. Retrieved from <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=71a8c0841486f310VgnVCM10000071d60f89RCRD&v>
- Cote, A., & Fenn, M. (2014). Provincial-Municipal Relations in Ontario: Approaching an Inflection Point. *IMGF Papers on Municipal Finance and Governance, 17*.
- Di Matteo, L. (2016, October 16). *Municipal finances in Ontario—growing water charges, too*. Retrieved 2016, from Fraser Forum, Fraser Institute Blog: <https://www.fraserinstitute.org/blogs/municipalfinancesinontariogrowingwatercharges too>
- Dupont, D. P., & Renzetti, S. (2008). Good to the Last Drop? An Assessment of Canadian Water Values. *Canadian Water Resource Journal, 33*(4), 369-380.
- Environment Canada. (2011). *2011 Municipal Water Use Report*. Ottawa: Environment Canada.
- Environment Canada. (2014). *Canadian Environmental Sustainability Indicators: Residential Water Use in Canada*.

- Ernewein, B., & Horsman, N. (2013). *The Process for Making Tax Policy in Canada*. Toronto: Canadian Tax Foundation.
- Fraser Institute. (2015). *Taxes Versus the Necessities of life: The Canadian Consumer Tax Index*. Fraser Institute.
- Gleick, P. (1999). The Human Right to Water. *Water Policy*, 1(5), 487-503.
- Goffa, M., & Crow, B. (2014). What is Water Equity? The unfortunate consequences of a global focus on 'drinking water'. *Water International*, 39(2), 159-171.
- Government of Canada. (2016). *Old Age Security- Overview*. Retrieved from <https://www.canada.ca/en/services/benefits/publicpensions/cpp/old-age-security.html>
- Hancock, J. (2004). *The Correlation Between Income and Home Values*. South Australia: The SA Centre for Economic Studies.
- Human Rights Watch. (2016). *Make it Safe: Canada's Obligation to End the First Nations Water Crisis*. Human Rights Watch. Retrieved from <http://www.hrw.org>
- Income Security Advocacy Centre. (2016). *OW & ODSP Rate Increases and the Ontario Child Care Benefit*. Toronto: Income Security Advocacy Centre.
- Kennedy, W., & McAllister, M. L. (2005). Politics of Municipal Property Taxes: Implications for Decision-making. *Canadian Public Administration*, 42(2), 207-230.
- Levasseur, J., & Marcoux, J. (2015, 10 15). *CBC News*. Retrieved from Bad water: 'Third World' conditions on First Nations in Canada: <http://www.cbc.ca/news/canada/manitoba/bad-water-third-world-conditions-on-first-nations-in-canada-1.3269500>
- Liu, L., & et al, .. (2012). Global, regional and national causes of child mortality: an updated systematic Analysis for 2010 with trends since 2000. *Lancet*, 9(379), 2150-61.
- McIntyre, O. (2014). The human right to water and reform of the Irish water sector. *Journal of Human Rights and the Environment*, 5(1), 74-101.
- Meier, B., & et al, .. (2014). Translating the Human Right to Water and Sanitation into Public Policy Reform. *Science and Engineering Ethics*, 20, 833-848.
- Milligan, K. (2014). *Tax Policy for a New Era: Promoting Economic Growth and Fairness*. C.D. Howe Institute Benefactors Lecture.
- Ministry of Public Infrastructure Renewal. (2005). *WATERTIGHT: The case for change in Ontario's water and wastewater sector*. Toronto: Queen's Printer for Ontario.
- MPAC. (2016). *Guide to Property Assessment in Ontario*. Retrieved from Municipal Property Assessment Corporation Web site: [www.mpac.ca/PropertyOwners/MPACsRple/assessmentGuide](http://www.mpac.ca/PropertyOwners/MPACsRple/assessmentGuide)

- National Academy of Public Administration. (2017, 02 22). *Social Equity in Governance*. Retrieved from National Academy of Public Administration: <http://www.napawash.org/fellows/standing-panels/social-equity-in-governance.html>
- OECD. (2002). *Social Issues in the Provision and Pricing of Water Services*. Paris: Organisation for Economic Co-operation and Development Publication Service.
- Ontario Ministry of Community and Social Services. (2016). *Ontario works Overview*. Retrieved from <http://www.mcsc.gov.on.ca/en/mcsc/programs/social/ow/>
- OSWCA. (2001). *Drinking Water Management in Ontario: A Brief History*.
- Pal, L. (2010). *Beyond Policy Analysis: Public Issue Management in Turbulent Times* (4th ed.). Toronto: Nelson Education.
- Palameta, B., & Macredie, I. (2005, March). Property Taxes Relative to Income. *Statistics Canada Perspectives*, 1.
- Pashardes, P., & Hajispyrou, S. (2002). *Consumer Demand and Welfare Under Increasing Block Pricing*. University of Cyprus, Department of Economics. University of Cyprus.
- Porcher, S. (2014). Efficiency and Equity in two part tariffs: the case of residential water rates. *Applied Economics*, 46(5), 539-555.
- Province of British Columbia. (2000). *Youth Policy Framework*. Ministry for Children and Families.
- Renzetti, S., & et al. (2015). An empirical examination of the distributional impacts of water pricing reforms. *Utilities Policy*, 34, 63-69.
- Renzetti, S., & Kushner, J. (2004). Full Cost Accounting for Water Supply and Sewage Treatment: Concepts and Case Application. *Canadian Water Resource Journal*, 29(1), 13-22.
- Rogersa, P., & et al, .. (2002). Water is an economic good: How to use prices to promote equity, efficiency and sustainability. *Water Policy*, 4, 1-17.
- SACES. (2004). *The Correlation Between Income and Home Values: Literature Review and Investigatio nof Value*. South Australia: The South Australian Centre for Economic Studies.
- Safe Drinking Water Act. (2002). *Ontario Regulation 453/07, Financial Plans*. Ontario.
- Sancton, A. (2015). *Canadian Local Government- An Urban Perspective*. Don Mills: Oxford University Press.
- Scott, J. C. (1969). *Water Saga, OWRC- A Story of Water Management in Ontario, 1956-1968*. MOE Publication.



- SDWA. (2002). Safe Drinking Water Act. Ontario.
- Shipman, C. R., & Volden, C. (2012, November/December). Policy Diffusion: Seven Lessons for Scholars and Practitioners. *Public Administration Review*.
- Shubsole, D., & Draper, D. (2007). *"On Guard for Thee? Water (Ab)uses and Management in Canada"*. UBC Press.
- Slack, E. (2002). Property Tax Reform in Ontario: What Have We Learned? *Canadian Tax Journal*, 50(2), 576-585.
- Statistics Canada. (2011). Census of Population . *Statistics Canada catalogue no. 98-313-XCB*.
- Statistics Canada. (2011). *National Household Survey. Catalogue No. 99-004-XWE*. Ottawa: Statistics Canada.
- Suzuki, D. (2017, February 16). *Government must do more to address First Nations' water woes*. Retrieved from David Suzuki Foundation: <http://www.davidsuzuki.org/blogs/science-matters/2017/02/government-must-do-more-to-address-first-nations-water-woes/>
- Teodoro, M. P. (2005). Measuring Fairness: Assessing the Equity of Municipal Water Rates. *American Water Works Association*, 97(4), 111-124.
- The Council of Canadians. (2017, 07 22). *Safe Water for First Nations*. Retrieved from The Council of Canadians: <https://canadians.org/fn-water>
- The Irish Times. (2014, November 19). *A Brief History of Water Charges in Ireland*. Retrieved from The Irish Times: <https://www.irishtimes.com/news/politics/a-brief-history-of-water-charges-in-ireland-1.2007574>
- Thompson, D. e. (2014). *Funding a Better Future: Progressive Revenue Sources for Canada's Cities and Towns*. Canadian Union of Public Employees.
- UN Office of the High Commissioner for Human Rights. (2010). The Human Right to Water, Fact Sheet No. 35.
- UNGA, U. N. (2010). Human Right to Water and Sanitation. Geneva: UN Document A/RES/64/292.
- University of Ottawa. (2017, 01 17). *Canada's Legal System - Sharing of Legislative Powers in Canada*. Retrieved from University of Ottawa: [https://slmc.uottawa.ca/?q=laws\\_canada\\_legal](https://slmc.uottawa.ca/?q=laws_canada_legal)
- UN-Water Decade Programme on Advocacy and Communication and Water Supply and Sanitation Collaborative Council. (2011). *The Human Right to Water and Sanitation*. Zaragoza, Spain.

Vander Ploeg, C. G. (2011). *Water Pricing: Seizing a Public Policy Dilemma by the Horns*. Canada West Foundation.

Wasimi, S., & Hassa, S. (2012). Social Considerations in Domestic Water Pricing: A Case Study of Perth, Western Australia. *Australian Journal of Water Resources*, 15(2), 131-144.

Water Canada. (2010, July 29). *WaterCanada.net*. Retrieved from Canada Abstains from UN Water Vote: <http://watercanada.net/2010/canada-abstains-from-un-vote/>