Unearthing Montreal's Municipal Water System
Amalgamating and Harmonizing Urban Water Services

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Volume 8, Number 7
FES Outstanding Graduate Student Paper Series
June 2003
ISSN 1702-3548 (online)
ISSN 1702-3521 (print)

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Abstract

In December 2000, the National Assembly of Quebec adopted numerous bills that would lead to a reconfiguration of the municipal territorial organization. The amalgamation process modifies long-standing patterns of urban governance. Within the metropolitan region, Montreal's municipal water system has been directly affected by the changes.

For the first time in its 200 year-old history, the entire municipal drinking water and sanitation infrastructure is brought under a single municipal administration: the new City of Montreal now comprising the 28 cities that used to exist on the island.

This paper looks upon the operational, financial and environmental aspects of drinking water delivery that have been modified following the amalgamation.

Remarks on this version

In order to provide a web version of the paper for the "Outstanding Graduate Publication Series," few modifications have been made. Two sections of the fourth chapter have been deleted as well as a limited number of large tables and figures.

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1. Unearthing Montreal's Water System

1.1. Unearthing: An Introduction

Unearthing is to discover by searching, digging, or rummaging. Unearthing Montreal's municipal water system is: discovering what is imagined as a water system; hollowing out the thing that is Montreal's water system; digging deeper into the engineered network underneath the streets from which life springs, profits gush and feces pour.

Unearthing Montreal's water system is also "to trace the flow of water and examine the discourses surrounding its use, distribution and quality is to illuminate the functioning of urban space in all its complexity and contradictions" (Gandy, 1997: 339). Unearthing a municipal water system is one way of looking at urban hydrosocial cycles as "the sum of the human and physical interrelationships pertaining to water in cities" (Keil and Young, 2001: 1). Urban hydrosocial cycles, as opposed to urban hydrological cycles, are regulated by complex natural and societal interactions that form an heterogeneous blend of connected parts of which the whole is larger and more complex that the sum of all its parts.

Water, city and ecology is the interconnectedness that forms the theoretical background that beholds the search of one aspect of Montreal's hydrosocial cycles on which I will focus: the amalgamation and harmonization of water services in 2002. Unearthing a municipal water system, such as in Montreal, is thus to explore a vital component of urbanization, one that will shape sustainable cities and bear the marks of capital accumulation: water. It is possible to think that water is the one medium through which capitalist urbanization will progress, prosper or decline in the next century.

The next section contextualizes the research questions by presenting the premises structuring the work. The section that follows defines the research with a research statement and presents questions and objectives. Methodology and design issues are dealt with subsequently, before some essential definitions.

The second chapter summarizes the development of water supply and sanitation services in Montreal over the last two centuries (1801-1995). It also provides historical notes on the situation that prevailed before, from the foundation of Montreal until the eighteenth century.

Next, we examine the amalgamation and harmonization of water and wastewater services from an operational approach, i.e., management and governance of drinking water in Montreal. The first section of chapter 3 describes the rationale for amalgamating before undertaking an investigation of the systems' organization before and after the amalgamation.

The fourth chapter investigates the post-amalgamation transformations from a financial standpoint. We look at local public finance before giving a general portrait of financing and funding urban water services in the 1990s. We also look at the system's built infrastructure (aqueducts, sewers and utilities) by reviewing past and recent assessment studies.

Finally, the fifth chapter reports on the environmental aspects of Montreal's urban water system, what we call the effects of the collective consumption of drinking water. We first consider the ecological

dimension of the collective consumption of drinking water to then turn to the environmental politics of water governance at the municipal and metropolitan levels.

1.2. Water, City and Ecology

1.2.1. Liquid Chronicles: Water and the City

Throughout history, civilization borne witness to an undeniable fact of life: air and water are necessary to survival. We need air to breathe and water to drink. Air drifts freely wherever we roam on the earth's surface; so did water, flowing in oceans, lakes, streams and aquifers. Animals inhale air and sip water. They do not engineer works to provide themselves with the delivery of one or another.

Humans, on the contrary and with regards to water, do erect expensive engineering works to provide themselves with water. Hunter-gatherers societies gravitated around water points and moved on. But once agricultural civilization settled, water was needed to drink and, in order to inhabit, for crop growing and cattle rearing.

It is with agriculture and sedentary settlings that the quest for water embarked on something totally different. The search for water translated into the delivery of water, i.e., moving water to people rather than people moving for water. It is then that societies enhanced their development given that they could tap the benefits of water resources to drink from it, grow crops, raise animals, embellish the (primitive urban) landscape and carry away their waste (Lindh, 1985).

"A center of civilization springs up, flourishes for a time, then decays; and from the ashes of the perished civilization, phoenix-like, there springs a larger, grander, more enduring civilization … In its broadest sense, a history of sanitation is a story of the world's struggle for an adequate supply of wholesome water, and its efforts to dispose of the resultant sewage without menace to health nor offence to the sense of sight or smell" (Cosgrove, 1909: 1).

First appeared supply-oriented societies that thrived under relative abundant water resources, whereas a few small-scale initiatives were undertaken to regulate the flows of streams. Further on, additional and more complex initiatives diverted, transferred and secured appropriate water resources for more demanding societies. Finally came the thorough exploitation and management of watercourses for "water-demanding," pre-capitalist agricultural societies (Lindh, 1985).

The development of water supply and sanitation techniques and technologies is also connected with the elaboration of complex social organizations that have shaped the rise of large administrative states (Porter, 1999). This development also transformed the societal relationship with nature through the creation of a physically regulated and culturally symbolized image of water (Jahn, 1996; Swyngedouw, 1996).

It is within that technological and socio-technical reality developed the public health domain, which greatly got underway through the development of bacteriology but also under the "sanitary awakening" that followed the cholera epidemics of mid- and late nineteenth century Europe and North America (Porter, 1999; Dupuy and Knaebel, 1982).

Accordingly, we can now assert that water is a necessary condition to the viability and growth of civilization's contemporary human settlements and cities (Gandy, 1997; Lindh, 1984). It is worth mentioning that public health events, such as cholera epidemics, had to happen before provisions were made in order to understand and prevent the outbreaks and spread of diseases.

However, Porter (1999) argues that public health measures were not taken primarily to avoid the outbreaks—and therefore improve the health of the general population—but rather to contain the ensuing civil disorder that endangered the political and socio-economic stability within which authorities could keep their legitimacy.

1.2.2. Bourgeois Thoughts: City and Ecology

Capitalism, through the development of coherent market structures (e.g. labor markets, consumption norms, etc.) has been central in the process of urbanization (Kipfer, 1995). In some ways, improvements in water supply and sanitation were pushed forward, on the one hand, by a desire to improve the general health of urbanites and minimize the chances of civil disorder, but, on the other hand, to increase economic activity within a particular geographical space, i.e., to ease the circulation of goods and people.

Early in the nineteenth century, the urban bourgeoisie deemed necessary to supply water networks (both potable and for sanitation) so that commercial and industrial capital could establish and prosper (Gandy, 2000; Fougères, 1996). But they were also to reflect the political aspirations and values of nineteenth century bourgeois urban capitalism: private modern housing water technologies and personal hygiene (Dupuy and Knaebel, 1982).

Capitalist-led development in western societies, since the mid-twentieth century, has had dire consequences on society and nature: "The Keynesian-Fordist class-compromise, which is at the heart of the welfare state, was supported by economic policies, the expansion of demand, broadening of consumption, and growth of productivity, which led to irrational uses of non-renewable natural resources … [and] partly or wholly ignored the consequences for the environment, society and the individual" (Demirovic, 1989: 40).

Cities, through the ordinary lifestyles of residents and passers-by, and as major consumers and metabolizers of resources, produce much environmental degradation (Gleeson and Low, 2000; White and Whitney, 1992). In the last thirty years, many observers have stressed that urbanized areas are the single-most important sites, if not cause, of social and ecological deterioration, that they are on an unsustainable trend (Gleeson and Low, 2000; Hartmann, 1996).

Urban water resources play an important role in this un-sustainable trend as Hough (2000) well summarizes when he affirms that developments in [water] supply and [wastewater] disposal technology, by improving human health, have been a central factor in urban growth. But the benefits of health and urban growth have been achieved at the expense of disturbed natural cycles and the creation of a general environmental deterioration (Hough, 2000: 95).

Furthermore, in the pre-Fordist and Fordist regimes of accumulation, water networks were planned and provided so as to contribute to capitalist accumulation. At one point, capitalist urbanization developed *with* water networks: it either came shortly after water systems were laid down or it either pushed forth the need for them. Today, capitalist urbanization builds upon them (more or less like before) but also *through* water systems, as they are great market niches: water services are increasingly privatized or privately built, owned and operated.

It is worth mentioning that the capitalist shift from a Fordist to a post-Fordist economy led to place-specific forms of urban environmental problematic (Keil, 1995). Furthermore, past capitalist urbanization criteria shaped the conditions of future capitalist urbanization and have erected physical and social constraints to future urban capitalist-led development (Harvey, 1989).

1.2.3. Urban Blends: Water, City and Ecology

It is within the contexts of place-specific capitalist urbanization and of reliable urban water supply that the relationship between water, city and ecology will be explored. Specifically, this relationship is grounded in modernism. This relationship makes sense if urban water supply and sewage networks are envisioned as modernism's environmental costs.

Modernism, understood as a shift towards lower-density patterns of urban development, propelled by the "introduction of affordable automobile and the decrease in real energy prices" (Vojnovic, 1999: 302), seriously constrains local efforts to move towards sustainability.

White and Whitney (1992, 18-19) proposed to design and rehabilitate cities on a sustainable basis with the objective of obtaining and maintaining the "economic, demographic, health, and cultural advantages of cities […] without degrading national and international environments."

The "environmental costs of modernism," it has been argued, came from "the under-pricing of urban-goods and services which facilitated inefficient and inequitable consumption practices" (Vojnovic, 1999: 302), and which relate to Hough's statement about the development of water-related technologies. The under-pricing of municipal services led to land-use patterns that are environmentally unfriendly and that are more expensive as they require more operational and capital costs.

But the necessary changes needed to move closer towards sustainability are now heavily influenced by the globalization of the world economy. Globalization is a process that puts government under pressure to enhance and promote an entrepreneurial culture, tighten fiscal expenditures (i.e. less social services), make labor market more flexible and keep environmental and social regulation low (Swyngedouw, 2000). Capitalist globalization, I would argue, promotes an economic and socio-cultural everyday life that is embedded in and that is pushing ahead with modernism, thus, intensifying and diversifying the sources and causes of modernism's environmental costs.

Finally, we could synthesize the urban hydrosocial dynamic as a capitalist production and reproduction process whereas water is the required input, sewage the compulsory output, and where the city is the socio-spatial site of transformation having the hinterland as a site of ecological deterioration.

Water is the city's vital, high-stakes and determinant input while being its most domesticated, low-value and disregarded output.

1.2.4. Blended: the St. Lawrence, Montreal and the Island

If we abide by the theory presented above, we would transpose water, city and ecology into the St Lawrence River as the water body supplying water and receiving wastewater, Montreal as the socio-spatial site of transformation and the Island as the hinterland (where the Island is not conceived as a piece of land in the middle of the river, but as a conceptual notion and political construct representing the metropolitan region where island and mainland are inextricably interconnected, if not undissociable from one another).

The St. Lawrence, Montreal and the Island thus form the geographical-historical elements of Montreal's municipal water system that will be explored all along this research paper. Now that we have framed and specified what is understood by water, city and ecology, we will now turn to our selected blend: Montreal.

1.3. Introductory and Necessary Research Elements

1.3.1. Research Statement

In December 2000, the National Assembly of Quebec adopted the contested bill 170 on the municipal territorial reorganization of the metropolitan regions of Montreal, Hull and Quebec City. The amalgamation process modifies long standing urban governance patterns including Montreal's municipal water system, directly affected by the changes brought by the fusion.

The amalgamation process brings together, for the first time in its 200 year-old history, the entire municipal drinking water and sanitation infrastructure of Montreal Island under a single municipal administration: the new City of Montreal.

A new pattern of governance demands a necessary harmonization of (a) fiscal and labor practices, (b) planning and engineering approaches, and (c) policies, programs and by-laws regarding local public services. The municipal water system (water supply and sanitation services) is among those most significantly altered.

At one end of the pipe, water supply services were part of the municipal level flattened by the amalgamation process (28 cities), whilst at the other end of the pipe, the wastewater service was part of the defunct supra-municipal level of government known as the Montreal Urban Community.

The municipal water system faces significant transformations as the new municipality (a) bonds together a declining water infrastructure divided under old municipal systems and (b) inherits a wastewater collection and treatment service which is seen as one of the largest source of water pollution in the metropolitan region.

Moreover, massive investments are needed to cope with an aging aqueduct and sewer system and to satisfactorily treat Montreal's drinking water to new standards enacted by the provincial government. Investments are also needed to appropriately dispose of huge quantities of wastewater (almost half of Quebec's wastewater production).

Furthermore, different water pricing mechanisms and tariffs exist in the new city, ranging from indirect pricing in municipal taxes to water meters and use-volume tariffs on which drinking water and sanitation services are partly funded. Water-pricing is often believed to be able to limit/control water consumption and pollution through economic incentives, water demand management and pollution abatement programs while, at the same time, having benefits for the environment and insuring a viable and safe provision of drinking water.

The amalgamation of Montreal's drinking water and wastewater services necessitates the harmonization of management practices (such as economic instruments like taxes and tariffs, and municipal policies and programs) geared towards drinking water consumption in order to provide and finance the services (capital and operational costs) and minimize the ecological consequences of wastewater discharge in the St. Lawrence River.

The research examines the amalgamation and harmonization of Montreal's municipal water system in order to assess how and why this new governance pattern alters, modifies or changes the operational, financial and environmental aspects of drinking water provision in Montreal.

1.3.2. Questions and Objectives

The research will examine elements of the governance and management of Montreal's water system (from raw water intake to wastewater discharge) after the amalgamation as they relate to the provision of drinking water. The research particularly examines aspects in relation to the operational, financial and environmental conditions of drinking water governance in Montreal.

The *operational* aspects relate to planning and engineering issues, like services' organization and governing arrangements, and to the changes in the day-to-day operations, in the decisional processes as well as to the ongoing transformations resulting from the amalgamation.

The *financial* aspects pertain to changes in the municipal funding of water and wastewater services, but also to the harmonization of budgets, labor practices and of local public finance (e.g. borrowing and taxing), central to the creation of a metropolitan city.

The *environmental* aspects concern the relationship between the ecological and socio-economic dimension of Montreal's water governance and management. They operate the link between funding, planning and providing urban water supply and sanitation services to citizens, and specifically explore the collective consumption of drinking water such as access and coverage, sites/types of consumption and pollution, and the means taken, or not, for a better environment.

While the overall research framework looks at drinking water governance and management in Montreal, its main purpose is to critically investigate the changes directly concerning the future of the municipal water system.

The merger between Montreal's water supply and sanitation services under the new and expanded Environment and Public Works Department (*Service de l'environnement, de la voirie et des réseaux*) causes several modifications to the provision of drinking water. The research posits that a change in the governance of water, necessarily leading to new management practices of planning and delivery of drinking water, calls for a re-definition of the relationships between the 'consumption' and 'conservation' of urban water resources.

Particular attention is given to the viability or durability of a publicly managed drinking water system in need of massive investments, at times of federal and provincial downloading and the decentralization of services' provision under municipal responsibilities.

The core questions of the research are: How does the amalgamation of Montreal influence the governance of the municipal water system? How do changes in the governance of water in Montreal modify the overall management of water and wastewater services? And how is the amalgamation process articulated in official documents and political actions?

1.3.3. Methodology and Design

The amalgamation of Montreal is fairly recent (less than a year) and we would like to understand what this means for water services in today's context. But to clearly understand what has happened or what is happening, it is useful to look back at the not-so-distant past, as it will help identify the changes from one state to another.

We are here concerned with the amalgamation and harmonization of urban water services in Montreal. Amalgamating is to amalgamate, to combine in an amalgam, to join together into one, to unite. In addition, harmonizing is to harmonize, to make harmonious or bring into agreement.

A case study methodology is considered the most relevant research technique available that can assist us in answering our questions. First, a case study methodology "relies on many of the same techniques as a history, but it adds two sources of evidence not usually included in the historian's repertoire: direct observation and systematic interviewing" (Yin, 1984: 19). Since we want to look at changes in the provision of drinking water from a past situation to a new one, history, direct observation and interviewing will complement each other during the collection and analyzing part of the research.

Second, "a case study is an empirical inquiry that (a) investigates a contemporary phenomenon within its real-life context when (b) the boundaries between phenomenon and context are not clearly evident and (c) in which multiple sources of evidence are used" (Yin, 1984: 23).

The amalgamation of Montreal is definitively a contemporary phenomenon as it happened in January 2002 and had been planned since 2000. The ensuing harmonization of water services is directly stemming from that amalgamation but the context within which both take place is not necessarily obvious.

On the one hand, amalgamation of local governments has materialized in different forms in the province but also in other provinces like Ontario.

On the other hand, municipal water services have been the subjects (and objects) of numerous studies lately and the provision of potable water received much attention from municipal authorities, academics, businesses, lending world institutions (e.g. the World Bank and IMF) and non-governmental organizations, especially in light of the Second World Summit on Sustainable Development in September 2002 in Johannesburg, South Africa. It seems that water services in many places are compromised either because of diminishing water resources or because of decaying or inappropriate water infrastructures (Gleick *et al*., 2002).

Our sources of evidence were primarily literature such as official publications from provincial and municipal governments, newspapers and magazines, and academic textbooks (see Works Cited). Interviews provided complementary evidence.

Five individuals were interviewed during the collection of data. Their names and affiliations are listed below:

- Michel Gagné, Director, Drinking Water Production, City of Montreal;
- Claude Massicotte, Foreman, Public Works Department, and Advisor to the Water Management Technical Committee, City of Montreal;
- Mario Tardif, Coordinator, *Organisation populaire des droits sociaux région de Montréal*;
- Gaétan Breton, Treasurer, *Eau Secours!,* and Accounting Professor, Université du Québec à Montréal;
- Richard Imbeault, Spokesperson, *Syndicat des Cols bleus regroupés de Montréal*.

A case study methodology, in addition, requires the definition of a unit of analysis related to the way the research questions were first set out (Yin, 1984). Thus, our unit of analysis is the water and wastewater services of the Island of Montreal, i.e. the 28 water services departments and the supra-municipal wastewater service.

In order to present statistics and budget spending in a simpler form, the 28 municipalities of the island have been clustered in groups. The first group, MONTREAL, only represents the old City of Montreal as it is, by far, the largest city on the island and because it provides drinking water to fifteen other cities (see Figure 3.2 on page 54).

The second group, OWNED, bands together the five cities for which the water network is owned by the city of Montreal. The third group, SUPPLIED, represents the nine cities for which the City of Montreal supplies drinking water.[1] OTHERS is the last group that clusters cities not related to Montreal's Water System. They either have independent water networks or are supplied by another city.

But because the discharge of wastewater impairs environments downstream from the island, we include in our unit of analysis the metropolitan region. We do not, however, elaborate on water and wastewater services of the metropolitan region.

[1] The City of Montreal supplied water to ten cities: Charlemagne is the tenth city but is excluded since it was not part of the MUC. Charlemagne is located on the North Shore, east of Pointe-aux-Trembles.

Finally, we are trying to understand what has happened (or what is happening) with regards to urban water services in Montreal in light of the contextualization premises stated in section 1.2: Water, City and Ecology. In order to confirm or challenge them, we need to design the research in view of some theory. Below we present the theoretical assumptions that have shaped the organization of the research.

Let's first state that the theory most helpful in conducting the research is the one that relates to the geography of collective consumption, which is concerned with "those goods and services provided through the public sector on a non-market basis, which reveal variations in both quantity and quality between areas because of jurisdictional partitioning, tapering and externality effects" (Pinch, 1984: 14).

In Montreal, urban water services definitively fall into this category of goods and services, as all three causes of variation in quality and quantity are noticeable. First, jurisdictional partitioning, i.e. the division of national or provincial territory into smaller local governments, is obviously of interest since water systems were individually managed through municipal departments and the provision of such services thus depended upon location.

Second, tapering, i.e. the gradual decrease (or increase) of access due to distance, is not automatically of relevance due to the kind of delivery for drinking water. Drinking water is delivered at the tap in each households or enterprises. However, tapering in the delivery of water does exist. There is a 'technical' tapering effect whereas pipe breaks prejudice more customers that are closer to the system's end than those at the beginning or mid-part, as the reticulation towards the end is not as much inter-connected; thus it is possible that drinking water can not be re-routed and delivered.

Third, externalities,[2] especially negative, are clearly of interest in the case of Montreal as wastewater discharge is affecting population outside the island.

Moreover, because we are here concerned with changes in the management and governance of urban water services, it is more than useful to look forward into the 'politics of urban public services' (Rich, 1982). There are broadly two kinds of services provided at the local level: "[Those that] support commerce, the circulation of capital, and the production process (for example street maintenance, sewers and fire protection), and services that are oriented more toward class-reproduction processes and maintenance of the social control required for those processes to function (for example, welfare, housing, and education)" (Rich, 1982: 4).

Urban water services fall in the first category and are services for which the infrastructure is considered essential and to be provided to everyone. In each category of services, the allocation of funds so as to provide them is largely determined through the budgetary process, which is not done on a neutral, bureaucratic manner, but is rather conditioned "by a set of social relations which is functional for the overall maintenance of the capitalist system" (Pinch, 1984: 36).

[2] Mishan (1971: 109) defines externalities as "a direct effect on another's profit or welfare arising from an incidental by-product of some other person's or firm's activity."

Furthermore, patterns of services distribution, or of collective consumption, are the "outcome of conflict and struggle between various groups" and local services production, distribution and consumption cannot be separated from the "broader operation of production" (Pinch, 1984: 157).

Finally, and as Rich argued (1982: 8), "to the extent that population distributions reflect the structure of the economic system, it is capitalism that gives political meaning to the geographic distribution of services." Accordingly, we will look at changes in the management and governance of urban water services in Montreal following the theory of the collective consumption and the politics of local services, as depicted above.

1.3.4. Defining Urban Water Services

A *municipal water system* comprises two broadly defined urban local services: drinking water services and wastewater services. It is not limited to delivery but also encompasses elements that relate to the management and governance of drinking water in urban areas.

A *water service* is understood as a chain of events that leads to the collection, transportation, storage of raw freshwater to a treatment facility. The chain of events persists through the distribution of potable water in a network made of mains, smaller pipes, pumping stations and reservoirs. Water mains are laid along street patterns with lateral lines connected to fire hydrants and service lines connected to household taps (Anderson, 1988). Not all freshwater collected for distribution is treated: New York City relied on untreated water for well over a century while some cities in Prince Edward Island still rely on clean unprocessed water supplies.

Wastewater services (or sanitation services) are recognized as the chain of events that collects consumed tap water and excreta, industrial wastewater and rain-fed storm water through a network of drains and sewers (i.e. sewerage). Those are generally connected to collectors (oversized sewers), in order to carry away untreated drainage water and/or sewage directly to a watercourse or via a treatment facility. Therefore, water services *supply* potable water and wastewater services *treat* that same, however, used or consumed, tap water. For example, Toronto is supplied by Lake Ontario but also disposes of its wastewater in the same body of water.

Therefore, a *municipal water system* comprises (a) the services' built infrastructure, from raw water intake to wastewater discharge, such as mains, sewers and the different treatment facilities; (b) the administrative organizations that finance, plan and operate the built infrastructure; and (c) the political institutions, at different levels, that regulate the services' provision and mediate the different socio-economic actors involved and concerned with such services.

In conclusion, unearthing Montreal's municipal water system is to look into the network of pipes, sewers and facilities but also the personnel and administrative apparatus that are necessary to provide drinking water to city dwellers. However, there are many ways to unearth, just like there are many ways to dig. This research uses a particular shovel: political ecology.

It is important to remember that a municipal water system is not only the engineered network beneath a city's surface, but rather a complex set of natural conditions and societal interactions inextricably linked to a city's growth and sustainability and for which local and global environments, especially in today's world, are not exogenous variables.

The next chapter on the history of Montreal clearly exhibits the natural conditions and societal interactions that have shaped Montreal's municipal water system over 200 years.

2. Montreal's Municipal Water System

2.1. Introduction

This chapter provides an historical overview of the creation of water supply and sanitation services in Montreal. It focuses on the construction of a modern system, laid down in the early moments of Montreal's rapid urbanization and industrialization.

A rapid mutation process transformed Montreal from a small commercial city to an emerging large industrial metropolis between 1792 and 1819 (Massicotte, 1999) and it is during that period that major socio-economic shifts occurred. These shifts are still reflected in today's urban landscape (Pothier, 1996), and numerous services were established, among them, a modern municipal water system.

Montreal's water system evolved erratically and at an irregular pace owing to the different socio-economic and socio-ecological conditions that have shaped the city all along the nineteenth and twentieth centuries, as is portrayed below.

This chapter is divided in four parts. First, we rapidly cover water supply and sanitation during the period that spans from the foundation of Montreal to early industrialization. Second, we provide details on Montreal's water system from early to mid-nineteenth century, and then, we concentrate on the evolution that has characterized the system from 1845 until the Great Depression of 1929. Finally, the last part describes the construction of a contemporary water supply network and wastewater treatment facility from the postwar era until the mid-1990s.

2.2. Pre-industrial Arrangements: 1642-1801

2.2.1. Ville-Marie and the Lachine Rapids[3]

This year Montreal celebrates its 360th birthday. Ville-Marie—as it was named earlier on—was founded in 1642 by Paul Chomedey de Maisonneuve, a *gentilhomme* appointed by a French catholic organization. Ville-Marie was a missionary project dreamed of by an enthusiastic catholic elite in the 1630s.

This history of Montreal is closely linked to its geographical conditions. Montreal is an island in the St. Lawrence River at the confluence of two waterways: the Ottawa River and the Great Lakes. However, the strategic importance of Montreal does not rest only upon that confluent condition. The Lachine Rapids played a more critical role because they blocked all maritime travel on the St. Lawrence. Laborious and backbreaking portaging was necessary to navigate further down or up the St. Lawrence River.

[3] This section (2.2.1) is based on: P.A. Linteau (1992) *Brève histoire de Montréal* (Montreal: Boréal).

When Europeans colonized America, maritime transport was the most important means of travel for people and goods. It was also essential to the economic prosperity and development of European metropolises such as France and England.

A brief historic reminder is necessary in order to capture the great importance that the Rapids played in the development of Montreal.

Jacques Cartier was the first Frenchman and the first European to set foot on the Island. He and his forty-man garrison came twice to Montreal; first in 1535 and later in 1541. Afterwards, only a few other French explorers set foot on the Island without settling or organizing.

In 1603, Samuel de Champlain, then governor of New France, traveled to Montreal where he met Amerindians living in Hochelaga—which later became Montreal. The original inhabitants provided valuable information that led Champlain to map out the region and understand the pre-capitalist trading routes that were the Ottawa River and Lake Huron.

For the Iroquois Montreal was a meeting point where they could exchange commodities with other native groups such as the nomadic Algonquians. Thus, even before European colonization, Montreal was an economic hub of significant importance. The French colonial rule (*L'Ancien régime*) would strengthen that importance with the growth of fur trading.

In fact, Montreal was an obligatory stop for all maritime travel along the St. Lawrence until the Lachine Canal was dug in the 1820s. The Lachine Rapids were the natural obstacle that led to the development of Montreal under French and British colonial rule. And in some ways, Montreal became an essential hub that sustained North American colonial development.

2.2.2. "L'Ancien régime"

Water supply and sanitation in Montreal prior to the nineteenth century is largely undocumented. Infrastructure development with regards to water really started in the mid-nineteenth century. However, historians and archeologists know that Maisonneuve who worried about being besieged by the Iroquois dug the first well in Montreal in 1658. A few more private wells were dug between 1659 and 1668 in order to provide convenient water to the colonial settlement (Pothier, 1996).

In 1672 the first public well was excavated on place d'Armes, in front of a church within the walls of Ville-Marie (Pothier, 1996). This first well was strategically placed as it served during the construction of the church and as an incentive for inhabitants willing to settle up-town, further away from the river. Another public well was dug later in the eighteenth century. For many years water supply remained archaic. Montrealers long relied on private and public wells but a majority used the river or bought water from water vendors called the *charrieux d'eau* (Pothier, 1996: 26).

Even though royal edicts regulated wastewater disposal, people still had no shame in flinging out their excreta through windows: the 'natural' thing to do in the minds of many urbanites. That was before the hygienist paradigm took hold later in the next century (Guérard, 1996).

In 1698, the colonial authority (*Conseil souverain*) prohibited the expulsion of wastewater, wastes and dirt through windows and a few years prior, in 1673, all owners were encouraged to install pit-latrines to prevent illnesses and offensive smells (Pothier, 1996).

The spread of such sanitary installations triggered the construction of small, private and unplanned sewers connected to the closest streams. However, rapid and disorganized development led to unexpected results. For example, the St. Pierre River became an open stinking sewer by 1741 (Pothier, 1996).[4]

Only the wealthiest households could afford such connection and convenience. Less fortunate inhabitants contented themselves with self-contained cesspools and latrines, which were for the most part unhygienic and rapidly outdated. Both types of structures were built all through the seventeenth and eighteenth century (Pothier, 1996).

While the first half of the eighteenth century is marked by a more organized development of sanitary infrastructure and the enactment of a small number of royal decrees regulating the use and disposal of wastewater, wastes and dead animals, it would be spurious to assert that it had been a sewer system (Guérard, 1996).

2.2.3. The British Colonial Rule

Following the Paris Treaty of 1763 between France and England, which announced the end of French colonial rule in North America, the British culture slowly crept in. When Montreal came under British colonial rule, just over 5 000 inhabitants populated the city (Brown, 1990). The period was characterized by major socio-cultural and political changes.

The British merchants, the new ruling class since 1780, brought from Europe emerging socio-cultural ideas contrasting with those in place. The concepts of cleanliness and embellishment were directly translated to the city. Slowly, the surrounding 'urban' environment was rapidly disgusting the city inhabitants and the cultural mind-set changed from community laissez-faire to proper hygiene practices (Pothier, 1996).

The new British bourgeoisie was determined to make Montreal an essential commercial hub in North America. Different projects were undertaken so as to make the city safer and cleaner. Easing the circulation of goods and people was also a key assignment. Most projects were elaborated during the last decades of the eighteenth century but only took place in the century (Pothier, 1996).

The most impressive project remained the abatement of the fortress' walls. A scheme that canalized small streams and where marshes, ponds and the like were filled up with the fortress' walls and built upon. And since most wells were already contaminated by unhygienic and leaking cesspools and pit-latrines, schemes to build the first aqueduct were deemed necessary (Pothier, 1996).

[4] The river was transformed as a sewage collector in the mid-1830s, being the first modern sewer built before mid-nineteenth century. Interestingly, the St. Pierre collector, as it is known, has been the last piece of infrastructure connected to the MUC interceptor in August 1995 (Boulay *et al.,* 2001).

2.3. Private Water Dries Up: 1801-1845

2.3.1. A Bourgeois Project

The early nineteenth century period was characterized by a major endeavor to re-organize the city and commissioners were nominated to execute new planning arrangements. Pothier (1996) argues that even though the state seemed to lead the effort in re-organizing the city, it is rather the new British bourgeoisie that pushed ahead a new type of capitalist urbanization through revitalization projects: *"Ceux qui font la ville, qui la dirigent, la planifient, font tous partie de cette élite marchande qui a fait fortune dans le commerce des fourrures. Pour augmenter leur emprise sur la ville, pour attirer de nouveaux capitaux et de nouvelles industries, il leur faut … refaire l'image de la ville. On veut faire de Montréal une ville sécuritaire, agréable, on veut développer cette plaque tournante du commerce nord-américain. Les marchands sont déterminés à y mettre le prix"* (Pothier, 1996: 31).

One way to do so was to put in place a reliable and constant water supply. Montreal and Philadelphia were the first two cities in North America to benefit from a modern water supply infrastructure (Pothier, 1996). For Philadelphia the need stemmed largely from the numerous epidemics that plagued the last decade of the eighteenth century. In Montreal, officials were concerned with offering a new, luxurious service to the inhabitants. But most importantly, the business elites were preoccupied by the constant threat of fires (Anderson, 1988).

2.3.2. The Montreal Water Works

The Company of the Proprietors of the Montreal Water Works was created in 1799 and incorporated in 1801 by well-respected businessmen (Fougères, 1996). The first distribution network was very small—and would stay so until the early 1850s. It was a gravity-fed system having its source on top of Mount Royal. Water was distributed to a small number of wealthy clients through wooden pipes (Pinard, 1989).

The drinking water network remained small for several reasons. Among them is the fact that a constant supply of water did not coincide with changes in the resource's use since running-water baths and toilets were not common in the general population (Pothier, 1996).

Furthermore, technical problems plagued the system from its initial stages: most pipes broke under the cold winter (Fougères, 1996). In 1816, the proprietors realized that water provision could not be a lucrative venture and sold the enterprise, and its remaining 35-year monopoly, to Thomas Porteous and Associates. Porteous invested $ 160 000 in the venture and brought back steam-powered pumps from Scotland that siphoned water directly from the St. Lawrence River and directed it in a 4 inch cast-iron plumbing grid (Pothier, 1996).

It did not take long before water quality was criticized. The company's raw water intake was directly in the harbor, largely polluted by wastewater from the newly channeled St. Pierre River, by tanneries and slaughterhouses' effluents, and by industrial wastes coming from the Lachine Canal—the industrial heart of Canada around 1825 (Pothier, 1996).

The company was sold again to Moses J. Hayes in 1833. He, like Porteous before, invested considerable sums in the project. Hayes spent over $ 60 000 in order to improve the system, increasing the size of pipes from 4 to 10 inches and in new and bigger pumps. While these were important investments, they were still insufficient as this comment suggests: "Fifty years after the Water Works had been founded, about 90% of Montrealers still relied on wells, cisterns, the river, the creeks on the island, and water carts" (Ward cited in Pothier, 1996: 25-46 and 47-63).

2.4. Public Water Flows: 1845-1929

2.4.1. "La municipalisation"

Following the rebellions of 1837-38, the British colonial power made several changes to the political administration of the colony. Montreal was incorporated in 1840 and the colony (Lower Canada) merged with its western counterpart (Upper Canada) through the Union Act of 1841. The two colonies would remain united until the Confederation Act of 1867 (Brown, 1990).

The incorporation of Montreal basically meant that the city was now a relatively autonomous governmental entity with, however, limited jurisdiction over political, economic and social aspects of urban development. The incorporation opened a new era in urban politics; the local public domain was invented: "*La naissance récente de la Corporation municipale ouvre un nouveau champ du domaine public (la chose municipale) à l'intérieur duquel la problématique de l'alimentation en eau trouve place. Ce nouveau rôle du pouvoir public tient à la fois à une série d'échecs, surtout techniques, accumulés par le privé et au désintérêt progressif de ce dernier dans cette aventure*" (Fougères, 1996: 49).

In 1843, the municipal council was concerned with the poor reticulation of the water supply network. Some even suggested that given the technical difficulties encountered since the foundation of the water works and the lack of interest from the business community, the City should buy the Montreal Water Works, which it did in 1845 (Fougères, 1996).

The City Council came to that decision through some factors that need to be described here. First, the bourgeoisie stressed that the threat of fires remained without proper water supply. Second, population growth and urbanization since the nineteenth century rendered drinking water distribution and consumption more difficult than in the past because the St. Lawrence was farther away, thus less accessible. Third, the business mind-set of the time obviously opined that a constant and reliable source of clean water would attract industries and capital, thus triggering economic growth (Fougères, 1996). Finally, municipal politics was already aware of the United States experience where problems arose from

the apparent "conflicting goals of short run profit maximization on the part of the water company and an adequate [water] supply … on the part of the municipality" (Anderson cited in Fougères, 1996: 62).[5]

When the City bought the company in 1845, the system had 14 miles (22.5 km) of water pipes and a 455 000 liters daily capacity. Four years later the system had over 25 miles (40 km) of lead and cast-iron pipes (Pinard, 1989).

2.4.2. A Modern Public Water System

Following the great fire of the summer of 1852, which demonstrated that the water supply was not sufficient and burnt down the installations, the city rebuilt the aqueduct. From 1852 to 1856, the City invested in new water mains, reservoirs and pumping facilities (Ville de Montréal, 2000; Anderson, 1988). Water was then extracted directly in the Lachine Rapids and stored in a mile and a half long canal. The Aqueduct Canal was dug between 1853 and 1856 and subsequently enlarged twice: in 1907 and in 1913 (Pinard, 1989).

During the 1850s, the municipal water system was re-programmed and re-planned. Solutions such as diverting water from Saint-Jerome (located 40 km north of the island in the Laurentians) and moving to coal-powered installations were deemed too costly (Fougère, 1996). Even though the Saint-Jerome diversion scheme re-appeared several times through out the next fifty years, it was eventually and definitively abandoned.

By the first half of the 1860s, Montreal's cold winter had already tarnished the potential of the new investments: ice accumulated at the entrance of the Aqueduct Canal stopping water from coming in and the winter-low levels threatened the hydro-powered mechanical installations (Fougères, 1996). It is during the 1860s and 1870s that the network grew and reservoirs, pumps and other facilities were set up so as to improve and secure the network's supply capacity.

2.4.3. The Montreal Water and Power

Over the years, the municipal level developed as a decisive political institution armed with executive and legislative authority and as a distinctive decision-making body. Between 1883 and 1918, the City of Montreal amalgamated 24 villages and parishes, therefore expanding its territory six-fold. By the end of the century Montreal held half of Quebec's urban population, close to 325 000 inhabitants (Linteau *et al.*, 1989).

The Montreal Water and Power Company was a private venture established in 1892 having its main enterprise around the City of Montreal. Many villages in the immediate surroundings of Montreal were provided with drinking water from the company as they did not have either the financial or technical expertise to set up a reliable water supply infrastructure (Fougères, 1998). The company lost a third of its customers when the City did not renew contracts signed between the company and the smaller

[5] Letty Anderson (1980) *The Diffusion of Technology in the Nineteenth Century American City*, Northwestern University, Evanston, Illinois, Ph.D. thesis.

municipalities. After hot debates over the amount the City should pay for Montreal Water and Power, the company was finally expropriated in 1928.

The City had thus decided that its best interest lay in controlling the entire water supply and drinking water infrastructure under its territory (Fougères, 1996). The City acquired 322 km of water pipes, pumping stations, numerous small reservoirs and a filtration plant. It also renovated other utilities (Ville de Montréal, 2000). [6]

2.4.4. On Nineteenth Century Public Health

The fifty years following the mass re-programming and re-planning of the water supply system saw the development of a built infrastructure. But also the development of a 'municipal water elite' formed of politicians, engineers, technicians and public health representatives all convinced of the need for a publicly owned and managed water system (Fougères, 1996).

The hygienist movement in Canada and in Quebec would gain momentum in the 1880s after unsuccessful efforts in the preceding decades (Guérard, 1996). In Montreal, the hygienist efforts would largely be tampered by the hostility of French Canadians who saw from a *mauvais oeil* the imposition of public health legislations from an English-speaking elite (Cassel, 1994).

The hygienist movement, coupled with the rise of sanitary engineers, contributed to a great extent to the improvement of water quality. Hygienists advocated cleaning processes such as filtration and chlorination. They also stressed the important relationship between sanitary conditions and the health of the general population (Baldwin, 1988). Their efforts led to the construction of the Atwater filtration plant, planned and built between 1912 and 1918 (Fougères, 1996).

John P. Doyle, a civil engineer, implemented the systematic programming of a modern sewerage network in the late 1850s (Pothier, 1996). However, it is R.S. Lea, a famous Canadian sanitary engineer that planned much of the existing system. Lea also worked for Charlottetown, Prince Edward Island in 1898 and for Vancouver, British Columbia in 1911 (Baldwin, 1988).

The reticulation of sewers soon polluted neighboring wells and the harbor front. Later, private owners built sewer systems and were reimbursed by the City. Between 1870 and 1890, a comprehensive sewer system was put in place with collectors, pumps and outlets such as the existing sewage collector underneath Craig Street in 1876.

The development of a more accessible water supply network resulted in higher volumes of wastewater that accelerated the pollution of wells. Obsolete privies did not support the additional quantities of water that continuously poured into them (Baldwin, 1988).

By 1910, Montreal was considered a disgrace to public health standards (Pothier, 1996). In fact, Montreal and the Province of Quebec were lagging behind other provinces in most health standards. Many causes are possible; among them is a lower economic status and inadequate health practices

[6] Massicotte (2002) stated that the City was looking forward in owning the filtration plant, but the City had to buy the whole system as a "package deal."

attributed to poor education of French Canadians, and disinterest from local (English-speaking) authorities (Guérard, 1996).

Cassel well illustrates this position by stating that: “Perceptions of [public health] problems were coloured by the view of one ethnic group by another and one class by another. Generally, infectious diseases were concentrated most heavily in the working classes, often recent immigrants or French Canadians” (Cassel, 1994: 287).

Even though the hygienist discourse had taken root in the urban political landscape of Montreal, most water pollution and sources of epidemics lay, then, from the unhygienic practices of cities along the Ottawa River: “[The capital-city of Ottawa empties] its sewage into the Ottawa River without any thought or care of the people below, who must, of necessity, use the water for domestic purposes; … it does not care in the least for the trouble it causes to the people of Montreal. It is the Ottawa River that is causing typhoid fever in Montreal” (cited in Baldwin, 1988: 235).

Montreal started to filter and then chlorinate its water supplies (Pothier, 1996). The first quarter of the twentieth century is also marked by the reduction and the elimination of pit-latrines and cesspools, which still numbered at 5 800 in 1896 (Pothier, 1996) but fell under a few hundreds by 1914 (Guérard, 1996).

2.5. Modernizing the Underneath: 1929-1995

2.5.1. Development and Progress at Both Ends

Between 1914 and 1960, the number of drinking water customers grew from 390 000 to almost 2 millions. Rapid growth commanded rapid extension of the drinking water network, which was pushed strongly in the late-sixties and late-seventies with Expo 67 and the 1976 summer Olympics. The worry of an inadequate supply of water to service future residential and industrial growth and international events prompted the construction of the Des Baillets filtration plant (1973-1985) (Fougères, 1996).

At the other end of the pipe, in the 1930s, the provincial Public Services Commission (*Commission des services publics*) approved a plan submitted by the City of Montreal to build a sewage collector for the northern side of the island and a treatment plant. Due to the Great Depression and the Second World War, though, the construction of the collector was dramatically slowed down. It was, in fact, only completed in 1955 (Vanier, 1982). And the treatment plant project was definitively cancelled before the end of the war (Boivert, 1987).

The war period (1939-1945) affected the water supply infrastructure, which needed to supply more industries and fourteen other municipalities. After the war, filtered-water reservoirs (at the Atwater plant) were added in 1947, 1958, 1960 and 1967, and a new water intake was laid down in 1951 (Ville de Montréal, 2000).

In the early 1960s, the provincial government engaged in formal actions with regards to water pollution. However, those efforts slowed down substantially during the 1970s. The government showed

a real willingness to address water pollution in 1978: it is then that it launched a comprehensive wastewater treatment program (CCE, 1983).

At that time, the provincial government established financial requirements at $ 6 billion, of which $ 4 billion were directed towards urban centers. The program obliged all new housing projects outside already-built areas to be supplied with sanitation services (Boivert, 1987).

2.5.2. Wastewater Treatment, Part I

In January 1970, the Montreal Urban Community (MUC) is created and the Provincial Water Agency (*Régie des eaux*) formally requested the collection and treatment of wastewater for the northern, northeastern and southwestern sides of the island. In 1971 the Agency commanded the building of a sanitation system for the southern and southeastern sides of the island. In 1973 it was decided that only one plant would be built in the Rivière-des-Prairies borough for economic and technical reasons (Boivert, 1987).

The construction of the northern collector, connecting previous works from the City of Montreal, started in 1974 and was completed in 1981. The period between 1975 and 1984 was marked by numerous feasibility studies concerning the collection and the treatment of Montreal's wastewater and by frequent stops in the construction process, mostly due to financial problems: The MUC's Executive Committee halted the works arguing a 'lack of enthusiasm' from the population.

However, outside observers disagreed and argued that the Olympics had rather taken their toll on municipal finance (Vanier, 1982). Furthermore, funding from the federal government was not readily available: the different levels of government could not agree on how money should be spent (Boivert, 1987).

2.5.3. Wastewater Treatment, Part II

In 1983, the Consultative Council on the Environment (*Conseil consultatif de l'environnement*) strongly advocated against the opening (*mise-en-service*) of the treatment plant's effluent outfall before the treatment facility is operational: "*Dans le cas particulier de la CUM, le Conseil en arrive à la conclusion qu'il ne peut recommander l'utilisation de l'émissaire des eaux usées compte tenu de plusieurs désavantages et inconnus et du fait que l'usine d'épuration sera prête dans trois ans*" (CCE, 1983: 68).

Cities downstream the island, on the South Shore, were concerned that concentrated undisinfected wastewater would greatly impair the natural habitat of St. Pierre Lake and the bordering shorelines. However, in 1984, the Ministry of Environment (*Ministère de l'environnement*) disregarded the recommendation and the northern collector's outfall was put into service even if the treatment facility was not ready—in fact, wastewater treatment for the northern collector started in late 1987 but was originally scheduled for 1986 (CCE, 1983; CUM, 1999).

The official opening of the treatment plant took place in November 1987 when the physico-chemical process and sludge incinerators treated wastewater from the northern collector (CUM, 1999). The period stretching between 1987 and 1995 was marked by the completion of numerous projects.

In 1988, the southwestern collector was connected to the northern one. In 1990, pre-treatment basins were added and new facilities were put into service in light of more effluent from the soon-to-be southeastern collector.

Finally, in August 1995, the treatment plant collected and treated all of Montreal's wastewater. That is 25 years after it had been ordered and more than 65 years after it was first thought of. Still, it is only in 1998 that the entire construction process was completed, a process that necessitated investments of $ 1,375 billion in total (CUM, 1999).

In sum, Montreal's municipal water system evolved erratically over the years. It was amongst North America's first modern systems in 1801, only to stagnate and crumble while under private hands in the mid-1800s. It was the local public administration that really set in motion the foundation of a modern, safe and reliable drinking water system. The next chapter describes the water system's public administrative and organizational structure before and after the amalgamation.

3. Amalgamating Urban Water Services

3.1. Introduction

Almost a year after the election of Mayor Gérald Tremblay, the City is still looking for a way to manage and operate municipal water services. Montreal has engulfed the total municipal landscape of an island in the St. Lawrence, the metropolis' largest: the Island of Montreal, just beneath Jesus Island.

Almost a century ago, Montreal annexed 24 cities in a period of more than twenty years, which culminated, in 1928, in the second *municipalisation* of waterworks. The first happened in 1845 with the Montreal Water Works (see section 2.4).

Ten months ago, Montreal annexed its neighbors again. The City amalgamated 29 other municipalities (One of them, the city of Ville Saint-Pierre, had amalgamated with Lachine in January 2000). The City now has total control at the municipal level: one government with executive and legislative powers and an almost total grip on the natural territory of the island. A single master plan, a single municipal planning policy and only one City Hall characterize the new municipality.

As of January 2002, the City now controls the entire waterworks infrastructure, from Sainte-Anne-de-Bellevue to Pointe-aux-Trembles. The amalgamation thus brought together numerous water systems under a single municipal department: Environment and Public Works (*Service de l'environnement, de la voirie et des réseaux*).

Before that, there were 28 public works departments and four different types of systems within the island, as presented in the table below. The first category draws together municipalities that owned their water supply infrastructure. The second category assembles those municipalities for which the water supply infrastructure was owned by the City of Montreal. The next category brings together municipalities that owned their water supply infrastructure but for which bulk water was delivered by the City of Montreal while the last category brings those cities that owned their infrastructure but for which drinking water is provided by another municipality.

Table 3.1. Type of Municipal Water System within the MUC, 2001

Type of water system (Ownership and Supply)	**Cities** (Total 28)
Municipally owned and supplied Owned and supplied by the City of Montreal	(6) Montréal, Lachine, Pierrefonds, Pointe-Claire, Ste-Anne-de-Bellevue and Dorval (4) Outremont, Westmount, Montréal-Est and Côte-St-Luc (St-Pierre not counted since 2000)
Owned but only supplied by the City of Montreal	(9) Anjou, St-Léonard, Montréal-Nord, Montréal-Ouest, Hampstead, Verdun, Mont-Royal, St-Laurent and LaSalle
Neither owned nor supplied by the City of Montreal, and not self supplied	(9) Baie-d'Urfé, Beaconsfield, Dollard-des-Ormeaux, Roxboro, Kirkland, Senneville, Ste-Geneviève, Île Dorval, Île-Bizard

Source: Massicotte (2002); Ville de Montréal (1996).

In this chapter we look after changes in the operational aspect of drinking water provision in Montreal. What are the changes in the administrative and organizational structure that affect Montreal's water

management and governance? How are operations modified with regards to water and wastewater services?

Water management is carrying out the task of operating. Water management is also to make operational the provision of drinking water. It is, in fact, operating the drinking water cycle: from raw water intake to wastewater discharge. But, what is 'to make operational'?

Operational: 'having to do with or derived from the operation of devices or systems.' To operate a system or device is the condition of being in action or at work. Waterworks are systems made of devices, such as filtration and treatment plants, for which the action is to produce, distribute, collect and treat water. The process is the provision of drinking water through pipes and the collection of sewage in sewers.

However, to operate a municipal water system—to make it operational—one must have had planned and engineered different parts of the system. Planning is to design an arrangement, to elaborate a scheme. Engineering is the art of making practical application of the knowledge of pure science, such as physics, biochemistry and hydrodynamics.

The first section presents the government's rationale for amalgamating. This first section will be useful to shed light on changes in the operational aspects of water and wastewater services, and as well on the financial aspects presented in chapter 4. In the second and third sections, we present the municipal organization of water services in Montreal. We first look at the municipal organization before the amalgamation when inter-municipal cooperation and supra-municipal coordination prevailed.

We then turn to official documents of the new City of Montreal to hollow out the new way of providing drinking water. The City, however, has yet to officially implement a new management strategy for water and wastewater services. Imbeault (2002) suggested that it is by far the most problematic service to be re-organized by the new City administration. Two independent private-sector studies are in process, thus not yet available. One is from an engineering consortium that will provide an assessment of infrastructures and investment needs. Another one from an accounting multinational will suggest funding and financing approaches to water and wastewater services.

The fourth section describes the new metropolitan context with the creation of the Montreal Metropolitan Community (MMC), a supra-municipal body with regional responsibilities. We finally conclude this chapter by reviewing the findings and interpreting what has happened in the delivery of drinking water in Montreal. How are water and wastewater services organized and administered?

3.2. A Rationale for Amalgamating: "Le Livre blanc"

Le Livre blanc is the official document published before most bills with regards to municipal reorganization were discussed and adopted (MAMM, 2000). The White Book (*Livre blanc)* was published in the spring of 2000 and by December of the same year all bills were adopted by the provincial legislature (Bill 29, adjusting provincial laws with regards to the new municipal context, such as planning regulations, was adopted in 2001).

There are four bills that relate to the changes in the administration and organization of municipal governments. They are:

- Bill 110, omnibus type, modifying municipal and urban community by-laws;
- Bill 124, favoring the municipal reorganization of smaller municipalities and changing the powers of the Quebec Municipal Board (*Commission municipale du Québec*);
- Bill 134, on the new Montreal Metropolitan Community; and
- Bill 170, on the municipal reorganization of metropolitan regions (i.e. Montreal, Quebec City and Hull-Gatineau).

Bills 170 and 134 are those that really transformed the municipal landscape of Montreal. Bill 170 established the new administrative and organizational structure under which the City of Montreal became the sole municipal administration on the Island of Montreal. Bill 134 created, a year prior to the formal amalgamation, the Montreal Metropolitan Community (discussed in section 3.5).

3.2.1. Local Inadequacies

The recent municipal reorganization in the province came almost twenty years after the first reorganization of local finance in 1980 and just a decade after the second reform in 1991.

The words of the Minister describe well the mind-set that has shaped the policies of municipal affairs of the last year: *"Le statu quo n'est plus acceptable. Il faut s'engager dans la voie du renforcement des pôles urbains sur tout le territoire du Québec. C'est une des clés incontournable de la création de la richesse et une condition de notre prospérité collective*" (MAMM, 2000: ix).

The position of the provincial government, as stated in the White Book, was that municipal organization, both territorial and administrative, restrained the local level in delivering good quality services. The government also suggested that municipal fragmentation could not provide for an equitable sharing of costs and revenues among the local levels (MAMM, 2000: 20). The government presented evidence that central cities had higher social services spending while having poorer urban populations, thus, a lesser fiscal capacity.

The inadequate provision of local services stems from the fact that inter-municipal cooperation and supra-municipal coordination have both reached their limit, hence a twofold local problematic. On the one hand, urban communities have grown old and urban regions have expanded beyond their competency. The government even added that the territory under the authority of an urban community is too small for the undertaking of tomorrow's tasks (MAMM, 2000).

On the other hand, inter-municipal cooperation has grown so much that its efficiency is greatly reduced. We could argue that transaction costs rose so much that agreements offset the benefits generally sought. For that matter, the government clearly stated that resorting to inter-municipal agreements has, over the years, increased fragmentation rather than decreased it: *"Le recours aux ententes intermunicipales est fréquemment utilisé dans les agglomérations pour pallier le problème de la fragmentation … Cependant, les ententes, à cause de leur caractère disparate, accroissent souvent la fragmentation plutôt que de la corriger, tandis que leur gestion engendre une lourdeur fréquemment*

dénoncée, avec une croissance presque géométrique des réunions auxquelles elle oblige les élus municipaux à s'astreindre" (MAMM, 2000: 30).

3.2.2. Global Tendencies

The government also recognized that metropolitan Montreal suffers from the same ills of other large urban agglomerations, such as sprawl, higher social expenditures, degraded public and private buildings, fiscal disparities and disjointed urban governance (MAMM, 2000).

But metropolitan Montreal, in the words of the government, is seriously lagging behind other North American and European metropolises in the re-arrangement of urban governance: Montreal must, at all costs, catch up.[7] The government thus prioritized Montreal in its municipal reorganization (MAMM, 2000: 38).

Rationale for amalgamating municipal governments stemmed as well, it appears, from the 'new competitive model' conveyed by the processes of globalization (see Stren and Polèse, 2000). On that matter, this paragraph is evocative: "*À notre époque de mondialisation des marchés et d'abolition des frontières économiques, la réussite internationale passe de plus en plus par la constitution de pôles urbains à fort pouvoir d'attraction internationale*" (MAMM, 2000: 27).

3.2.3. Provincial Ideals

The provincial government clearly desires an administrative and organizational *renouveau* fitting the 'global standards' of urban governance. The municipal reorganization is a chance to re-position Montreal in the North American economy, but also an opportunity to renew municipal governance. The reasons are many.

Local governments have long pressured the provincial and federal governments for more funding because of inadequate local financing. Montreal begged often for special status and other peculiar fiscal treatments, making a case of its meager revenues and hefty expenses at the Quebec Municipal Board.

Besides local problems, the nationalist government espoused deficit reduction and looked forward into raising revenues and/or lowering expenditures. Even though municipal reorganization is a complex and politically risky business, it could help cutting costs at the municipal level and enhance metropolitan development in two ways.

First, the reorganization could re-allocate local income amongst the municipal level, thus reducing fiscal discrepancies. This is possible by regrouping municipalities and elaborating supra-municipal bodies (MAMM, 2000: 71). Secondly, it could also reduce the costs of public services by standardizing operations and cutting back on administrative redundancy.

Both could help in relieving the pressure on the provincial purse while maintaining or improving local public services quality and delivery, as wished by the government: "*Il faut enfin que l'organisation du*

[7] "La région de Montréal est encore à la remorque de ces mutations et il lui faut rattraper à tout prix le retard accumulé" (MAMM, 2000: 40).

secteur municipal soit plus simple, plus efficace, moins coûteuse. En effet, la réorganisation doit permettre de maintenir les services existants tout en réduisant leur coût, ou d'améliorer les services sans accroître le fardeau fiscal global des contribuables" (MAMM, 2000: 103).

Furthermore, after the Rio Declaration, in 1992, sustainable development became a catchword for local, provincial and federal governments (Low *et al*., 2000). Better land-use planning, limiting sprawl and reducing air and water pollution were among the key strategic elements that had to be implemented.

Sustainable development came alongside 'global economics' (or the Global Economy) and paradigmatic strategies for strengthening economic growth in key industries (e.g. new information technologies and life sciences) and developing an international, competitive image (Harvey, 1989; Swyngedouw, 2000).

In 1999, Louise Harel, the then Minister of Municipal Affairs, argued that the reorganization of the municipal level, the amalgamations, was a good thing for 'better' (greener) and 'stronger' (more) urban growth. She also mentioned that the new municipal re-organization provided for better performance of the metropolitan economy: *"les régions métropolitaines les plus performantes sont celles dont les services sont offerts par des organisations opérant à différentes échelles. Or, c'est exactement ce que la réorganisation municipale en cours au Québec prévoit dans les régions métropolitaines, à savoir la division des activités et services municipaux en trois groupes et leur prise en charge par le palier le plus adéquat: les activités stratégiques sont confiées aux communautés métropolitaines alors que la gestion des services municipaux est partagée entre les grandes villes et leurs arrondissements*"(MAM, 1999: 19).

Thus, the municipal reorganization could become a key tool in the geo-economic development of the provincial economy as well as strengthening the role of the metropolitan economy. It could also become a geo-social and environmental tool for urban growth and development.

On the one hand, it spreads local government costs sharing among a larger number of inhabitants of different, often higher, socio-economic statuses. And, on the other hand, policy-making is circumscribed to a defined metropolitan territory for which mass transit, ecological conservation and improvement is encouraged. Land development and re-development within already urbanized areas is also a key policy orientation (MAMM, 2000).

3.3. The Municipal Organization in the Late 1990s

3.3.1. An Example of Inter-Municipal Cooperation: Water Services

Water management in the City of Montreal, like in other municipalities, was under the public works department's authority. The public works department had to plan, conceive and carry out the daily management of water services. It dealt with most tasks that directly and indirectly relate to the provision of drinking water.

The provision of drinking water necessitates tasks such as production, filtration, distribution, and drainage. Public works responsibility pertained also to maintenance, rehabilitation and modernization of

utilities and networks (Ville de Montréal, 1996: 9). However, other departments provided complementary services. These departments were required to:

- collect due taxes and tariffs from the clientele: municipal, commercial, institutional and industrial customers (*Service des finance et du contrôle budgétaire*);
- draw up and elaborate contracts and agreements between the city and other municipalities and to represent the city at the Quebec Municipal Commission (*Service du contencieux*);
- take care of green spaces at the two filtration plants and at the reservoirs (*Service des parcs, des jardins et des espaces verts*).
- oversee the purchase and maintenance of motor vehicles (*Service de l'approvisionnement et du soutien technique*);
- maintain buildings (*Service des immeubles*).

Water management has also been the fertile ground of inter-municipal agreements between municipalities. The City of Montreal was in charge of operating and maintaining the water supply infrastructure system of Côte-St-Luc, Outremont, Westmount, Montréal-Est and Saint-Pierre. The City of Montreal owned the water supply infrastructure of those five cities.

The cities paid back the City of Montreal the value of the service provided. In general, the amount was based on expected operational costs. Sometimes, the amount transferred was based on the average consumption of 10 other cities supplied by Montreal (CIEB, 1999: 35).

The City of Montreal sold bulk drinking water to ten other municipalities on the island. Those cities were billed, at a fixed annual tariff, on water consumed and the tariff was set by the Quebec Municipal Board.

The City water infrastructure thus supplied 1.5 million citizens daily (of 1.8 million total), notwithstanding the 500 000 or so outside workers who come to the City in the daytime. The remaining 300 000 citizens of the island were supplied by their own municipalities or, as in Beaconsfield, drinking water was provided by another municipality.

Statistical data from the Ministry of Environment mentioned that 99.9% of the island's population is served by a 'surface water intake system' and that there were 26 municipal drinking water networks with treatment on the island (MENV, 2000).

The municipalities of Lachine, Dorval, Pierrefonds, Pointe-Claire and Sainte-Anne-de-Bellevue all owned a water filtration plant. Dorval did not provide drinking water to any other cities mentioned above until this summer. It now supplies Île-Dorval (Refer to Map 1 in appendix). Sainte-Anne-de-Bellevue partially supplied Senneville, however, the former was partially supplied by Pointe-Claire. The latter also supplied Beaconsfield, Baie d'Urfé and Dollard-des-Ormaux (partly). Kirkland was possibly supplied by Pointe-Claire. [8]

[8] Massicotte (2002) could not provide any details on Kirkland, but the GTIU study (2001) suggests that Pointe-Claire supplied five cities: we are certain for (1) Ste-Anne-de-Bellevue, (2) Baie d'Urfé, (3) Beaconsfield and (4) Dollard-des-Ormeaux. Thus, Kirkland is most probably the fifth one. However, the question remains.

Pierrefonds also supplied Dollard-des-Ormeaux as well as Sainte-Geneviève, Roxboro and Île Bizard. Finally, Lachine supplied about a quarter of LaSalle (Massicotte, 2002).[9]

3.3.2. An Example of Supra-Municipal Coordination: Wastewater Services

Before the amalgamation, the Montreal Urban Community (MUC) took care of island-wide collection and treatment of wastewater. Wastewater collection and treatment was among the MUC's first responsibilities upon its creation in the early 1970s (CUM, 1999a).

Wastewater services became part of the Environment Department (*Service de l'environnement*) of the MUC in 1990. The new environment department had three directorates in order to take care of wastewater collection and treatment, air and water purification implementation and enforcement as well as food inspection (CUM, 1999a). Consequently, two divisions among the environment department related to wastewater.

The Rivière-des-Prairies treatment plant division planned, operated and maintained wastewater facilities while the air and water purification division enforced and implemented by-law 87 throughout the island (CUM, 2002a; 2002b).

In the same year, the organizational structure of the MUC changed and reinforced the treatment plant's vocation. The modifications entailed a strengthening of wastewater collection and treatment activities through the addition of administrative and computing tasks and of engineering processes. These were added to operations, maintenance and construction competencies already in place (CUM, 1999a).

By 2000, the Rivière-des-Prairies plant collected and treated close to 99% of all wastewater on the island, representing over 900 million cubic meters of wastewater (CUM, 2000). The quantity treated corresponds to 44% of all wastewater collected and treated in the province (Boulay *et al*., 1999).

The Rivière-des-Prairies treatment plant is an engineering mammoth. The plant's pumping capacity of 88 cubic meters per second makes it one of the biggest wastewater treatment plants in North America (CUM, 1999b and 1999c). In 2000, the plant collected and treated 2.6 million cubic meters of sewage and storm water on a daily basis, a third of its capacity (CUM, 2000). For comparative purposes, in 1999 Toronto treated a daily average of 1.3 million cubic meters of sewage. Daily maximum capacity at Toronto's four treatment plants is 1.5 million cubic meters (City of Toronto, 2000).

Wastewater responsibility for the MUC began only when sewage and storm water entered the drainage collectors or interceptors (*intercepteurs*). Local drainage remained a responsibility of municipalities until sewers hit the closest collector. Upon collection, wastewater is slowly directed to the eastern end of the island for primary treatment only. Once treated through a physico-chemical treatment process, wastewater is then returned in the St. Lawrence River without disinfecting (more in chapter 5).

[9] Lachine supplied more or less 20 000 out of 70 000 inhabitants.

3.4. The Municipal Organization Post-amalgamation

3.4.1. Decision-making Organization

The City's services are deconstructed in departments (*Direction générale adjointe*) and within each department, if need be, directorates are in charge of a single service (*Direction de division*). The Chief Administrative Officer (CAO) (*Directeur général*) spearheads the City's services and administrative apparatus. The CAO is nominated by the mayor but accountable to the Executive Committee as well as to City Council. The CAO is responsible for planning, running, coordinating and monitoring the general affairs and activities of the City and of boroughs. Furthermore, the CAO is assisted by three associated directors (*Directions générales associées*) each being responsible for a set of boroughs.

The new administrative structure breaks up the borough landscape into Eastern, Central and West. Table 3.2. summarizes the political and population share for each set of boroughs. The *Eastern* borough set is definitively the largest and most important as it represents close to 40% of the City's population and of City Council representatives. But it only combines a quarter of total boroughs.

Table 3.2. Political and Population Share of Eastern, Central and Western Boroughs

Borough Set	Western	Central	Eastern
Number of representatives	21.0 (29 %)	25.0 (34 %)	27.0 (37 %)
Number of boroughs (%)	11.0 (41 %)	9.0 (33 %)	7.0 (26 %)
Population in thousands (%)	502.8 (28 %)	609.4 (34 %)	694.7 (38 %)

Source: CTM (2001).

The *Central* borough set is characterized by a relatively stable share in each set of indicators, a third of the population, of boroughs and representatives.

The *Western* set, on the contrary, covers eleven boroughs, making 40% of total boroughs. But population and representative shares are less than 30%. It is also the set that shows the lowest population density (CIEB, 1995). Most boroughs in this set have separate sewer systems, as opposed to combined sewers for the two other.

Most municipalities that were supplied or had a system owned by Montreal are in the Eastern and Central boroughs. Only the Côte-St-Luc / Hampstead / Montréal-Ouest and Saint-Laurent boroughs are part of the Western set as well as the Ahuntsic / Cartierville borough—once within Montreal city limits. Thus, the Eastern and Central borough sets make up most of the MONTREAL, OWNED and SUPPLIED categories while the Western set consists mostly of the OTHER category.

3.4.2. General Provisions in the City Charter [10]

[10] Exclusively taken from Ville de Montréal, Service du Contencieux (2001) *Charte de la Ville de Montréal*, unless stated otherwise.

The administrative structure of the new City of Montreal provides for competency at the city-level (hereafter the City) as well as at the borough-level (hereafter boroughs). In general, the City plans municipal services and settles budgetary matters for the City and for boroughs.

The City either provides services centrally or in a 'de-concentrated' manner at the borough level. 'Decentralized' services are those taken cared of by the borough council. Two key paragraphs stress, or rather detail, the nature of such competency sharing between the two levels of municipal government within Montreal: "*Quant à l'organisation générale des services, elle se présente de deux façons: on parle de décentralisation lorsque l'arrondissement dispose d'une autonomie dans la conception et la livraison des services et qu'il gère les ressources qui y sont consacrées. D'autre part, on parle de déconcentration lorsque certaines activités sont localisées dans l'arrondissement et qu'elles sont prises en charge par un personnel qui demeure sous l'autorité hiérarchique de l'unité centrale correspondante*" (CTM, 2001: 8).

"*L'élaboration des politiques et des orientations de la nouvelle Ville revient aux unités centrales, alors que les arrondissements doivent voir au respect de ces choix dans la gestion de leurs opérations. Les unités centrales ont quelquefois des responsabilités opérationnelles. Le personnel des unités centrales ayant un mandat de planification est donc limité en nombre mais détient une expertise spécialisée*" (CTM, 2001: 11).

In passing, it is worth mentioning that organizational flexibility is provided for in article 186. It allows the City to delegate (*délégation*) some services that boroughs can undertake in the City's name. The delegation of services, though, does not necessarily apply to all boroughs as the City can determine which, how and to whom services will be delegated, as specified below: "*Le conseil de la ville peut, dans son règlement intérieur, aux conditions et selon les modalités qu'il détermine, déléguer à un conseil d'arrondissement les pouvoirs suivants : … l'entretien du réseau de voirie artérielle, y compris l'installation et l'entretien de la signalisation routière, des réseaux d'aqueduc et d'égout ou de tout autre infrastructure ou équipement relevant de l'autorité du conseil de la ville*" (Ville de Montréal, Service du Contencieux, 2001: 123-124).

This flexibility was probably inscribed in the City Charter so as to allow boroughs that were municipalities to provide services on a continual basis, especially with regards to water and wastewater services, until the City organization signs a collective agreement with its employees.

The City is responsible for enacting and planning economic, social and community development by-laws. The City is also responsible for the strategic planning of municipal services. Boroughs must abide by and implement City regulations and by-laws. They are in charge of permit delivery, information diffusion as well as public consultations. Finally, boroughs must also provide financial support to economic, social and community development organizations.

The situation is similar with culture, recreational parks and amenities. The City must designate which items of such services are under the City's authority and those that are under the authority of boroughs. Boroughs, though, are responsible of organizing and planning activities.

Article 105 stipulates that major transit arteries and roads (like in the downtown core), designed as such in by-laws, are the prerogative of the City whilst remaining road works are taken cared of by the respective borough.

While the City is responsible for recycling, fire protection and risk assessment, and social housing, boroughs are responsible of local fire risk assessment, refuse and wastes collection. Mass transit is under the City's sole authority so does police and fire fighting services.

It is, however, important to note that mass transit is operated at the City level but planned by the Metropolitan Transport Authority (*Agence métropolitaine de transport*), a supra-municipal entity now under the competency of the MMC.

3.4.3. Specific Provisions with regards to Water and Wastewater Services

The City is responsible for drinking water production and wastewater treatment. The City's Charter specifies that the City can undertake works within and outside its boundaries if they relate to water supply and sanitation. The City can also collect and treat wastewater from other municipalities but all agreements between the City and a third-party are subjected to the Environment Minister's approval.

Furthermore, the City can delegate the provision of City-services, such as drinking water, to one or many boroughs. Water management is provided through the Environment, Public Works and Networks Department (*Direction générale adjointe à l'environnement, la voirie et aux réseaux*).

This department is divided into five directorates. Two relate to environmental protection and road works while three others relate directly and only to water management:

- Water Production Directorate (*Direction de la production de l'eau potable*);
- Wastewater Treatment Directorate (*Direction de l'épuration des eaux usées*);
- Aqueduct and Sewer Management Directorate (*Direction de la gestion des réseaux d'aqueduc et d'égout*).

3.5. Metropolitan Governance

In the summer preceding the amalgamation of Montreal, the provincial government passed bill 134 on the creation of a new supra-municipal entity: the Montreal Metropolitan Community (MMC). The new body is established along lines fitting the Census Metropolitan Area.

Population in the census tracts for the Metro Community was 3 269 977 in 1996 while it was 1 837 062 for the City of Montreal, in 2001 (MAMM, 2002). The City is more than half of the metro community while the old City of Montreal (the nine boroughs) represented a third of the metropolitan population (Séguin and Germain, 2000).

Territorial delimitation has been decided upon characteristics that relate to the new goals of metropolitan governance. Provincial objectives included, more or less, the Census Metropolitan Area but also considered the municipal center-periphery problematic and democratic issues: *"Le choix d'un territoire […] doit aussi tenir compte des objectifs suivants : l'équité fiscale sur le territoire, la souplesse et l'efficacité des structures, la responsabilisation et l'imputabilité, les conditions favorables à la prospérité*

économique et à la compétitivité" (MAMM, 2000: 77).

It is worth noting that Verchères and Contrecoeur were among the cities that requested an environmental audit for the Rivière-des-Prairies treatment plant back in 1983 (CCE, 1983). These two were not part of the metropolitan area but are now included in the MMC. The government argued that Contrecoeur should be in the MMC because its seaport is an extension of Montreal's seaport rather than because of the relationship between the 'environmental' responsibility of the Community and Montreal's wastewater treatment plant (MAMM, 2000).

The MMC is responsible of metropolitan land-use planning and socio-economic development. It is also responsible of water purification (CMM, 2002). The specific responsibilities include the development of coherent strategy for drinking water delivery and wastewater treatment, and a say on all projects with regards to wastewater facilities and equipment (MAMM, 2000: 85-86).

However, the White Book stipulates that: "*Advenant que la démarche de regroupement des municipalités aboutisse à la constitution d'une ville unique sur le territoire actuel […] de la Communauté urbaine de Montréal […] c'est cette municipalité qui prendrait à sa charge les responsabilités qui auraient autrement été confiées à la Communauté métropolitaine pour le territoire de l'actuelle communauté urbaine*" (MAMM, 2000: 79).

Consequently, it is the new City of Montreal that is responsible for operating and managing wastewater services while the MMC is responsible for metropolitan coordination. The organizational structure of the MMC resembles the new City's structure. The MMC is headed by a president and a Community Council of municipal representatives chosen by and among elected municipal officials such as mayors and borough presidents. In between the Council and the commission is the Executive Committee. The General Manager, assisted by nominated Assistant General Managers, spearheads the administrative apparatus of the MMC.

3.6. Restructuring Urban Water Services

One goal of the territorial reorganization of the metropolitan regions of Montreal, Hull and Quebec City was to reduce municipal fragmentation so as to reinforce urban growth, development and planning. Unmistakably, that has not occurred in Montreal yet. Table 3.3 below summarizes changes pertaining to the number of municipalities before and after the amalgamations process.

Table 3.3. Number of Municipalities Ranked by Population Size, in Quebec and Montreal

Population Size	Number of Municipalities (Quebec, 2000)	Population	Cities (Montreal, 2000)[(a)]	Boroughs (Montreal, 2002)	Difference (1999-2002)
< 1 000	552	315,029	1	0	-1
1 000 to 1 999	296	421,988	0	0	---
2 000 to 4 999	251	780,360	5	0	-5
5 000 to 9 999	82	568,166	3	0	-3
10 000 to 24 999	76	1,200,719	7	7	---
25 000 to 49 999	28	985,773	6	4	-2
50 000 to 99 999	16	1,083,551	5	10	+5
100 000 >	5	1,742,712	1	6	+5
Total	1306	7,098,298	28	27	-1
With MUC (1999) and City government (2002)			29	28	-1

Sources: CTM (2001); MAMM (2000) *La réorganisation municipale*; and MAMM (1999) *Prévisions budgétaires des organismes municipaux*.
(a) St-Pierre not included.

From that table, we can see that there were thirty different governments within the island territory before the amalgamation. The local level had twenty-nine city level governments and one supra-municipal government. The situation afterwards is basically the same. The local level, following the amalgamation, consists of a single city government and of twenty-seven boroughs that are amputated forms of city governments. The new municipal organization for Montreal, as develop in bill 170 and in the City Charter, implies that boroughs are municipal governments that have handed over some competency to another, the City.

Article 130 of the City Charter specifies that boroughs be regulated by the Town and City provincial law just as the City is. However, boroughs are not provided with taxing and borrowing powers and they cannot appear in court. These are exclusive to the City. Furthermore, a larger supra-municipal community replaces the past supra-municipal level: the MMC. Before the amalgamation, there were two levels of local governments governing the Island whereas now there are three levels of local governments.

Accordingly, the amalgamation did reduce the number of municipal governments on the island but it did not reduce the number of local governments. In fact, the situation as of 2002 is that there are more levels of local governments governing the Island and basically the same number of municipal governments (boroughs and City). Does the new local level landscape fulfill its promises? It is still too early to provide any useful answers. However, water management and governance have been significantly altered.

The new governance structure amalgamated twenty-four (24) water systems into one, thus eliminating numerous water supply related inter-municipal arrangements (over 20). It also abolished supra-municipal coordination of sewage disposal. The new configuration centralizes in the City's hands drinking water production, wastewater treatment and water services planning, development and funding. The City did not delegate plants' operation to the respective boroughs (e.g. Pointe-Claire, Dorval, etc). However, treatment and discharge activities are 'strategically planned' at the metropolitan level while being managed and operated at the municipal level. Thus, the City is entirely responsible for production and treatment but discharge is a shared competency.

Distribution and drainage activities are de-centralized (not de-concentrated) at the borough level. Twenty-seven boroughs of relatively unequal shape and size and with substantially different underground infrastructures will now maintain, repair and up-grade water mains and sewers underneath their political delimitations. Nevertheless, the City is responsible for particularly expensive maintenance and rehabilitation costs and of new infrastructures.

In the final analysis, both ends of the water reticulation are centrally operated while the central part, the network making up distribution and disposition, is de-centralized to boroughs. And, even though inter-municipal cooperation disappeared, it, nonetheless, reappeared as inter-borough cooperation. Boroughs are entitled to service one another with circumspection. This new type of cooperation is necessary as some boroughs relied on other municipalities for water services. Westmount is a good example. Before the amalgamation, the infrastructure was owned and serviced by Montreal but now, the infrastructure is still owned by Montreal but serviced by the Sud-Ouest borough (Massicotte, 2002).

In conclusion, the processing aspects of urban water services have been centrally restructured into two operational units: production and treatment. The distribution and collection aspects have been reshuffled into parceled operational units at the borough level. This is confirmed by the new organizational structure, which has three directorates exclusively dedicated to water management.

The most important feature of the new system is the disappearance of previous inter- and supra-municipal agreements towards the provision of drinking water. However, a new operational feature is added through the creation of boroughs. On the one hand, in the old City of Montreal, water services were operated throughout the entire territory without parceled units, which is still not in place due to the current negotiations with labor unions towards a new collective agreement. On the other hand, old suburban municipalities saw their autonomy slightly reduced by the creation of the new city.

4. Structural Adjustments

4.1. Introduction

In the preceding chapter, we have seen how the operational aspects of water and wastewater services were articulated before, as well as after, the amalgamation. We now turn to the financial aspects of water and wastewater services. What has changed in the financing and funding of water and wastewater services? How does changes in the administration and organization of those services relate to those aspects?

Actually, we could not provide a thorough portrait of the financial changes because the new City decided that the status quo should prevail until a new management strategy is clearly identified.[11] For 2001, the City did not made significant changes to water pricing mechanisms (Ville de Montréal, 2002c: 4). They are the same as in previous years and we present them in section 4.3. And, since we could not provide a description of changes from one period to another, we have decided to look back at the last ten years and examine financing and funding issues.

Financing, the act of collecting funds for water and wastewater services falls in the realm of local public finance and it is, consequently, our first section. In this section we present the Québécois context and we also quickly point out to theoretical and practical notes of interest with regards to local public services.

If financing is the act of collecting funds for services, funding is the act of distributing collected funds to different services. This is presented in section 4.3 which provide information on the funding of water and wastewater services in Montreal.

In the fourth section, we turn to the question of infrastructure. The section discusses the needs for rehabilitating and modernizing Montreal's water infrastructure but also the financial consequences of new drinking water standards. The final section provides a comparative analysis of boroughs in light of the latest municipal budget and of the last ten years.

4.2. Local Public Finance

4.2.1. The Québécois Context

In Canada, there are broadly three levels of government: the federal or central government, the provincial governments (often referred to as national in Quebec) and municipalities, the local governments. The Constitution[12] specifies the jurisdiction and competency of both the federal and provincial governments. With regards to municipal governments, not much is provided except for article 92 (1867), which specifies that: "In each Province the Legislature may exclusively make Laws in relation

[11] As of 1 February 2003, the City has not made public its new management strategy. It is possible that it will be known following the signature of the "contrat de ville" between the City and the provincial government, which will be done by April 30th (Lessard, 2002).
[12] *A Consolidation of the Constitution Acts, 1867 and 1982*, Department of Justice, Ottawa.

to Matters coming within the Classes of Subjects next hereinafter enumerated; that is to say, … Municipal Institutions in the Province."

Furthermore, provincial governments, as opposed to the central government, rely only on direct taxation for funding. Thus, municipal finance is confined within the limits of provincial government.

Local governments in Quebec have generally relied on property tax yields for funding the municipal administrative apparatus, local services and equipments (MAM, 1993). It has been said that property tax is "a type of tax that has been traditionally criticized as the most poorly conceived tax ever applied," exhibiting "lack of flexibility or rigidities because of constitutional prohibitions that primarily stem from debt limitations" (Henderson and Ledebur, 1972: 102).

This situation reflects the British influence among countries of British traditions where local governments rely "most heavily on taxes on real property and least heavily on income taxes" (Bird, 1995: 8).

In the late 1970s, municipal governments were not as autonomous as they now are; back then provincial transfers accounted for more than 30% of their income. The 1980 municipal fiscal reform fundamentally changed local finance in Quebec (MINF, 1996).

The 1980 fiscal reform, known as the *Réforme de la fiscalité municipale*, was the first event in a series of four that led to the amalgamation of Quebec's metropolitan regions. This first and most important reform put into place the concept of de-centralization, as opposed to de-concentration (MAM, 1993). The provincial government then believed that local autonomy had to concurred with financial autonomy. The reform gave the (almost) exclusive use of real property tax revenues to municipalities (MAM, 1993).

However, the 1980 reform did not modify competency sharing between provincial and local governments. The 1991 competency reform, known as the *Réforme du partage des responsabilités*, tailored local finance to the new competencies of local governments. Among other things, local governments were now in charge of mass transit, police services and local road works (MAM, 1993).

In 1991, municipal finance represented less than 20% ($ 6.3 billion) of provincial total public-sector revenues. Land, real property and services taxes accounted for more than 85% of total local income, provincial transfers made up about 5% and the rest, 10%, came from borrowing (MAM, 1993).

The competency reform of 1991 did not please the Montreal administration. In a testimony to the Fiscal Commission's hearings, the city clearly stated that it was against the reform arguing that it did not reflected the purposes, needs and aspirations of Quebec's metropolis and economic heart. The city even suggested that the new fiscal arrangements would seriously impair its future funding capacity and that it would promote further urbanization in the surrounding periphery (Ville de Montréal, 1991).

The case of Montreal is not different from other central cities of North America. Mills (1972) argued that central cities had financial difficulties because of the inherent problems of property taxes: "Property tax yields are particularly unresponsive to economic growth in central cities. Neither the amount nor the value of property in central cities increases very fast. The amount does not because central cities

are almost completely built up, and most construction for both housing and employment occurs in suburbs" (Mills, 1972: 229).

Following the Conference on the Social and Economic Future of Quebec (*Conférence sur le devenir social et économique du Québec*) in March 1996, the provincial government established a public services financing commission, which had to consider, among other topics, local public finance. Following the commission's recommendations, the provincial government made changes to the fiscal arrangements between both levels of government.

During the commission's hearings, Montreal solicited a special status supporting its importance in the metropolitan economy; it even requested that the provincial government and municipalities in the metropolitan area support 5% of Montreal's budget (CIEB, 1997).

By 1996, real property and service taxes, tariffs and tax compensations made-up 97% of the revenues of municipalities while 3% came from direct provincial transfers. The local tax system provided almost 80% of total local income (MINF, 1996: 14-5).

4.2.2. Decentralization and Local Public Finance

Decentralization implies realizing the importance of local government finance, a new emphasis on local participation and autonomy (Bird, 1995). In practice, decentralization is the transfer of competency, such as the provision of services, from higher-level governments to lower-level governments.

It is often believed that decentralization comes with the "expectation that additional local resources can be mobilized to pay for them" (Bird, 1995: 1). In Canada, provincial governments have been transferring a number of competencies to local governments but income transfers have not followed.

Bird (1995: 39) suggests that "even in the most sophisticated countries, local property taxes can seldom yield enough to finance local services." He adds that the property tax "may be a useful, even a necessary, source of local revenue, but it is most unlikely to provide sufficient resources to finance a significant expansion of local public services in any country."

This situation is confirmed by the fact that even after the three local public finance reforms, cities are still begging for cash. Cities have long argued that their new responsibilities do not match up with available incomes.

Thorny inter-governmental relations between Ottawa and Quebec City complicate the local public finance debate in Quebec and provincial governments have almost taken cities hostage. The federal government has recently stated that it is hearing the plea of municipal governments, who were more than happy for that possible financial support. But the provincial government has clearly stated that federal funding for municipalities is by no means acceptable (Buzzetti, 2002).

The debate has been complicated by a recent study by the OECD (2002). The study stated that provincial governments are responsible for municipal under-financing, while provincial governments have argued that it is the federal government that maintains a fiscal desequilibrium affecting provincial funding

resources. The fiscal desequilibrium was confirmed by the Conference Board of Canada and the Quebec Séguin Commission but forcefully negated by the federal government. To that matter, the Finance Minister John Manley alleged that there is no desequilibrium between the federal government and provincial governments (Cornellier, 2002). However, it is important to note that the federal government announced a national urban strategy which would allocate federal funds towards transit, infrastructures and social housing (Sgro, 2002).

4.3. Water and Wastewater Services Accounting

4.3.1. Financing Water Services in Montreal

In the Economic and Budgetary Bulletins (*Cahier d'information économique et budgétaire*, hereafter CIEB) of the City of Montreal, one will find, among other things, detailed information of the City's sources of revenue and expenses. It provides an explanation and a description of water services income sources: the water tax and aqueduct services.

The water and services tax (*taxe de l'eau et de services*) is a charge based on the rental value of non-residential properties. Social, cultural, community and charitable organizations are exempted from that tax. Through the 1970s and until 1982, the water tax was based on the rental value of properties and levied on all types of properties: business places, owned and rented housing units (CIEB, 1996: 11).

From 1983 until 1986, residential customers were charged $ 60 per unit (owned or rented) while business places were still charged on rental value. Afterwards, residential customers were not charged at all. From 1987 until 1992, business places were charged on property value instead of rental value.

There are over 3 000 water meters installed for industrial consumers which pay a tariff in excess of "normal consumption." That is a tax reflecting the extra cost of providing water that would otherwise not have been paid for through the water and services tax.

In passing, low-income and unemployed people ferociously fought the water tax from 1974 until 1981 (Brunelle, 2002). The organization defending the rights of socially assisted people argued that the tax was regressive and came down to a thirteenth month of rent.

Some boroughs still have water taxes for which people have to pay. In the Montréal-Nord and Saint-Léonard boroughs, low-income people have organized and are systematically refusing to pay for "an essential service that is drinking water" (Tardif, 2002). The aqueduct revenues (*services d'aqueduc*) are collected from cities for which water services are provided: the ten cities only supplied pay a tariff based on their consumption. The Quebec Municipal Commission fixes the tariff.

The five others, those for which the infrastructure is owned, are required to pay an amount related to the estimated provision costs. The pricing formula allows the City of Montreal to charge for costs that encompass operational, administrative and maintenance costs plus certain fees related to water infrastructure debt servicing (Ville de Montréal, 1996)

Until 1995, the City acknowledged that the aqueduct services income really reflected the provision costs:

Les recettes générées par la vente de l'eau aux quinze municipalities […] reflètent les coûts réellement encourus pour rendre ce service (CIEB, 1995: 60).

However, since 1996 and until 1999, the City stated that aqueduct services income only covered operational costs and partly covered infrastructure financing: "Les recettes générées par la vente de l'eau aux quinze municipalities […] reflètent les frais de financement d'une partie des infrastructures et les coûts d'opération encourus pour render ce service" (CIEB, 1996: 56).

That period coincided with the election of Mayor Pierre Bourque and the publication of the *Livre vert* on the city's water management. It is also then that the privatization debate sparked (Phony accounting and the *Livre vert* is discussed in section 4.3.3). Other financing, or pricing, mechanisms existed for municipalities of the MUC but none of them has the same pricing scheme, which comes down to 28 pricing mechanisms for the island. However, the different pricing mechanisms can be grouped into three categories.

The first model relates to pricing based on property value and there are five municipalities that fit within this model. The second model, applied by twelve cities, is based on types of housing units while the last model is based on consumption computed with water-meters. This last model is common among eleven cities in the western suburbs, accounting for 18% of the population (GTIU, 2001: 21). The only pricing mechanism common to all municipalities is a charge levied on residential property value that municipalities paid for funding the MUC's wastewater services.

4.4. Rehabilitating and Modernizing

4.4.1. Montreal's Municipal Water Infrastructure Today

Montreal's municipal water system is constituted of (i) 5 700 km of water mains, (ii) 8 500 km of sewers, (iii) 90 km of sewage interceptors of 1.8 to 5.4 meters wide, and (iv) a 8 km long Aqueduct Canal (Massicotte, 2002; Ville de Montréal, 2000).

The water system also has seven water filtration plants and two of them, Atwater and Des Baillets, are Canada's biggest. They have four raw water intakes, each seven-foot wide, extending as far as 610 meters in the St. Lawrence River. The system has a daily maximum capacity of over 2 725 000 cubic meters and nine reservoirs with a total capacity of 829 900 cubic meters of water.

And the Rivière-des-Prairies wastewater treatment plant with a daily maximum capacity of 7.6 million cubic meters is one of the largest primary treatment plants in North America (see section 3.3.2). All of which served a population of 1 837 072 (Gagné, 2002; Ville de Montréal, 2000).

Almost half of sewers (48.5%) and forty percent of water mains (41.0%) were laid down to earth before the 1930s. This proportion increases to 79% for sewers and two-thirds for aqueducts by the 1960s. Put differently, more than half of the network is more than 70 years old.

Montreal, as we have seen in chapter 2, has one of the oldest systems in North America and is in need of infrastructure rehabilitation and modernization. The system has also a leakage rate between 35%

and 50% and faces important labor training costs in the next few years as the government asks for 'trained personnel' at all levels of operations.

And since water services are part of the public works department, anybody that might have to fix a pipe, turn off a van or dig a hole will have to be certified as a formal water networks technician by the provincial government (Massicotte, 2002; GTIU, 2001). With new drinking water standards, further investments are needed to up-grade filtration plants and the wastewater treatment plant. The amalgamation also poses a problem with regards to filtration plants.

Early in this chapter we have stated that there were seven filtration plants on Montreal Island. In fact there are eight. Senneville has a brand new filtration plant built for older water standards. Since it was completed after new standards were enacted, it cannot be operated as it is not licensed or certified as meeting the new standards by Quebec's Ministry of Environment (Massicotte, 2002).

In addition, the five plants owned by cities (now boroughs) in the western part of the island supply less than 10% of total production. The Atwater is near full capacity but the Des Baillets plant is running at half total capacity. Thus, water production could soon easily be taken over by the Des Baillets filtration plant.

In fact, total drinking water production in Montreal could technically produce drinking water to supply over 4 000 000 inhabitants, at least two times the actual population or less than total metropolitan population (GTIU, 2001: 24). The (new) City must make choices with regards to these plants. The new drinking water standards apply to all plants: they must all be up-graded in order to continue producing drinking water as they actually do. Will the City invest millions in all seven plants when it could only invest in the two biggest plants, Atwater and Des Baillets? The answer will probably be known after the publishing of the two studies later in the year.

4.4.2. Montreal's Infrastructure: Previous Assessment Studies

In the 1991 testimony (Ville de Montréal, 1991), the city estimated that $ 1.8 billion, spread over ten years, were necessary to rehabilitate and expand its water network in order to attract businesses, especially in the southeastern and eastern parts of the city. In that same testimony, the city mentioned that 30% of its network had been built before the 1920s and 9% before the 1900s (slightly different from figure 4.5 above).

In 1995, Serge Pourreaux, a researcher affiliated to the City of Montreal, suggested that 280 km of mains were more than 80 years old and that by 2020 a thousand km would be that old. Furthermore, he estimated that between $ 1.3 and $ 1.5 billion were deemed necessary investments. But the city only allowed between $ 400 and $ 600 million, leaving a probable deficit of $ 900 million in the next ten years (Pourreaux, 1995: 12).

In the *Livre vert* (Ville de Montréal, 1996), the city estimated that water supply intake and treatment, reservoirs and pumping facilities were in very satisfactory shape (*satisfaisant*), while aqueduct and sewer systems were deemed good (*bon*). However, it specified that some parts of both the supply

and sanitation networks necessitate rehabilitation and modernization if drinking water quality was to remain good: "*L'élaboration et la mise en oeuvre d'un plan d'investissement doivent donc être considérées […] si l'on veut sauvegarder la qualité de la distribution de l'eau potable, ainsi que celle du drainage, tant à Montréal que dans les villes clients*" (Ville de Montréal, 1996: 13).

Regular technical and technological up-grades at the Des Baillets filtration plant allowed the City to envisage only the modernization of one of the three oldest galleries at the Atwater plant. Furthermore, the City believed that the reservoirs did not necessitate major investments in the years to come.

Numerous inspection programs have been put forth and the conclusions suggested that the network is not as deteriorated as once thought but the state of secondary conduits is not well known. Upon release of the *Livre vert*, 72% of the network had been inspected and over 350 leaks identified (Ville de Montréal, 1996: 14).

In the same *Livre vert*, the city presented different studies that have put different numbers on the total investment needed in order to rehabilitate and modernize the networks. Numbers vary from $ 450 million to $ 157 million over ten years. Some suggested that $ 207 million were enough, but the city claimed that between $ 160 million and $ 207 million were probably the correct investment needs (Ville de Montréal, 1996: 15).

4.4.3. Montreal's Infrastructure: Recent Assessment Studies

Recent newspaper articles suggest that investment requirements for the modernization and rehabilitation of water facilities were likely to be $ 400 million for the wastewater treatment plant and $ 200 million for filtration plants (Girard, 2001; Rodrigue, 2002). Back in 2001, an article claimed that investment needs for the aqueduct network alone would be between $ 304 and $ 416 million over twenty years (Girard, 2001).

However, other newspapers report a $ 1.6 billion investment program over the next twenty years for underground works (Beauvais, 2002; Corriveau, 2002). One even claimed, loud and clear, that Montreal was to undertake its biggest work site ever, as this headline suggests: *Aqueduc: Montréal entreprend le plus vaste chantier de son histoire.*

The most comprehensive study to date remains the *Livre bleu* (GTIU, 2001). The document was put out by a number of high-ranked or senior managers and directors working for the City of Montreal, the MUC and other cities. This document was submitted to the Transition Committee so that it could make decisions about the future management and governance of water in Montreal.

The *Livre bleu* states that: "*À défaut de programmes d'investissement récurrent en entretien et rehabilitation, les dysfonctions non seulement s'additionnent les unes les autres mais les unes amplifient les autres, créant un état de risque général, de sous-performance et de dangerosité potentielle*" (GTIU, 2001: 13).

Furthermore, $ 50 million annually over fifteen years are judged to be necessary to rehabilitate a system badly in need of fresh investments. This would drive down assumed life expectancy to normal

levels of 80 years. As it now stands, investment needs taking into account the new drinking standards for the new City of Montreal would be of $ 175 million for production utilities and over $ 9 billion over fifteen years for networks (GTIU, 2001).

However, the most interesting figures suggested in the *Livre bleu* are for the wastewater treatment plant's upgrades. Projections are of $ 83 million. Just a few years back, estimates were between $ 33 and $ 47 million for a disinfecting process, which would have come down to $ 5 or $ 9 million annually (Boulay *et al*., 1999). On top of the first $ 83 million for the facility, $ 270 million are required for the construction of storm water retention basins (GTIU, 2001).

Finally, with regards to investment we still have to wait for the 'real' studies to be published very soon by a Quebec-based engineering consortium: SNC-Lavalin, Dessau-Soprin and Aqua Data.

4.5. Uneven Spending, Sunken Inequalities

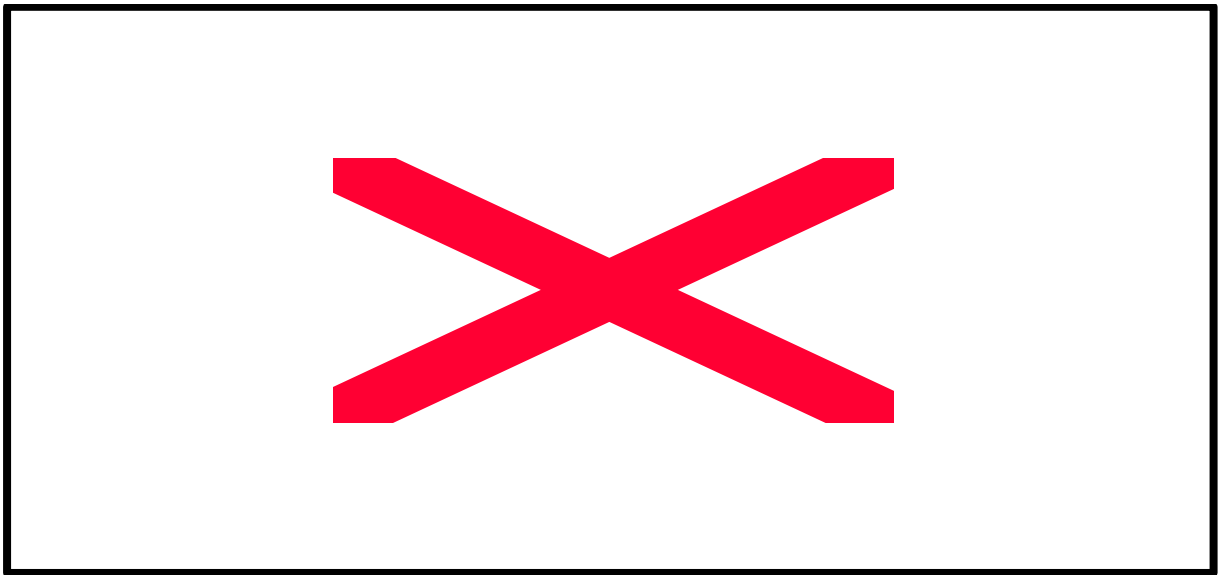
Total municipal operational costs for water and sewer for the former municipalities of the MUC stood at $ 190 million in 1999. The first budget of the City of Montreal estimates that $ 144 million are necessary for total water management operations (Ville de Montreal, 2002c). This is equivalent to the 1990 budget level ($ 140 million) and marks a 25% decreased in water and sewer expenditures.

New cuts in budget expenditures have not been shared equally amongst boroughs. The nine boroughs that formed the old City of Montreal were the most affected by those cuts as figure 4.7 below suggests. Per capita expenditures have decreased for all boroughs, Saint-Laurent being the only exception. However, data that served for figure 4.7 do not equal total spending for water and sewer. These were taken from the amount each borough had been allocated, which accounted to $ 89 million.

Notwithstanding budgetary discrepancies (that might be caused by the new sharing of competency) it clearly seems that the nine boroughs located within the old City of Montreal are disadvantaged relative to their counterparts with budget decreases between 60% and 85%.

To circumvent the budgetary discrepancy, we present the same collected data but distributed for kilometers of networks. That might be more accurate as linear piping was calculated for each borough in the *Livre bleu* (2001).

Figure 4.7. Per Capita Water and Sewer Budgets, Boroughs, 1999 and 2002



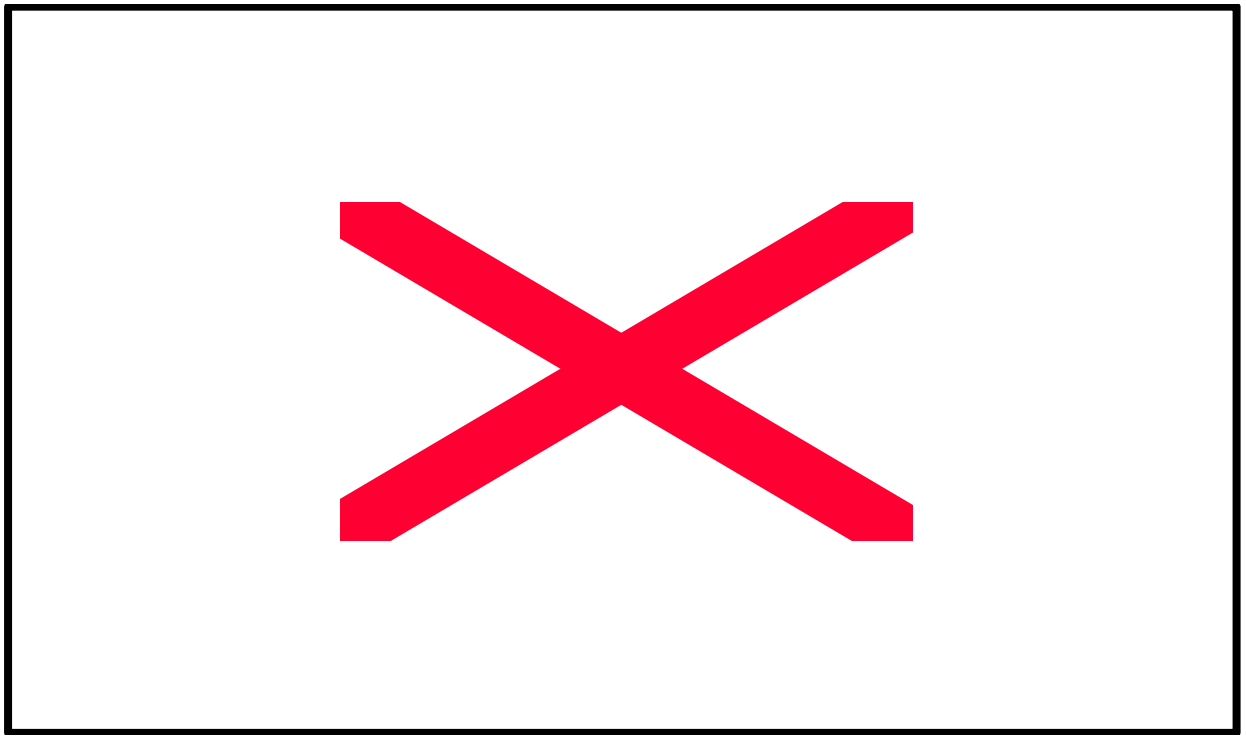
Source: 1999: MAMM (1999) Prévisions budgétaires des organismes municipaux; 2002: Ville de Montréal (2002) Budget 2002 : nouvelle Ville de Montréal.
(a) Old City of Montreal; (b) Includes former City of Montréal-Est.

Again, it is obviously apparent that boroughs from the old City of Montreal are drastically under-funded. Thus, both per capita and per km budget show a strong bias against those boroughs. However, while under-funding might be problematic for those boroughs, the infrastructure's modernization and rehabilitation takes us on a different level.

Rehabilitation and modernization of aqueducts and sewers is not only related to age. Even though some boroughs from the old City of Montreal have amongst the oldest networks on the island, these might not require expensive rehabilitation. In fact, rehabilitation and modernization of infrastructure is influenced by *(a)* age, *(b)* materials used, *(c)* design standards and *(d)* the surroundings underground (Massicotte, 2002).

Accordingly, some newer systems might necessitate investments that older systems do not. The Saint-Michel borough is a good example. Like many sectors of the island that were urbanized in the 1950s and 1960s, the then City of Saint-Michel [13] had lower design standards and used sandstone piping materials. Consequently, the life expectancy of the infrastructure is greatly reduced due to these two parameters.

Figure 4.8. Per Km Water and Sewer Budgets, Boroughs, 1999 and 2002



[13] The City of Montreal annexed a number of small cities during the 1970s and mid-1980s, such as Pointe-aux-Trembes and Rivières-des-Prairies.

Source: MAMM (1999) *Prévisions budgétaires des organismes municipaux*; Ville de Montréal (2002c) Budget 2002: nouvelle Ville de Montréal; GTIU (2001) *Livre bleu*.

Lower conception standards are known to cause more pipe breaks and sandstone has been recognized as an inferior, unreliable piping material. Thus, even if the infrastructure is newer than, say, in the Sud-Ouest borough, rehabilitation and modernization costs are expected to be greater (Massicotte, 2002).

In conclusion, it seems that the water and sewer spending trends of the 1990s have benefited suburban municipalities more than Montreal. And, the first budget of the new City of Montreal appears to support the unequal spending trends that have marked the last decade.

This interpretation is partly acknowledged by recent public coverage in the newspaper. As recently as 26 September 2002, the municipal opposition claimed that past inequalities in the provision of services have not been redressed. This is an outrageous situation for citizens and city councilors coming from the old City of Montreal as budget and workforce balancing-out was one of the amalgamation's priorities.

Even though the new City administration promised to create a 'balancing out' fund (*fonds de péréquation*) transferring monies from richer, suburban boroughs to poorer, central boroughs, it seems that more is needed to even out decades of sub-financing and under-funding in the central city (Cardinal, 2002b).

However, the coming engineering study might shed a different light on investment needs based on the evaluation of the system and political priorities of the City administration. This could mean that needs are not localized where they are believed to be, such as in the downtown core. Priorities may well, too, differ from past assessments. And that might just, as well, strengthen inequities amongst boroughs.

Finally, amalgamation is seen as a solution to chronic local public finance problems, especially for Montreal (see section 4.2). But already, the new municipal organization does not remedy budgetary problems for Montreal. The City has already asked all boroughs to reduce expenditures by 1% while these argue that they need more money to maintain service quality levels (Le Devoir, 2002).

5. Collective Consumption and Degradation

5.1. Introduction

In the two preceding chapters, we have described the operational and financial aspects of drinking water in Montreal. We now direct our attention towards the environmental aspect of drinking water in Montreal. Under this label we will look at the ecological conditions that characterize the system. We will also examine local environmental politics as it relates to the new metropolitan arrangements.

In cities, consumption is the decisive moment of the drinking water cycle. Water is produced and distributed so that customers, residential, commercial, institutional and industrial, can consume it. It is then drained, collected and discharged in a body of water treated or not, disinfected or not.

Water is produced and consumed for different purposes. Residential consumers, ordinary people, need potable water to live and therefore drank it. But they also use water for cooking, bathing, washing (self and cars) and finally, to water lawns and gardens.

Other users consume water for industrial processing and cooling, for making business and working places livable (fountains and toilets) and, often, water is necessary for commercial activity (e.g. restaurants).

It is through that 'consumption' that water is transformed from potable water to sewage. Thus, it is then, at that precise moment that water moves from one state to another. And it is at that same moment that clean water leaves the aqueduct to eventually enter the sewer altered. It is consumption that operates the modification from input to output.

The drinking water cycle in Montreal processes water three times: once to make it potable, once through consumption and once again to treat it. Below, we will focus particularly on this last aspect: treatment or lack thereof.

5.2. The Effects of Consumption

5.2.1. The Deliberate Production of Aquatic Squalor

Montreal has an inadequate wastewater treatment plant facility. Its greatest deficiency remains the lack of any disinfecting process that would greatly reduce disease-causing micro-organisms, such as faecal coliform and bacteria.

Chlorine disinfecting was designed in the construction plan of the station and the necessary equipment was even bought and built. But, early in the 1990s, the provincial government banned all chlorine disinfecting processes in municipal wastewater treatment. From 1991 until 1993, the MUC and the Environment Ministry tested different alternatives but none was retained then. Ultra-violet rays and ozone remain possible alternatives but implementation has yet to begun (Boulay *et al*., 1999).

For that matter, Table 5.1 below shows that the actual treatment process does not significantly reduce different disease-causing micro-organisms. Authorities are not denying this lack of disinfecting as

stated in a document presented at the Office of Public Hearings on the Environment (*Bureau d'audiences publiques sur l'environnement*): "*Les rejets des eaux traitées non désinfectées de la Station d'épuration contribuent à une détérioration des charactéristiques bactériologiques des eaux du fleuve en aval du point de rejet situé à l'Ile-aux-Vaches … Il est évident que la Station d'épuration réussit à peine à éliminer une fraction des micro-organismes presents*" (Boulay et al., 1999: 8).

Table 5.1. Selected Microbiological Results of Effluent, MUC's Wastewater Treatment Plant, 1996

Micro-organisms	Affluent	Effluent	Reduction (%)
Viruses/l	962	972	0
Giardia/l	1165	284	76
Cryptosporidium/l	6	4	27
E.coli/100ml	1 321 594	1 158 361	12

Source: Boulay *et al*. (1999) *La réforme de la gestion de l'eau.*

This is the main reason why the Sierra Legal Defence Fund gave a F+ mark to the wastewater treatment plant in its 1999 Sewage Report Card (SDLF, 1999). This same environmental organization blamed the MUC for numerous combined sewers overflows. These generally happen after severe storms or heavy rains when "the [sewage] flow is too large, excess is diverted through an overflow pipe and discharged untreated straight into a nearby body of water" (SLDF, 1999: 9).

The reduction of combined sewers overflows is one of the City's environmental priorities and it is seriously looking forward for the construction of stormwater retention basins for each sewage interceptors. It seems that combined sewers overflow are to be prioritized over the lack of disinfecting. In recent official City publications, these are 'taken seriously' while disinfecting hangs about unresolved.

A decade after the completion of treatment facilities that included chlorine disinfecting in initial plans has passed without alternatives (GTIU, 2001; Ville de Montréal, 2002a). If it had really been a technical problem due to the colossal volume treated, authorities would have been quick to point towards that as a reason for not disinfecting. But it rather appears that it is a political and financial matter (Trottier, 1999a; Boivert, 1987; Vanier, 1982). Imbeault (2002) clearly said that it is a political matter.

The disinfecting problem remains a puzzling issue (see sections 2.5.2 and 2.5.3). From the beginning, in the 1970s, political will has not matched up with expectations. However, the treatment plant still meets provincial requirements: in the last few years, its 'environmental' notation was over 95% (CUM, 2000; Boulay *et al.*, 1999).

Ecological monitoring around Montreal indicated that water quality ranges from fair to very good all around the island, but that it ranges from critical to severe after the plant's effluent outfall (Deschamps *et al*., 1998). And it is for that reason that we argue that it is a 'deliberate production of wastewater.'

5.2.2. The Inevitable Making of Toxic Landfills

The lack of disinfecting is not the only ecological problem stemming from the treatment of wastewater in Montreal. Two particular steps in the process result in the burying of waste collected: preliminary treatment and sludge incineration (CUM, 1999c).

First, preliminary treatment consists of screening grit and solid materials of a certain size before wastewater is pump into the station for primary treatment. Upon collection, residues are hard-pressed and taken to a landfill without further handling. In 1998, 850 tons of residual matter was taken from the wastewater processing plant to a sanitary landfill next to the site (GTIU, 2001).

Second, sludge "is the solid waste left over after sewage is treated and effluent discharged" (SLDF, 1999: 10). In Montreal, sludge is dehydrated, pressed and burned so as to make ashes. These ashes are then taken to a specific landfill owned by the City and buried together with the sands removed. Approximately 8 tons of sand and over 40 000 tons of ashes are buried annually (CUM, 2000).

The problem is that sludge contains incredible amounts of toxic compounds, such as heavy metals like mercury and lead, PCBs and industrial solvents. Since 1986, water pollution from industries is taken cared of at the source. In the last fifteen years, toxic pollutants in wastewater have been reduced by 66% through by-law 87 and 129 of the MUC.

Sludge contains 45% of toxic pollutants making their way at the station. The remaining is simply released in the St. Lawrence River, as the treatment was not planned to decontaminate wastewater from its toxic pollutants.

Industrial toxic pollutants oozed out in sewers come from the many facilities operating on the territory. On the 4 000 or so industries emitting pollutants, less than a quarter are responsible for noteworthy emissions: "*Les rejets industriels contiennent des mélanges de composés chimiques provenant de fonderies, imprimeries, tanneries, métallurgies, d'industries de traitement de surface ou de la chimie organique. Les eaux usées industrielles sont déversées à l'égout sous forme d'acide, de solvant, de métaux lourds et autres composés organiques. On estime que sur les quelque 4000 industries présentes sur le territoire, environ 800 ont des rejets liquides significatifs*" (Deschamps et al., 1998: 12).

What is not absorbed in sludge is simply discharged with the effluent, as the station has not been programmed to remove and/or treat such contaminants. This means that over 130 tons of toxic material is released into the St. Lawrence River (GTIU, 1999). In 1996, it is estimated that 11 tons of phenols and 60 tons of zinc were discharged in the environment (Deschamps *et al*., 1998).

5.2.3. The Reckless Export of Waste

Accordingly, toxic pollutants not buried on the territory are released into the St. Lawrence River. This poisonous amalgam is simultaneously discharged with disease-causing micro-organisms into the body of water and goes with the flow towards St. Pierre Lake downstream.

Effluents from the Rivière-des-Prairies plant are dismissed from Île-aux-vaches, located in the middle of the St. Lawrence. From there, effluents are mixed with the flows of the three streams on the

northern side of the St. Lawrence.[14] They, therefore, mostly contaminate the northern banks of the St. Lawrence River.

Available data for water quality downstream and upstream the treatment plant provides obvious evidence that the plant is responsible for important degradation of the aquatic environment downstream (Deschamps *et al*., 2001). At the point of discharge, indicators showed that there were 400 000 faecal coliform/100ml while the standard is of 1 000 faecal coliform/100ml (Deschamps et al., 2001: 33).

The disastrous effects of undisinfected and undecontaminated wastewater can be felt up to 26 km downstream from the point of release and even beyond, up to St. Pierre Lake. A biologist speaking in the name of residents living next to the lake argued that: *"La santé de l'écosystème du lac Saint-Pierre, de même que celle de ses riverains qui tirent leur eau potable du fleuve, est largement tributaire des politiques et règlements appliqués ou non en amont. En effet, les problèmes vécus par les usines d'épuration de la région montréalaise mettent en évidence la nécessité d'assurer une capacité d'infrastructure suffisante afin de prévenir les rejets directs au fleuve sans traitement (re : problème des surverses)"* (Bourgeois, 1999: 6).

Even though the City's plant is not the only source of municipal sewage pollution, it is by far the single-biggest source of pollution. For comparative purposes, there are three other treatment plants in proximity (Deschamps *et al.,* 2001: 5): that of Laval (240 000 cubic meters per day); of Repentigny (35 000); and of the new City of Longueuil (330 000). Together, they account for a quarter of Montreal's total wastewater (605 000 as opposed to 2 750 000 cubic meters per day).

5.2.4. Metropolitan Catch-22

The Montreal Metropolitan Community has yet to come up with a new regulation for air and water purification but also for wastewater treatment standards (CMM, 2002: 17). As it stands now, it has adopted the MUC's by-law until new ones are enacted later this year.

There are at least ten wastewater treatment plants on the MMC territory and three of them— Montreal, Laval and Longueuil— serve 75% of the total metropolitan population. Laval and Longueuil have fairly recent treatment plants with physico-chemical processes, just like the one in Montreal.

However, Laval's Lapinière plant has a ultra-violet ray disinfecting process that reduces the amount of bacteria and micro-organisms released into the receiving body of water (Deschamps et *al.*, 2001). Thus, the quality of wastewater discharged by those last two plants is superior than that of Montreal.

Will the new regulations be more stringent than past ones? And if so, what can be forecasted for the Rivière-des-Prairies plant? What is certain is that Montreal has a preponderant weight on the MMC council with half of all seats.

Cities treat their wastewater so as to reduce the environmental impacts on receiving environments but also to reduce to costs of treating potable water. If the supply of drinking water is

[14] The L'Assomption, Des Prairies and Mille Îles Rivers.

cleaner, it costs less to bring it to adequate standards. This is confirmed by the quality of water supplies for Montreal. Gagné (2002) asserted that in the last 40 years water quality from the Ottawa River and the Great Lakes remained sensibly the same—some indicators even improved—even if population grew substantially in those areas (e.g. Ottawa, Hull and Toronto).

Montreal discharges enormous quantities of noxious material that necessitate, for cities downstream, supplementary filtration costs. Considering the actual squeeze on local public finance, could municipalities downstream Montreal having their raw water intake in the St. Lawrence pressure Montreal for adequate wastewater treatment so as to reduce their own costs?

Then, could Montreal put forth the idea that its wastewater treatment plant is a 'metropolitan infrastructure,' thus pooling financial resources from all cities in the metropolitan community? All of which could start a bargaining process, some sort of metropolitan give-and-take practice, with unpredictable results. Furthermore, the MMC is a new supra-municipal body much bigger than was the MUC. It links municipalities that had never been administratively associated before. For the first time in the metropolitan history of Montreal, the greatest contributor of environmental degradation in the St. Lawrence River is formally facing its victims. Thus, for the first time there are no intermediaries between site of consumption and site of deterioration.

5.3. Local Environmental Politics

5.3.1. Municipal Terrain

The ruling party at City Hall is the *Union des citoyennes et citoyens de l'île de Montréal* (UCIM) headed by Mayor Gérald Tremblay, a former cabinet member of the provincial legislature. His party has won 41 seats and a majority in eighteen boroughs in the November 2001 municipal election.

The opposition party, *Vision Montréal* (VM), has won 29 seats and a majority in six boroughs. The remaining boroughs are shared between both parties and independents. The interesting phenomenon is that most municipalities that existed before the amalgamation voted massively for the UCIN, opposed to municipal amalgamation. The exception is Westmount where citizens exclusively elected independents.

In contrast, boroughs located within the then-city limits of Montreal voted massively for Vision Montréal, the ruling-party before the November 2001 election. The Plateau Mont-Royal borough had mixed feelings and spread the vote equally amongst representatives of both parties. The situation is similar in the Ville-Marie borough where there are two representatives of the opposition party and one from the Union des citoyennes et des citoyens de l'île de Montréal (UCIM).

The Rivière-des-Prairie / Pointe-aux-Trembles / Montréal-Est borough shows surprising results. Voters elected a single member of each party and two independents. Finally, the Côte-des-Neiges / Notre-Dame-de-Grâce borough preferred representatives of the UCIM by electing five of out six. The remaining seat went to VM.

It appears that the poorest boroughs have voted in favor of the past administration, in favor of amalgamation, while the wealthiest boroughs preferred voting for a party that had been opposed to municipal amalgamation.

However, what as to be noticed is the political fragmentation between central and suburban boroughs. And that must be seen in the context of budgetary allotment. From chapter 3 and 4, we know that boroughs receive funds from the City government and that central boroughs are those with significantly lower water and sewer expenditure allotment, as well as a decade of under-financing. In this context, to what extent will party 'ideology' dictate local environmental policymaking? Will this result in a status quo that was to change by the amalgamation?

Massicotte (2002) stated that borough councilors from western boroughs were much more in favor of residential water meters than those from central boroughs. Furthermore, will water conservation policy be tainted? Residential green lawns and luscious gardens are much more present in the western, low-density part of the City than in the central, high-density (and poorer) part of Montreal (Gagné, 2002).

And what about the 'balancing out' fund for central boroughs? The mayor has promised it for boroughs that have elected, in a majority, representatives of the opposition … It is still too early to distinguish any trends or to even point to a particular event that could indicate any such thing.

5.3.2. On Shaky Grounds

For years, severe water pollution characterized the bodies of water around Montreal. The *mise-en-service* of the wastewater treatment plant and the systematic collection of sewage allowed the improvement of water quality in St. Louis Lake, the des Prairies River and in the St. Lawrence River downstream the wastewater treatment plant's effluent outfall (Deschamps *et al*., 1998).

These improvements are, however, greatly diminished due to a lack of an adequate disinfecting process of wastewater. It results in serious degradation downstream from the island, which impacts municipalities on the North Shore but also those on the banks of St. Pierre Lake (Bourgeois, 1999).

The disinfecting problem has not been resolved for years due to the lack of political will from municipal and provincial authorities. But the new configuration of metropolitan governance might just be a serious incentive for Montreal to finally move in the right direction and disinfect wastewater adequately.

However, the situation might just stay the same if new regulations geared towards water purification and wastewater treatment are not stringent enough or if metropolitan environmental politics becomes a thorny ground of inefficient discussions leading to paralysis.

In addition, at the local level, municipal environmental politics appear to be building on two antagonistic groups. On the one hand, the ruling party was elected as a party opposed to amalgamation and is largely represented in suburb boroughs where indicators show better socio-economic status and lower housing density.

On the other hand, inner-city boroughs massively voted for a political party that strongly supported amalgamation. These boroughs also indicate lower economic status and higher housing

density. Furthermore, these are boroughs where there were no specific residential water pricing mechanisms as opposed to most boroughs in the periphery.

This indicates a possible 'suburbanization' of water management policies, all of which cannot benefit the under-funded, poorer and larger population of inner-city boroughs. It is still too early to be point towards that 'suburbanization' of water management but the amalgamation certainly raises the issue.

In conclusion, the environmental aspects pertaining to Montreal's water system are twofold. On the one hand, consumed drinking water poses a serious threat to the receiving body of water, the St. Lawrence River, due to a lack of adequate treatment, notwithstanding the too numerous sewer overflows during spring, summer and early fall.

On the other hand, metropolitan and municipal environmental politics will play a decisive role in the resolving the ecological problems for which Montreal is responsible. At the municipal level, party politics resembles a center-periphery dichotomy while turf politics and financial considerations might just do the same at the metropolitan level.

6. Montreal: Troubled Waters?

Like many other North American cities, Montreal had a privately owned water system early in the nineteenth century. And like many other North American counterparts, it too recognized that an efficient and reliable municipal water system had to be in public hands. Twice in its 200 year-old history the City of Montreal bought up private enterprises in order to assume fully and completely the provision of drinking water under its territory: in 1845 and in 1928.

Throughout the twentieth century, the water system developed alongside population growth, urbanization and suburbanization. In the post-war era, rising concerns over the environment, especially with the surrounding bodies of water like the St. Lawrence and the Mille Îles Rivers, triggered a quest for wastewater treatment. The Rivière-des-Prairies plant saga unfolded strangely with many discouraging twists. The fact that chlorine disinfecting was abandoned should be seen as a relief considering the deadly outputs it would have released in the St. Lawrence. However, the actual treatment capacity should be seen as inadequate and, in the long run, disastrous towards the environment.

The Rivière-des-Prairies treatment plant was the last facility to be added to Montreal's municipal water system. Since then and most particularly during the 1990s, City officials have been raising the issue of insufficient investments with regards to the water infrastructure pointing towards its age and need for rehabilitation and modernization. The amalgamation, which came alongside more stringent drinking water standards, acted as a catalyst.

Water supply and sanitation services are brought together under a single municipal administration thus putting an end to numerous, redundant and costly inter-municipal agreements with regards to water supply while also integrating wastewater treatment activities that were managed at the supra-municipal level. But the City has yet to implement its new water policy as it is waiting for the two assessment studies that will be used for a public consultation in months to come.

As it is now, i.e. under the new arrangements between City and boroughs, the water system did move towards a better-integrated type of management. But, as Massicotte (2002) stated, the actual organization looks a lot like a dismembered body where head and body do not behave in symbiosis. It is understood that the actual organization will be revised following the results of the two studies but also after public consultations—or public outcry as the City leans towards greater private involvement, it seems.[15]

Water-related NGOs, such as *Eau Secours!*, were puzzled by the fact that, in the White Book, the ownership of the Rivières-des-Prairies treatment plant was left out, leaving it open to a private take over. Others, like the OPDS, are still wondering what will be the residential drinking water policy that ought to be implemented.

Municipal finance is also at the heart of the problem. The choice of governance preferred for managing and operating water supply and sanitation services will determine to a great extent how funds

[15] The Toronto and Vancouver cases point towards that direction as city officials in both municipalities have or had, respectively, plans for greater private participation.

will be divided up between the City and boroughs. On the one hand, the sunken inequalities, which result from uneven spending between former municipalities, are to be dealt with promptly if the amalgamation is to be a step in the right direction and if it is to meet its objectives of better local public services provision at lower costs. However, municipal politics will, in definitive, play a decisive role in meeting the citizens' expectations.

Almost a year after the amalgamation, not much has changed with regards to Montreal's municipal water system. In theory, there is a new administrative and organizational structure that is very different from what had been before but in practice, on the terrain, management and operations remain steady. For example, Pointe-Claire is still operating and funding its drinking water plant and the nine boroughs that made up the old City of Montreal are still managed as they were prior the amalgamation. The main reason is that a new collective agreement between the City and its 7 800 blue-collar workers has not been reached yet and it seems that a strike is imminent (Benessaieh, 2002), which should slow down significant changes in the way how Montreal's municipal water system is governed and managed.

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