Building Sustainable Communities Through Market-Based Instruments

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Please use this citation:

Zhou, Y., Clarke, A., & Cairns, S. (2020). Building Sustainable Communities Through Market-Based Instruments (pp. 233-247). Walker, T., Goubran, S. & Sprung-Much, N. (Eds.) *Environmental Policy: An Economic Perspective.* USA: Wiley Blackwell. DOI: https://doi.org/10.1002/9781119402619.ch14

Abstract

Local Agenda 21s (LA21s), also known as community sustainability plans, consider integrated ecological, social, and economic topics all in one strategic plan. With over 1000 LA21s in Canada, most municipalities prioritize water near the top of their plans. Over 97.4% of the plans contain water-related goals and objectives. While many communities have adopted a form of community sustainability plan, there are only a few that are successful in implementing the objectives and documenting the strategies.

This chapter discusses the roles of market-based instruments (MBIs) in the implementation of LA21s and associated limitations. The use of MBIs offers the potential to bridge the barriers between planning and implementation, complementing the traditional approaches in addressing local water challenges. The chapter also provides background information on the water-related content of a typical community sustainability plan, as well as the water section of the Sustainability Alignment Methodology (SAM). SAM is a methodological tool that aligns the MBIs under the municipal jurisdiction with the environmental goals of the LA21s.

Keywords

market-based instruments
sustainable community
water legislation
water management
environmental policy
sustainability

14.1. Introduction

Sustainable development and water management have become increasingly important at the local level. At the United Nations Conference on Environment and Development in 1992, national governments adopted Agenda 21, and one paragraph within that visionary document explicitly calls for critical action at the local scale (Clarke 2014). Emerging from Agenda 21, Local Agenda 21 (LA21) offers the opportunity for local governments to take a prominent role in sustainable community planning and development initiatives (Freeman 1996). More recently, the need for local sustainable development was reiterated through Sustainable Development Goal 11 – sustainable cities and communities (United Nations 2015).

LA21s integrate ecological, social, and economic topics in one strategic plan to help communities identify and document areas for sustainable improvements, and determine their long-term vision (anywhere from five to 100 years) (Clarke 2011, 2014). Some of the other standard terms for LA21 are Integrated Community Sustainability Plans (ICSPs), Sustainable Community Plan (SCP), Municipal Sustainability Plan, and Local Action Plans (Parenteau 1994; Clarke and MacDonald 2012). While many communities have adopted a form of LA21, only some are successful in implementing the objectives (Clarke and Fuller 2010; MacDonald et al. 2018). Thus, it becomes increasingly difficult to ignore the barriers between planning and implementing such plans (Gahin et al. 2010; Hendrickson et al. 2011).

Although municipalities have developed goals and targets to address their water concerns, one of the main barriers to implementation is the lack of sufficient and stable financial resources (Cantin et al. 2005; Gahin et al. 2003; Hendrickson et al. 2011). Compared with the international community, Canadians have higher rates of water consumption but pay a small price for water use (Cantin et al. 2005). However, raising prices without considering other alternatives, such as changing the pricing structure, may promote undesired and unsustainable water consumption patterns (Dinar et al. 1997). With over 1000 LA21s in Canada, most municipalities prioritize water near the top of their plans, with over 97.4% of the plans containing water-related goals and objectives (Clarke et al. 2019).

In order to advance water sustainability among Canadian communities, the “plan–implementation gap” of LA21s needs to be addressed (Hendrickson et al. 2011). The use of market-based instruments (MBIs) offers the potential to bridge the barriers associated with implementation. Pricing and market signals have the power to stimulate behavior changes and a paradigm shift through economic rationales (Hendrickson et al.

2011). MBIs serve as policy tools to mitigate the limitations of conventional regulatory and legislative approaches through combinations of pricing, taxes, charges, and subsidies (Bosquet 2000; Stavins 2003; Hendrickson et al. 2011). Thus, they could be complementary to the traditional regulatory approach of addressing water challenges. In fact, the use of pricing is deemed to be more cost-effective for demand management compared to regulations or other nonprice conservation methods (Olmstead and Stavins 2009).

This chapter will summarize the existing best practices at the intersection of sustainable development and water management. It will also examine the role of MBIs in the implementation of LA21s and their limitations at the local level. Finally, it will provide a list of MBIs relevant to water, wastewater, and stormwater management by local governments. The findings present over 15 MBIs across four different water subtopics and make a significant contribution to sustainable community development by providing an improved understanding of MBIs for implementing LA21s.

14.2. Literature Review

14.2.1. Sustainable Development and Sustainable Development Goals

Sustainable development was first defined in the Brundtland Report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987, p. 43). Governments, international agencies, and organizations undertook numerous initiatives across the world to address sustainability challenges (Roseland 2000). However, their impacts were mostly minimal (Mebratu 1998). In addition, these localized initiatives have led to many different interpretations of the concept of sustainable development (Mebratu 1998).

The most commonly accepted concept is the three pillars of sustainable development, which represent the environment, economy, and society. They are generally represented by a “Venn diagram model” or “concentric circles model” to illustrate the interaction and relationship between the three pillars (Campbell 1996; Lozano 2008). The two models present different perspectives on the connection between the three pillars. In the Venn diagram model, environment, society, and economy are equally important in achieving sustainable development (Campbell 1996). In contrast, the concentric circles model highlights a hierarchical relationship for sustainable development, where the environment is the most important (Lozano 2008). The three pillars of sustainable development can be further divided into those that need to be sustained: nature,

life supports, and community; and those that need development: people, economy, society (Robert et al. 2005). The concept of sustainable development has been continuously improved and refined ever since.

In September 2015, the UN member states adopted the 2030 Agenda for Sustainable Development (United Nations 2015). This 15-year framework builds on Agenda 21 and the Millennium Development Goals to ensure that all countries can take action in achieving sustainable development (United Nations 2015). It integrates and balances the initial three pillars of sustainable development with additional elements such as governance, peace, and justice. With over 17 goals, 169 targets, and 230 indicators, the new agenda for sustainable development envisions environmental prosperity, social, and gender justice, eradication of poverty and hunger, and universal health and education (United Nations 2015). The Sustainable Development Goals (SDGs), which are part of the 2030 Agenda, have been highly instrumental in the field of sustainability management.

Canada has already begun actively participating in conferences, forums, mutual learning, and exchange of experience concerning the 2030 Agenda for Sustainable Development. Canada's Federal Sustainable Development Strategy for 2016–2019 is now linked to advancing many of the SDGs, and the federal government is developing an inclusive approach to implementation of the SDGs domestically and internationally (Government of Canada 2018).

14.2.2. Sustainable Community Plans/Local Agenda 21s

LA21s could be used to localize the SDGs. Currently, there are over 10 000 LA21 (or equivalent) initiatives around the world (ICLEI 2012). A sustainable community should continuously supply the social and economic needs of the residents, as well as maintain the environment's ability to sustain the demand (Roseland 2000). According to Roseland (2000), the six community capitals – natural, physical, economic, social, human, and cultural – need to be carefully managed to ensure that they will sustain the needs of future generations (Roseland 2000). A goal of sustainable community development and LA21s is for local governments to improve and strengthen all six forms of community capital through collaborative strategic planning and implementation (Clarke and Fuller 2010; Roseland 2012). The goals and objectives outlined in an LA21 are closely aligned with the six forms of community capital and integrate the three pillars of sustainability: society, economy, and environment (Clarke 2011; MacDonald et al. 2018).

In 1992, Hamilton established the first LA21 in Canada, Vision 2020 (Clarke 2012; Clarke and MacDonald 2012). Municipalities and communities who are actively involved in the planning of LA21s are also becoming interested in the implementation of LA21s to address environmental, social, and economic problems (Berke and Conroy 2000; Clarke and Erfan 2007; Hendrickson et al. 2011). Municipalities can continuously provide enormous opportunities to address sustainability challenges. They have the capability to manage their resources sustainably (Roseland 2000) and are important actors in reaching the new SDGs and targets. Local sustainable development and community planning can address environmental, social, and economic issues and generate possible additional revenue (Roseland 2000; Zokaei et al. 2017).

14.2.3. Sustainable Development and Water

Although Canada is fortunate to have an abundant supply of water resources, the available water resources per capita globally have dropped by more than half in the past 50 years (Dinar and Saleth 2005). Furthermore, it is anticipated that by 2050, water availability per capita will drop by 10–20% of what it was in 1955 regardless of the initial water availability and state of development (Dinar and Saleth 2005).

With Canada ranked as the second highest in the rate of water consumption, one of the biggest challenges of providing water to communities is the ability to support the increased level of water consumption and the increasing urban population (Cantin et al. 2005). For Canada, urbanization presents a key issue since over 80% of Canadians currently live in urban communities and over 68% live in a census metropolitan area (CMA) (Statistic Canada 2008). Infrastructure maintenance, water quality, and demand management are also among the water concerns for municipalities (Cantin et al. 2005). However, most of the municipal water pricing structure continues to remain stagnant. If the misalignment between water pricing and consumption is not further addressed, municipal governments will likely be faced with numerous liability concerns (e.g., current subsidies for the price of water).

LA21s typically integrate key areas of municipal concerns. In terms of water management, most municipalities are responsible for drinking water and urban wastewater treatment and hold partial authority over water resource management for the local area (Environment Canada 2010). Thus, some of the critical concerns are the quality of water, consumption and treatment; wastewater and stormwater management; and protection of water resources and watershed ecosystems (Environment Canada 2010; United Nations 2015). Most Canadian municipalities have developed strategic goals and plans to address water, wastewater, and

stormwater concerns in their community (Clarke et al. 2019). However, many Canadian communities are experiencing a significant “planning–implementation gap” along with the economic pressures associated with sustainable community governance and development (Hendrickson et al. 2011).

14.2.4. Market-Based Instruments and Water

Market-based instruments are policy tools that encourage behavioral change through market signals (Scoccimarro and Collins 2008). They are used to mitigate the limitations of conventional regulatory and legislative approaches (Hendrickson et al. 2011) and serve as implementation tools for LA21s.

The use of MBIs could help overcome the barriers associated with the SCP and implementation. Pricing signals and market power have the potential to stimulate behavior changes through economic rationales (Hendrickson et al. 2011). This research focuses on three types of MBIs: price-based instruments, rights-based instruments, and friction reduction instruments. Priced-based instruments address environmental impacts using pricing and economic signals (Sargent 2002; Whitten et al. 2003; Clarke and MacDonald 2012). This type of MBI can also be classified as a financial instrument that diversifies local revenue streams (Jacobs 1993; Roseland 2000). Rights-based instruments are those that control the type of goods and services produced (Whitten et al. 2003). Contrastingly, through price-based approaches, the government is able to establish limits on the quantity or quality of goods and services, while the price reflects the market's response (Whitten et al. 2003). Finally, friction reduction instruments aim to influence behavioral change through improving market functions, addressing market power (monopoly), externalities, and information failures (Hahn and Stavins 1991; Clarke and MacDonald 2012).

To move beyond the current limitations, there is a need for the implementation of innovative approaches to sustainability. The traditional approaches are often “command-and-control” regulations, where standards are uniform and environmental burdens are equally shared (Stavins 2003). These conventional approaches effectively limit environmental pollutants and distribute the costs equally (Stavins and Whitehead 1996). Thus, traditional approaches are inadequate in aligning economic drivers with sustainability objectives (Stavins 2003; Hendrickson et al. 2011). Moreover, they may also result in unacceptable expenses and high societal costs as individuals vary in their contribution to environmental problems (Stavins and Whitehead 1996). Furthermore, utilizing “command-and-control” regulations to achieve sustainable community development tends to result in nothing more than compliance (Stavins 2003). Little or no financial incentive

exists for those who strive to achieve objectives beyond the minimal requirements and standards, while also discouraging changes in policies and governance structure (Roseland 2000; Stavins 2003).

By contrast, MBIs for sustainable community development offer greater flexibility, accountability, and transparency (Stavins 2003; Hendrickson et al. 2011). They also help to improve the allocation of environmental resources and the dissemination of information for individuals and society (Pirard and Lapeyre 2014). The financial incentives associated with MBIs motivate communities to better manage their community capitals, especially natural capitals (Roseland 2000; Henderson and Norris 2008). Additionally, MBIs are intended to be market-friendly and improve market efficiency if adequately designed (Hendrickson et al. 2011). MBIs can thus be used on their own or in conjunction with regulations.

Water pricing is often a mechanism to reduce water demands and consumption (Ruijs et al. 2008). Moreover, price structure (e.g., flat rates, unit pricing) has more influence on water demand and consumption compared to price level (Reynaud and Renzetti 2004). Cities in China with block pricing structures experienced a decrease in residential water demand by 3–5% compared with cities that had flat rates (Zhang et al. 2017). In fact, using pricing is considered to be more cost-effective for demand management than “command-and-control” regulations or other nonprice conservation methods (Olmstead and Stavins 2009). Aside from demand management, other well-known examples of MBIs for water include effluence charges and tradable permits (Stavins 2003, Cantin et al. 2005). Importantly, MBIs must not be regressive, and vulnerable populations also need to be considered. Thus, the proper design of MBIs remains crucial to alleviate these concerns.

Market-based instruments for water management have two key roles: (i) a financial role as a mechanism for generating municipal revenue, and (ii) an economic role for signaling the scarcity value and the real cost of water (Dinar and Saleth 2005). MBIs for water could also promote equity by identifying usage of individual users and points of pollution, thus accurately awarding beneficial behaviors and penalizing negative ones (Dinar and Saleth 2005). However, it is important to note that they also have their limitations. For example, there is no guarantee that one will gain advantages from using MBIs because two critical factors affect the use and effectiveness of the MBIs: (i) the nature of the environmental problem/objective; (ii) the state of the market and the government (Whitten et al. 2003; Broughton and Pirard 2011).

The success of MBIs is determined by the nature of the environmental problem-objective. To start, the gain from MBIs for environmental problems must exceed their cost to ensure success (Guerin 2003). Point sources and stationary environmental problems are more amenable to the use of market instruments compared to nonpoint sources and mobile environmental problems (National Center for Environmental Economics 2015). However, MBIs will be more cost-effective and beneficial if there is a higher degree of heterogeneity among the polluters (Stavins 2003). Since the degree of uncertainty regarding environmental problems affects effectiveness of MBIs, they tend to be more effective (Stavins 2003; National Center for Environmental Economics 2015). Lastly, clearly defining rights and responsibilities, as well as who pays and who will benefit, is necessary to ensure the effectiveness of an MBI (Whitten et al. 2003).

The market and the government have also played an influential role in the use and effectiveness of MBIs. Sufficient levels of political support are required to ensure the success of such instruments (Whitten et al. 2003). Moreover, transparency and information disclosure are critically important (National Center for Environmental Economics 2015). Lack of information is likely to discourage the proper design and use of MBIs (Kulsum 2012). Furthermore, market competitiveness also determines the design and price of MBIs (National Center for Environmental Economics 2015). Therefore, MBIs are by no means a replacement for the traditional command-and-control approach of implementation. In fact, they work to complement the traditional approach because each of the two could operate differently under different circumstances. The appropriate choice of MBIs will be essential in ensuring their successful implementation and practical results. This chapter explores the potential of MBIs as an alternative or complement to implementing water-related goals in the LA21s.

14.3. Research Design and Limitations

14.3.1. Research Design

This research utilized a multiphase qualitative approach to conduct an in-depth analysis of the use of MBIs in mid-sized municipalities from Ontario, Canada. Phase one of the research focused on the construction of the framework from academic and gray literature. In preparation for the case studies, a list of existing and emerging MBIs was created for the implementation of LA21s.

The case study approach was used in order to gather the amount of data necessary in the most effective

manner (Yin 2009; Creswell 2014). Rather than using a single source, a multicase study analysis increased the level of accuracy and validity of the results (Creswell 2014). Thus, two municipalities were chosen for case studies, and a set of criteria were applied to identify potential municipalities for a comparative case study analysis.

- Due to funding restrictions, the communities must be within the Province of Ontario.
- The communities had LA21s (as determined by the Canadian Sustainability Plan Inventory) and were at least 2–3 years into the implementation phase of their LA21s (University of Alberta 2014).
- The communities had a population of over 100 000 (as determined by the population listed in the 2008 Census of Canada) and were similar in size.
- The communities had similar characteristics in their plans (e.g., age and time horizon of the plans).
- The communities were willing to engage in the research project and participate in focus groups.
- The communities had different governance structures. Each community must represent either a two-tier or a single-tier municipal structure.

A number of Canadian municipalities matched the above criteria. For this research, the City of Kingston was selected as the single-tier municipality, and the Region of Waterloo (which includes the cities of Kitchener, Waterloo, and Cambridge) was selected to represent the two-tier municipal structure. Both of the communities selected are located in southern Ontario, have LA21s (the lower-tier municipalities in the Waterloo Region all have their plans), and are considered leaders in community sustainability. The cities had already implemented numerous environmental initiatives, gained several awards, and received recognition for their efforts. They also had displayed a keen interest in and commitment to this research.

Moreover, both municipalities are also located within a major watershed. The City of Kingston is located within the Cataraqui watershed and the Region of Waterloo is part of the Grand River watershed. These major watersheds are essential parts of the water management for each municipality. The municipalities hold partial responsibility for their watershed and are active in the protection and management of the watersheds.

A half-day focus group was held in each community to gather data from the municipalities. The participants were the staff most familiar with the MBIs used for implementing the LA21 in their community. The objective of this focus group was to discuss the draft MBIs with the participants and gather feedback for

further revisions. The participants were invited to provide feedback about the draft MBIs. The Chatham House Rule was enforced during the focus group, so the participants at the meeting were free to use information from the discussion but were not allowed to reveal the identity of the person commenting. This design enabled open discussion during the focus groups while ensuring that participants' specific comments remained anonymous.

14.3.2. Limitations

First, this chapter is focused on the use of MBIs for implementing water, wastewater, and stormwater goals in the LA21s. Thus, the MBIs outlined in this chapter only consider residential water concerns under municipal jurisdiction. For example, when considering water consumption, residential water uses account for only 5–10% of the total available water use, while irrigation accounts for 70–90% (Dinar and Saleth 2005), Therefore, the generalization of the MBIs in this chapter is limited to the implementation of water, wastewater, and stormwater goals within the municipal jurisdiction.

The second challenge of this research is attributable to funding constraints, which limited the case studies to Ontario communities Although focus group discussions and the resulting MBIs tool were both successful, more communities across a broader geographical boundary could have been involved in the research to help to ensure that broader generalizations could be made. The preference would have been to conduct multiple focus groups across Canada.

14.4. Results

14.4.1. Sustainability Alignment Methodology

The Sustainability Alignment Methodology (SAM) is used by practitioners to align the MBIs under the municipal jurisdiction with the environmental goals of the LA21s (Cairns et al. 2015). The Water section in the SAM identifies relevant MBIs for water, wastewater, and stormwater, as well as the associated municipal departments related to these MBIs. The listed MBIs are presented in Table 14.1.

Table 14.1 Market-based instruments (MBIs) for water, wastewater, and stormwater

	Water quality	Water consumption and wastewater treatment	Water source (groundwater and surface sources)	Other
Price-based instruments	• Charges for biochemical oxygen demand (BOD) loading • Nitrogen levy • Phosphorus levy • Incentive for bio-swales	• Water rebates • Funds to support water, wastewater treatment infrastructure • Water pricing structure • Stormwater utility charges • Subsidies for rain barrels		• Other subsidies, funds, and grants
Rights-based instruments	• Water quality permit trading			
Market-friction reduction instruments	• Water quality program • Certification program (e.g., smart salt application) • Stormwater management	• Stormwater management	• Water source protection incentive programs or policy	• Green public procurement • Partnership approach • Education programs • Reporting requirements
Department/location	• Municipal utilities • Water services department • Environmental services department			

Regarding the appropriateness of the subtopics, one participant pointed out that a critical subtopic for the water section is its source.

> Source really [influences] the types of programs you have, whether it is surface water or groundwater here. It changes your protection mechanisms … and may affect the conservation bylaw.

Aside from the inclusion of the source of water, most participants agreed with the terms used for the subtopics. In addition to the modification of subtopics, the participants also suggested changing the topic names to water, wastewater, and stormwater to avoid confusion with the waste section.

Out of all the water-related MBIs identified from the literature, only water extraction charges are not within the municipal jurisdiction. Also, the structure of nitrogen and phosphorus levies may vary between communities. Surcharges or levies are available in communities with heavy loading bylaws; otherwise, fines are applied to the effluents. In addition, participants identified additional water-related MBIs under the municipal jurisdiction. One participant mentioned stormwater utility charges and associated water rebates.

> You pay for the stormwater you create, which is based on how impervious your site is. It was a new utility fee that was introduced a couple of years ago. As part of that, they also have [a] rebate program. If you have the infrastructure, such as a rain barrel, or a rain garden, you may pay less on the stormwater utility rate.

Other MBIs mentioned during the focus groups were water quality programs and education programs.

Regarding the location of information, the results obtained from both focus groups resonated with the publicly accessible information. The local utility company, water services departments, and environmental services departments are responsible for the implementation of water-related MBIs.

14.4.2. Policy Relevance

Canada has committed to over $59.8 million for programming to support the implementation of the SDGs. The information from this research offers a complementary approach toward achieving the global SDGs, particularly SDG 6: Ensure availability and sustainable management of water and sanitation for all, and SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable (United Nations 2015). To achieve the specific actions within these goals by 2030, communities must plan and take the approximate action to update and/or implement their LA21s (in Canada, often these are called ICSPs). The SAM helps the Canadian municipal government to accurately pinpoint the appropriate MBIs to implement individual water-related objectives in a LA21 and locates relevant municipal departments.

14.4.3. Limitations of Implementing Market-Based Instruments at the Local Level

The two most important lessons learned from the focus group are: (i) currently, municipal governments have a limited amount of authority over MBIs; (ii) some MBIs may have high implementation costs and disincentives.

The first lesson learned from the two focus groups is that currently, municipal governments only have limited authority in implementing MBIs. In many cases, municipalities are already stretching the limits of their power. It is crucial to identify and distinguish the types of MBIs within municipal jurisdictions. Many of the MBIs shared during the focus group were market friction reduction MBIs.

Another lesson is that the costs of implementing MBIs vary between MBIs. Some have high upfront costs, which may discourage implementation and municipal uptake. Thus, it is important to acknowledge both the environmental incentive and the financial burden for such an MBI. It is equally important to assess (i) the cost-effectiveness of various MBIs, especially with regard to subsidies and the free-rider effect; and (ii) the cost-effectiveness of a market-based approach, compared to alternative policies.

14.5. Conclusion

Although MBIs are becoming more prominent in sustainability, research on this topic remains scattered. The research conducted in this paper aimed to bridge the gap in the literature on the development of MBIs for water, wastewater, and stormwater, which was necessary in order to accelerate the implementation of LA21s and achieve the SDG targets. Over 20 MBIs are identified for the implementation of water-related goals and objectives in the LA21s. Furthermore, the market approach and the use of MBIs highlighted in this chapter are innovative methods of implementation of LA21s. Research on MBIs contributes positively to the understanding of market approach for water management, as well as improving the understanding of MBIs for achieving the goals and targets of the 2030 Agenda for Sustainable Development.

However, research is still required to understand the different municipal jurisdictions and identify MBIs for water, wastewater, and stormwater that are distinct in other Canadian and international communities. Furthermore, additional research could also investigate the assessment criteria and scoring methodology for

the SAM framework presented in this chapter. Although scoring seems to be useful to determine the performance of communities, further research is necessary to help assess the usefulness of scoring for the SAM framework and determine the best scoring methodology.

Overall, the chapter provided a list of MBIs that help to achieve the water-related goals in the LA21s and also established an essential foundation for future research in this direction. Moreover, this chapter contributes to improving the understanding of MBIs that are applicable at the local level. Finally, the research helps provide alternative options and policy tools to implement LA21s, as these plans are an excellent mechanism for further implementation of SDGs at the local level.

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