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DRINKING WATER SAFETY: DO OWNERSHIP AND MANAGEMENT MATTER?

By
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Abstract

This study explores the following questions:

> Is there a relationship between water safety and water quality, on the one hand, and who owns or who operates the water system, on the other? Does it make a difference whether it is a private firm or a public body that owns all or part of the water system? Does it matter whether the water system is operated by a for-profit company or by a public agency?

Recognizing that countries around the world have employed a variety of arrangements for the delivery of their water services, and recognizing as well that natural-monopoly considerations place clear limits on the role that the private sector can play in the water field, the study adopts a three-pronged approach.

Firstly, we report on discussions of water quality, ownership, management, and regulatory issues and note that although there is extensive writing on these subjects, there is very little analysis that directly examines the relationship between water quality and either ownership or management issues.

Secondly, the study explores the experience of several jurisdictions that have used different forms of organization and delivery for their water and sewage services. Historically, countries have fashioned diverse arrangements to supply their needs, ranging from predominantly public models, as in the United States, Great Britain, and many other industrialized countries, to those in which the private sector took a larger role, as in France. The last decade or two has seen substantial innovation and experimentation, sometimes involving major system transformation (as in the United Kingdom), and yielding a wide array of public/private models. The study looks at some of the more interesting of these models: Canada, the United States, the United Kingdom, France, Australia, Poland, Argentina, Mexico, and Bolivia.

Thirdly, the study reports in more detail on the divergent paths taken by three municipalities in the Toronto area: the former Region of Hamilton-Wentworth, now the amalgamated City of Hamilton, and the Regional Municipalities of Peel and York. All faced major choices in the 1990s, but each chose to pursue a distinct course of development. York decided to stick with a public delivery model; Peel, after a competitive bidding process, engaged the public corporation,

the Ontario Clean Water Agency (OCWA), to operate key elements of its system; and Hamilton selected a private sector firm to run its water and sewage operations.

The study concludes that, with respect to the question of ownership, the titleholder of the assets is a relatively unimportant consideration in the achievement of good water quality outcomes, compared to a variety of other factors. As for the difference between public and private operators, we have found that while the systems may be shaped rather differently, depending on the relative roles of the public and private sectors, the public and private elements in the equation as such seem to be relatively minor factors in the construction of a system that delivers safe water.

Our hunch is that other considerations have a good deal more to do with determining the performance of a water system than who owns the pumping station or whether a private firm has been put in charge of delivering the water and collecting the sewage. With respect to the ongoing operations of a water system, for example, we suspect that factors such as the skills and training of the staff, the overall management systems in place, the state of development of water engineering and water technologies, the condition of the infrastructure, and the existence of effective monitoring capability and adequate feed-back loops are of capital importance in determining what level of water quality the citizens of a given jurisdiction may enjoy. As for the preservation of the long-term viability of a water system, it seems quite clear that sensible water-pricing policies, the development of and adherence to long-term capital plans, and the timely renewal and expansion of the water system's infrastructure characterize high performance outcomes.

What these observations point to is the importance – if safety risks are to be reduced to a minimum – of a jurisdiction's equipping itself with a fully articulated operating system for water management. No single element can do the job on its own. High quality water and water safety appear to be characteristics of a system whose many interlocking parts work together to produce the desired outcomes and to correct deficiencies quickly and effectively when parts of the system fail.

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1 Introduction

1.1 Aims of the Study

The task confronting this paper may be simply stated, but its execution is complex. The mandate of this study is to seek to answer the following questions:

> Is there a relationship between water safety and water quality, on the one hand, and who owns or who operates the water system, on the other? Does it make a difference whether it is a private firm or a public body that owns all or part of the water system? Does it matter whether the water system is operated by a for-profit company or by a public agency?[1]

The reason why these questions merit examination in the context of the Walkerton Inquiry is clear. The catastrophic failure of the water quality system in Walkerton has given rise to general concerns about the safety of Canadian water. These concerns are directed at all parts of the water and wastewater system, and at the authorities and organizations responsible for their management. If there is something about the public ownership and the public delivery of water and sewage services that, by its nature, undermines or, alternatively, supports high quality performance, then it is important to know that and understand the reasons why it is so. Alternatively, if it can be demonstrated that private-sector owners or providers are likely to fail to deliver water safety – or, alternatively, are likely to succeed in offering a high quality, secure water supply – then it is highly desirable to know that, too. Finally, a conclusion that shows that there is no structural link between ownership arrangements and water quality or between private or public management regimes and water quality would be significant. This would permit us to set aside unsupported claims and allow us to consider the various public, private, and middle ground alternatives in the knowledge that they do not, in themselves, have a direct negative or positive effect on water quality and water safety.

This paper has been prepared for discussion purposes only and does not represent the findings or recommendations of the Commissioner.

[1] "Water" and "water systems" include both water and wastewater services. This appears to be conventional terminology, presumably in recognition of the fact that water delivery and sewage collection are in certain vital respects part of a single system.

1.2 Factors Affecting This Study

Does the public or private sector status of the operator of the system have an impact on water quality? Does who owns the system, or parts of the system, make a difference? These questions are not simple to answer for at least two reasons:

First, in attempting to explain a specific level of water quality by reference to the ownership or management model that is in place, we are trying to establish a link to a small part of a highly complicated system, composed typically of

- many entangled jurisdictions – municipal, provincial, and federal; often a mix of both public and private actors;
- many program components – watershed management, water supply generation, water treatment, and distribution infrastructure, wastewater processes;
- many regulatory frameworks – environmental, water, and wastewater standards;
- a variety of monitoring and inspection protocols;
- an infrastructure of pipes, pumps, sewers, holding tanks, water reservoirs, filters, sedimenting basins, and the like; and
- fallible human beings who plan, build, operate, monitor, and oversee the whole thing.

If something goes wrong, if water quality fails, where in that tangled universe does one look for the reason? And if the task is to determine the performance levels of entire systems, rather than the cause of a specific incident of water-quality failure, then the undertaking is even more daunting.

Although it is true that the assessment of water quality is in most respects a matter of established science and practice, at the margin there remain uncertainties and technical limitations on our capacity to readily determine whether there are contaminants in water or not. The troubles in Sydney,

Australia, in 1998, clearly constituted a crisis, but it was a crisis in confidence triggered by faulty water testing. The water, it was ultimately determined, was almost certainly acceptable, even though it was thought not to be.[2] Reliable testing for the presence of *Cryptosporidium* and *Giardia* in the water supply has proven to be difficult to achieve, and the capacity of existing purification systems to expunge these hazards when found has proven to be far from perfect.

Thus, the establishment of a causal relationship between the quality of water and a set of highly complex, interrelated social systems and physical processes is no easy assignment.

The second reason why answering these questions is not simple is that we are inclined to view them through a veil of ideology. We live at a historical moment in which belief in the superiority of the private market place and the applicability of market logic to many spheres of public life is widespread. There are powerful ideological and material interests that advance this view at every opportunity. The theories of public administration that travel under the general name of the New Public Management (NPM) have been influential in importing market logic into government and the public sector. On the other side, one finds strong forces of resistance to this general orientation, and vigorous arguments contesting the beneficence of the market, the claims of NPM, and the extension of private-sector norms and practices into the realm of government. We are all affected by this debate to some extent. Thus, the consideration of what lessons to draw from the Walkerton tragedy inevitably offers yet another occasion for an ideological debate that may have very little to do with the impartial consideration of the advantages and disadvantages of one set of arrangements over another. This environment of deeply contested values and doggedly held convictions can make an empirical examination of the question and a balanced consideration of the evidence difficult to achieve and difficult to sustain.

Nevertheless, it is the intention of this paper to eschew ideological discourse as much as possible. Instead, within the practical constraints we face, the study will marshal relevant information and identify such experience as may be useful, in an attempt to fashion a practical answer to the questions at the centre of this study.

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[2] Chapter 3 of this report discusses this case in detail.

1.3 Outline of Our Approach

Clearly, there are a number of ways to examine the relationship between administrative forms and practices and water safety. In this study we adopt a three-pronged approach.

Firstly, we report on discussions of water quality, ownership, management, and regulatory issues. Chapter 2 surveys some of the literature on these subjects. This chapter is based on the results of a comprehensive bibliographical search (see the Annotated References). This chapter will give the reader a sense of international scholarly, practical, and professional opinion on the topic. Although there is extensive writing on each of these subjects, there is little analysis that directly examines the relationship between water quality and either ownership or management issues.

Secondly, the study explores the experience of several international jurisdictions that have used different forms of organization and delivery for their water and sewage services. Historically, countries have fashioned diverse arrangements to supply their needs, ranging from predominantly public models, as in the United States, Great Britain, and many other industrialized countries, to those in which the private sector took a larger role, as in France. The last decade or two has seen substantial innovation and experimentation in many places, sometimes involving major system transformation, and yielding a wide array of public/private models. Chapter 3 tries to draw lessons from these experiences. Our primary, but not exclusive, focus in this chapter, and indeed in the study as a whole, is on modern, industrialized examples, not on the developing world or on transitional economies.

Thirdly, we review and report on the divergent paths taken by three municipalities in the Toronto area: the former Region of Hamilton-Wentworth, now the amalgamated City of Hamilton, and the Regional Municipalities of Peel and York. All faced major choices in the 1990s, but each chose to pursue a distinct course of development. York decided to stick with a public delivery model; Peel, after a competitive bidding process, engaged the public corporation, the Ontario Clean Water Agency (OCWA), to operate key elements of its system; and Hamilton selected a private sector firm to run its water and sewage operations. An examination of their experiences uncovers some factors and considerations that are important to our story.

1.4 Goals of the Study

This study describes the various administrative configurations that are in use, the perspectives of practitioners working within them, and the academic, professional, and policy literature on water management. On this empirical basis, it will identify some of the key themes and considerations that arise out of the evidence.

1.5 Analytical Framework

We will study various systems based on ownership issues and management and operation issues, recognizing that the elements could apply to all of the water and wastewater system, or to only part of it.

1.5.1 Ownership

Who holds title to all or parts of the system? There are a variety of possible answers to this question.

- The state could own the system, or specific parts of the system. In Canada, this could mean ownership directly by the provincial government, by a municipal government, or by a form of public corporation.
- A private-sector entity could own it.
- Public and private sector interests could jointly own it.

1.5.2 Management and Operation

There are two management and operational dimensions relevant to the focus of our study. Broadly, the management and operation of a system is characterized by a complex array of features: organizational culture, norms and practices, regulations, incentive structures, human and financial resources, forms of public participation and accountability mechanisms, and so on. Within this range of characteristics lies a matter that is particularly germane to our study; namely, whether a public or a private sector operator is responsible for delivering the service. The public-private feature is embedded in this complex system, and will affect it and be affected by it in many different ways.

Analytically, then, the relevant question for our study to ask is: Who operates the system? As with the matter of ownership, there are a variety of possible answers to this question. The system, or parts of the system, could be

- publicly owned, with direct government delivery
- publicly owned, with delivery by a public corporation
- publicly owned, with private delivery
- privately owned, with private delivery.

If the system – or parts of the system – is publicly owned with private delivery, what shape might those arrangements take? This is the area of so-called "public-private partnerships" or "private sector participation," and could include, for example, any of the following: contracting out, management contracts, franchising, licensing, and individual contracting.[3]

1.6 Real World

In the real world of privatization, the distinctions drawn above are almost always blurred.[4] The capacity for human invention and adaptation to specific needs and circumstances enjoys full expression in this field, as it does in others. PPPs, PUPs, PSPs, BOOs, BOTs, and BOOTs,[5] lease-back agreements, and many other practical arrangements, large and small, bring ownership realities, management systems, and practices together in complex ways. Sometimes the private sector participates in research, planning and policy formation, but not in ownership or operations. Then there is the question of scale: private can

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[3] Michael J. Trebilcock, 1994, *The Prospects for Reinventing Government* (Toronto: C.D. Howe Institute), pp. 20–21.

[4] Privatization is used in both a broad and a narrow sense in public discourse. Donald Savoie describes the situation well: Prime Minister Margaret Thatcher "gave privatization a new look and new political support. She broadened its definition considerably by viewing it as a synonym for any action that reduces the role of government and expands that of the private sector. The term *privatization* now means contracting out and deregulation, as well as selling public assets …" *Thatcher, Reagan and Mulroney: In Search of a New Bureaucracy* (Toronto: University of Toronto Press, 1994), p. 168. We will employ the term in both ways in this study, making sure that the context makes the meaning clear. For a very useful annotated bibliography of privatization, see Janice Beecher, Richard Dreese, and John Stanford, 1995, *Regulatory Implications of Water and Wastewater Utility Privatization* (Columbus: The Ohio State University National Regulatory Research Institute), NRRI 95-09, pp. 245–60.

[5] Public/private partnerships (PPP); public/public partnerships (PUP); private sector partnerships (PSP); build/own/operate (BOO); build/operate/transfer (BOT); build/own/operate/transfer (BOOT).

mean small, user-owned systems (trailer parks, camps, and cottages, communal systems, individual wells, and so forth), or it can refer to giant investor-owned corporations (like Vivendi or Suez Lyonnaise des Eaux). A single jurisdiction, such as Ontario, will typically display a wide variety of approaches and arrangements, three of which we will discuss in chapter 4.[6]

All these factors underline the inability of a summary analytical framework such as that outlined above to snare all the empirical models and practices in existence. It also points to the fact that the public/private factor is but one consideration in what is typically a highly complex, interdependent system.

1.7 Private and Public Roles in Water Systems

At this point, it is worth considering briefly the nature of the sector we are examining. The provision of water and sewage services is generally understood to be something close to a natural monopoly.[7] It is not plausible to think of several service providers – governments or private actors – competing in the offering of some of the key services in question.[8] Just as there can realistically be only one electrical power grid in any given territory, there will be one water-catchment arrangement, one set of pipes in the ground, one set of pumping and sewage treatment stations – in short, a single water and sewage system. Unlike the electricity example, however, which can accept the existence of several electricity providers competing over a common grid, it is uncommon for a water system to accommodate multiple suppliers because distinct lines of accountability for the quality, security, and supply of the water that is carried through the pipes is difficult. There is, therefore, not just one system of

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[6] For a description of the various approaches employed in Ontario, see Jim Joe, Jacinta O'Brien, C. Erv McIntyre, Michael Fortin, and Mike Loudon, 2002, *Governance and Methods of Service Delivery for Water and Sewage Systems* (Toronto: Ontario Ministry of the Attorney General), Walkerton Inquiry Commissioned Paper 17, Walkerton Inquiry CD-ROM, <www.walkertoninquiry.com>.

[7] "Monopoly occurs where consumers of a service can buy it from only one supplier. Natural monopoly occurs where it is only feasible for one supplier to exist in the market – because the more services provided, the lower the costs of providing each additional unit of service. This means that if a new entrant tries to compete with the existing supplier, it can do so only at a higher cost." See World Bank, 1997, *Toolkits for Private Participation in Water and Sanitation* (Washington, D.C.: World Bank), [online], [cited June 22, 2001], <www.worldbank.org/html/fpd/wstoolkits/Kit1/contents.html>.

[8] The World Bank states that "competition comes naturally to few areas of the water and sanitation business … Monopoly is reinforced by the fact that there are no substitutes for water in many of the purposes for which it is used." Ibid.

distribution, but normally one system of supply as well.[9] The same logic applies to the wastewater side of the equation.

The World Bank sets forth the competitive and monopoly characteristics of a water and sanitation system as indicated in Table 1-1.

Accordingly, it is more appropriate to speak of designated roles for the private sector in the water and wastewater field than it is to talk more comprehensively about the wholesale privatization of water. The latter seems to imply the existence of a market in a monopolistic industry where there is regulated service provision by a single supplier and not market competition among multiple actors. Even in England and Wales, where the government has gone further than most places in privatizing water – selling off the whole water system to ten watershed-based companies – there is one owner and supplier for each designated territory, and all are tightly regulated by the government in matters of health and safety, rates of return, infrastructure renewal, environmental standards, and the like.[10]

Table 1-1 Competition and Monopoly in Water and Sanitation

Activity	Characteristics of Competition
Allocation of water resources and regulation of use	Natural monopoly in each hydrogeological unit
Capacity construction	Competitive
Bulk supply generation*	Small number of suppliers (often only one)
Water treatment	Local monopoly
Local distribution	Local monopoly
Local sewage and storm water network	Local monopoly
Sewage treatment	Local monopoly
Equipment and appliance sales, plumbing services	Competitive

* The general supply of water (big pipe), not distribution (small pipes).
Source: World Bank, 1997, Toolkits for Private Participation in Water and Sanitation (Washington, D.C.: World Bank), [online], [cited June 22, 2001], <www.worldbank.org/html/fpd/wstoolkits/Kit1/contents.html>.

[9] The United Kingdom is testing the outer limits of this understanding. In March 2000, it passed the *Competition Act* which opened the water supply systems in England and Wales to new entrants through the principle of common carriage, that is, by allowing multiple water suppliers to use the same distribution network to service large-volume users. For the time being, the arrangements are highly constrained. See chapter 3. The anonymous reviewer of an earlier draft of this paper noted that in 19th century London "competing companies laid parallel networks of pipes down streets and competed for the custom of individual households …" [author's files].

[10] See chapter 3. The ground may be shifting somewhat in the UK; see the reference to the *Competition Act* in footnote 9.

Government has an indispensable regulatory role in the water field in protecting public health and safety, as it does in other fields, such as the food and drug industries where the market functions much more vigorously. But in the case of water, there is an additional need for public regulation that arises out of the inevitable absence of the marketplace in most of that sector. Normal market mechanisms do not apply, or apply only at moments (such as the bidding for a contract); as a consequence governments must act, either to directly regulate, or to oversee the operation of market-mimicking conditions, no matter what private sector entities are involved.

Simon Cowan notes that "in water, the implicit assumption at the time of privatization [in Britain] in 1989 was that the whole of the business is naturally monopolistic and that the role for competition would be very marginal."[11] He acknowledges that "there is some empirical evidence to justify the assumption of natural monopoly,"[12] but notes that this does not imply that competitive forces cannot operate in the industry and goes on to identify several possible types of competition. He discusses five types:

- yardstick competition
- competition for the market
- contracting out of services
- capital-market competition
- product-market competition.[13]

Thus, privatization in the water and wastewater field includes the competitive bidding of private firms for the chance to offer a specific, time limited service; for example, the construction of a pumping station (competition *in* the market); or the operation of part of the system as a tightly regulated monopoly in the water and wastewater industry (competition *for* the market); or some combination of the two. It can refer as well to the comparative judgments investors make about the relative efficiency of water and wastewater companies, and to the parallel principle of yardstick competition, in which the performance of suppliers in different locales is compared by regulators.[14]

Britain is unique in giving over the entire system – infrastructure and management – to private firms. It is also unique in the manner in which it did

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[11]Simon Cowan, 1997, "Competition in the water industry," *Oxford Review of Economic Policy,* vol. 13, no. 1, pp. 83–84.
[12] Ibid., pp. 83–84.
[13] Ibid., pp. 85–86.
[14] See the World Bank discussion. Previously cited, footnote 7.

this – not by a competitive bidding process, but by assigning the concession directly to the ten existing public watershed authorities, which it proceeded to constitute as private corporations.

1.8 Delivery Models

A government, then, has several general alternatives in deciding which type of arrangement should be made in the water and wastewater field.[15] It could choose to do the tasks directly via a government department. It could create an independent or quasi-autonomous public bureaucracy, like a public utility or an arm's-length agency. Or it could contract with a private, for-profit firm.

Proponents of the first choice – the public bureaucracy model – contend that direct public provision is best – especially for core public functions, however defined, because there are direct lines of accountability back to democratically elected politicians. In addition, such a choice maximizes the fairness and neutrality of the system. If there is a price to be paid in efficiency, effectiveness, and flexibility, it is worth paying, given the primacy of public and democratic values.

The second choice – an independent, public organization – is often thought to combine the public interest commitments of a government department with the effectiveness and flexibility of private sector organizations. It can more easily attract the entrepreneurial people who are reluctant to enter government, and the semi-autonomous status allows it to avoid much of the red tape associated with a government bureaucracy. The organization can also be introduced to the disciplines of competition by forcing it to compete for business with private sector firms.

The third choice – a private firm – is commonly justified by arguments of efficiency. The pursuit of profit, which animates a private firm, fosters maximum efficiency in the use of available resources, and a properly structured relationship with government will ensure that the public interest will be efficiently served by a firm's pursuit of its private interest.

It is the fashion to speak of cases that fall into this third category as "public-private partnerships" (PPPs), although this seems to stretch the notion of

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[15] See the discussion in Christopher Hood and Michael Jackson, 1991, *Administrative Argument* (Dartmouth: Aldershot), pp. 88–93.

partnership well beyond its conventional meaning. A partnership suggests two or more principals combining in a joint venture in which the risks and profits are shared. Most public-private partnerships are in fact contractual relationships in which a private firm undertakes to supply a service to government in accordance with the terms of the contract. The relationship may be complex and highly articulated and may endure over an extended period – as long as 20 or 30 years – which is probably in part what explains the PPP vocabulary. However, it is still a contract for services, not, strictly speaking, a partnership. The risks and benefits are not pooled, but assigned specifically by the contract to one party or the other. Indeed, that is part of the point.

The Canadian Council for Public-Private Partnerships addresses the following as examples of water service PPPs:

- service contracts
- leases and concessions
- build-operate-transfer and other hybrids in the infrastructure field
- full privatization of facilities and networks.[16]

None of these examples is a partnership in the sense of a joint venture sharing in risks and profits.

Two public sector entities can and do enter into these kinds of relationships from time to time. They are frequently described as public/public partnerships (PUPs). These occur, for example, when a municipal or regional government enters into an agreement with a neighbouring jurisdiction to build and benefit from a water plant or sewer main which will be used in common, or where one jurisdiction signs a long-term purchasing agreement to buy water from another government, thereby permitting the other government to build a bigger plant or to build a plant earlier than would otherwise be the case. Like the PPPs, the PUPs are typically governed by a contract, not by a classic partnership agreement.

Although we will use the conventional terminology in this paper, it is important to remain aware of the real, contractual nature of the relationships that are described as partnerships, whether PPPs or PUPs. The legal contract, not the partnership agreement, is the heart and soul of the relationship that regulates

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[16] Canadian Council for Public-Private Partnerships, 2001, *Benefits of Water Service Public-Private Partnerships*, prepared for the Walkerton Inquiry, (January), [online], [cited May 5, 2001], <www.walkertoninquiry.com>.

these actors when they work together in the water sector. With PPPs, the public interest and the private interest do not dissolve into one another to produce a conceptually new governing principle. Quite the reverse. They are disentangled and specified. Indeed, PPPs appear to work best when the two parties are very clear about what their respective interests are, recognize that they are different, and fashion an agreement that protects and advances the distinct interests of each.

2 Literature Review

This chapter reviews the literature regarding the relationship between water safety and administrative regimes. It seeks to provide a coherent synthesis of the insights and conclusions contained in the relevant primary and secondary literature. It describes various delivery configurations operating in Canada and elsewhere, and discusses whether there is a connection between ownership and operating arrangements and instances of success or failure in preserving water quality.

2.1 Two Facets of the Discussion

Literature on water quality and on management and ownership regimes is extensive. However, the two issues are rarely examined together in any depth. The water quality literature tends to be narrowly scientific and technical. The economic and political science literature on different management and ownership regimes for urban services devotes little attention to water sector issues.

The literature on water privatization is polarized, with people espousing deeply held beliefs for or against privatization and deploying the evidence to bolster their arguments. Their conclusions about the relative advantages and disadvantages of privatization initiatives can often be anticipated from the political orientation of the groups they represent, even before reading the articles that they have written. Proponents and opponents of privatization will often use the same cases to advance their arguments about the advantages or disadvantages of privatization. Part of the reason that they arrive at such different conclusions about the attractiveness of public or private ownership or management of water infrastructure is that they ask radically different questions. The economic literature focuses mainly on the question of whether the

privatization of water companies leads to efficiency and cost-effectiveness.[17] Others have attempted to expose the drawbacks of water privatization from a nationalist perspective.[18] Questions like the effect of privatization on water quality or the distributional and political implications of privatization have not attracted as much empirical study as have the explicitly economic questions.

Experts' views about privatization are related to their perceptions of water and the values that they hold.[19] Those who view water as a collective good, based on the idea that water is a right,[20] tend to stress that it should be used equitably.[21] Water is for all. Hence the public sector should play an important role in organizing, financing, and regulating the delivery of water services. Any profits that are generated from the provision of water services can be used for the good of the whole community. The public shares the financial burden of extending water services to those who cannot afford to pay the full cost. The public sector protects against private abuses, since it is less likely to cut off services to those who cannot pay for them.

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[17] Some academics (e.g., David Hall) think that the public sector is likely to be more efficient. Others find evidence that the private sector is more efficient (e.g., Kathy Neal et al.). David Hall bases his conclusion on a 1995 water cost comparison between Swedish and English cities. David Hall, 1998, "Restructuring and privatization in the public utilities," *Labour and Social Dimensions of Privatization and Restructuring (public utilities: water, gas and electricity),* edited by L. De Luca (Geneva: International Labour Office), pp. 109–51. Kathy Neal et al. use a case study of investor-owned and government-owned water companies in California to demonstrate the superior efficiency of the private sector. Kathy Neal, Patrick Maloney, Jonas Marson, and Tamer Francis, 1996, *Restructuring America's Water Industry: Comparing Investor-Owned and Government Water Systems,* policy study no. 200 (Los Angeles: The Reason Foundation), [online], [cited March 25, 2001], <www.rppi.org/ps200.html>.

[18] Maude Barlow, 1999, *Blue Gold: The Global Water Crisis and the Commodification of the World's Water Supply*. A special report issued by the International Forum of Globalization, June. Gil Yaron, 2000, *The Final Frontier.* A working paper on the big ten global water corporations and the privatization and corporatization of the world's last public resource. Prepared for Tony Clarke, Polaris Institute, and the Council of Canadians.

[19] For an analytical framework regarding different ways of viewing water, see Teti Armiati Argo, 2000, *Thirsty Downstream: The Provision of Clean Water in Jakarta, Indonesia*, Ph.D. diss., University of British Columbia, p. 7.

[20] Lyla Mehta discusses the discourse concerning water as a human right and water as an economic good. She argues that the notion of water as a human right is too abstract unless it is accompanied by an exploration of the responsibilities of relevant actors for providing this right. She regrets the monopolization of the "water as an economic good" narrative because it obscures "the cultural, social and symbolic dimensions of water and also fails to adequately address questions concerning equity and justice." See Lyla Mehta, 2000, *Water for the Twenty-First Century: Challenges and Misconceptions*, IDS Working Paper 111 (Brighton: University of Sussex, Institute of Development Studies), p. 16.

[21] Colin Ward, 1997, *Reflected in Water: A Crisis of Social Responsibility* (London: Cassell).

On the other hand, those who view water as a commodity argue that the private sector should be responsible for delivering it to consumers. They gather evidence to show that the private sector has a well-founded reputation for efficiently and cost-effectively managing urban services.[22] Researchers on both sides of the privatization debate claim that their preferred model of ownership is more closely associated with water quality.

In the balance of this chapter we will organize our review of the literature by looking first at writings on water quality, and then at the work that has been done on ownership, management, and regulatory issues. In chapter 3, we will bring these two together by reporting on the practical experiences of various jurisdictions as they have followed different paths in the structuring of their water and wastewater system.

2.1.1 Water Quality

The public and private sectors have different motivations for providing quality water services. The Canadian Council for Public-Private Partnerships argues that the public sector is driven by a need to preserve a reputation for public service and benevolence and to provide essential services when and where they are not otherwise available. The council suggests that investor-owned utilities have an incentive to provide high quality service because they need to establish an impressive performance record in order to win the contract to deliver water again when it comes up for renewal. [23] Private sector firms are motivated to avoid operating risks because if they do not, they may face "fines, forfeit of bonds, contract default, damage to their corporate reputation, and legal actions."[24] Implicit in this account of private-sector behaviour is the acknowledgment of the centrality of the profit motive.

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[22] For example, researchers from the Reason Foundation conclude from their comparison of investor-owned and public water utilities in California that "the decision to have government entities provide water to consumers should be reconsidered, since private companies can provide this same function at the same cost without subsidies or tax-exemptions." See Kathy Neal, Patrick Maloney, Jonas Marson, and Tamer Francis, 1996, *Restructuring America's Water Industry: Comparing Investor-Owned and Government Water Systems*, executive summary, policy study no. 200 (Los Angeles: The Reason Foundation), January, [online], [cited March 25, 2001], <www.rrpi.org/ps200.html>.

[23] Note that in the Ontario context, the publicly owned corporation for water/wastewater services, Ontario Clean Water Agency (OCWA), facing competition from alternative providers, is subject to this same incentive.

Nature of Water Quality

Although individuals' ideas of aesthetically attractive water are highly idiosyncratic, as T.H.Y Tebutt observes, they obviously prefer water that is free from

- visible suspended matter
- excessive colour, taste, and odour
- objectionable dissolved matter
- aggressive constituents
- bacteria indicative of fecal pollution.[25]

Even when it comes from the highest quality sources and is subject to state-of-the-art treatment processes, water is not completely free from contaminants. Whether individuals' health is compromised by contaminants depends on the strength of their immune systems and the type and concentration of contaminants present in the water. A full consideration of the different types and sources of contaminants is beyond the scope of this paper, but the issue has been thoroughly explored elsewhere.[26] The World Health Organization indicates that, of the various types of water contaminants, pathogenic microorganisms are "the most important danger to drinking-water in both developed and developing countries."[27]

Escherichia coli O157:H7 and *Cryptosporidium* are two of the newer forms of contamination that are highly contagious and resistant to commonly used treatment and monitoring processes. *E. coli* O157:H7 is a bacterium that may cause diarrhea, cramps, fever, and vomiting in patients. It also has the potential to cause life-threatening complications, such as hemolytic uremic syndrome, which is characterized by acute renal failure, hemolytic anemia, and thrombocytopenia.[28]

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[24] Canadian Council for Public-Private Partnerships, 2001, *Benefits of Water Service Public-Private Partnerships*, presented to the Walkerton Inquiry, January, p. 11, [online], [cited May 8, 2001], <www.walkertoninquiry.com/part2info/publicsubmissions/pdf/benefitsofwaternew.pdf>.

[25] T.H.Y. Tebutt, 1998, *Principles of* Water Qua*lity Control,* 5th edition (Oxford: Butterworth-Heinemann), p. 9.

[26] For example, see Frank R. Spellman and Joanne Drinan, 2000, *The Drinking Water Handbook* (Lancaster, Pennsylvania: Technomic Pub. Co.), pp. 162–64.

[27] World Health Organization, "Protection and improvement of water quality," [online], [cited May 21, 2001], <www.who.int/water_sanitation_health/GDWQ/protection.html>.

[28] World Health Organization, 1996, *Escherichia coli O157:H7,* fact sheet N 125, July [online], [cited May 5, 2001], <www.who.int/inf-fs/en/fact125.html>.

Cryptosporidium is a parasite that, since 1976, has been known to cause disease in humans. After 1982 when acquired immune deficiency syndrome (AIDS) was identified, *Cryptosporidium* began to be recognized as a major threat to vulnerable individuals. It poses a serious challenge to the water supply because it is "a most highly infectious enteric pathogen, and because it is resistant to chlorine, small and difficult to filter, and ubiquitous in many animals."[29]

The preferred method of removing contaminants depends on their type and degree and the expense of removing them. T.H.Y. Tebutt has identified the primary methods of treating water:

- physical processes, which depend essentially on physical properties of the impurity; for example, particle size, specific gravity, viscosity, etc. Typical examples of this type of process are screening, sedimentation, filtration, and gas transfer.

- chemical processes, which depend on the chemical properties of an impurity or which utilize the chemical properties of added reagents; examples of chemical processes are coagulation, precipitation, and ion exchange.

- biological processes, which utilize biochemical reactions to remove soluble or collodial impurities, usually organics: aerobic biological processes include biological filtration and activated sludge; anaerobic oxidation processes are used for the stabilization of organic sludges and high strength organic waste.[30]

Challenges in Determining Water Quality

The challenges in determining water quality are daunting. According to David Ingle Smith, two key issues make it difficult for experts to draw firm conclusions about water quality:

- the large number of individual components that comprise water quality and the associated problems of measurement
- variations in time and space for each of the components.[31]

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[29] R. Guerrant, 1997, "Cryptosporidiosis: an emerging, highly infectious threat," *Emerging Infectious Diseases,* vol. 3, pp. 51–57.
[30] Tebutt, 1998, p. 119.

The quality of water is largely invisible to the end users. Consumers are very aware if their water tastes or looks unusual, but it is almost impossible for them to detect most of the water contaminants that have serious public health consequences.

Many writers have discussed the severe limitations of water quality data.[32] It is difficult to draw precise conclusions about the effects of contaminants on the ecosystem or on public health. Hence conventional monitoring data can be misinterpreted to imply that water is safe, when in fact there is some public health risk. Conversely, water experts may undermine the public's confidence in their water by overreacting to phantom crises in the water system.

The U.S. Environmental Protection Agency (EPA) has identified a number of factors that are barriers to the proper recognition of outbreaks of water-borne infection in the U.S. context. For an outbreak to be accurately identified, patients need to report their symptoms to physicians and follow through with laboratory tests. Positive results need to be reported in a timely manner to a health agency and then collected in a database. In practice, individuals and doctors do not always recognize the source of the symptoms of water-borne disease. Laboratories are not always available or proficient. Health officials do not always recognize small outbreaks, because most occur in noncommunity water systems that service nonresidential areas and transient populations.[33] U.S. states do not always report outbreaks to the Centers for Disease Control and Prevention because reporting is voluntary.[34] In order for the water quality to be accurately determined, it is often necessary to take steps to enhance surveillance. Robert Douglas and Martha Sinclair observe that "surveillance will only work effectively if improved

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[31] David Ingle Smith, 1998, *Water in Australia: Resources and Management* (Oxford: Oxford University Press), p. 18.

[32] A number of articles suggest that the water industry's faith in pathogen monitoring is misplaced and alternative strategies should be used, such as "source water protection, treatment optimization, maintenance of water quality through storage and distribution, and use of new technologies and real-time instrumentation to monitor processes." Martin Allen, Jennifer Clancy, and Eugene Rice, 2000, "The plain, hard truth about pathogen monitoring," Executive summary, *Journal of the American Water Works Association,* vol. 92, no. 9 (September), p. 64. See Jennifer Clancy, 2000, "Sydney's 1998 water quality crisis," Executive summary, *Journal of the American Water Works Association*, vol. 92, no. 3 (March), p. 55; Edwin D. Ongley, 1999, "Water quality: an emerging global crisis," *Water Quality: Processes and Policy*, edited by Stephen Trudgill, Des Walling, and Bruce Webb (Chichester: John Wiley & Sons, Ltd.), p. 17.

[33] A "noncommunity water system" is one that does not serve year-round residents, but intermittent users. United States, Environmental Protection Agency, 2000, *Proposed Ground Water Rule – Regulatory Impact Analysis* (April 5), 4.1.

[34] Ibid.

partnerships are developed between public health units and water authorities, and if there are agreed triggers for enhanced surveillance."[35]

Accountability Mechanisms for Safeguarding Water Quality

One of the objectives of regulatory institutions is to bolster accountability in the water system.[36] Progress is being made in the development of accountability mechanisms as public and private quality assessors try to make the water system more transparent and open, and water services more responsive to the needs of the public. Most accountability mechanisms, such as consumer confidence reports and surveillance systems, can be used in either a public or a private sector context.

Consumer confidence reports were introduced in the United States as part of the right-to-know provisions in the 1996 Amendments to the *Safe Drinking Water Act*. The reports inform consumers about the level of contaminants in their water and indicate how well their local water compares with national drinking water standards.[37] Water providers can use consumer confidence reports to educate the public about the issues related to their local drinking water. If, for example, the public is well informed about infrastructure needs, they may view rate increases in a more positive light.

Surveillance systems, like consumer confidence reports, can be used to inform the public about water quality. Surveillance systems keep track of the data relating to occurrences and causes of water-borne disease outbreaks. Advocates

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[35] Robert Douglas and Martha Sinclair, 1998, "*Cryptosporidium* in water," report of the consensus conference on *Cryptosporidium* in water, Melbourne, October, *Communicable Diseases Intelligence,* vol. 23, no. 6 [online], [cited May 17, 2001], <www.health.gov.au/pubhlth/cdi/cdi23206/cdi2306b.htm>.

[36] Michael Klein posits four design objectives for regulatory institutions: independence, commitment, accountability, and flexibility. See Michael Klein, 1996, *Economic Regulation of Water Companies* (Washington, D.C.: International Bank for Reconstruction and Development, Private Sector Development Dept.), p. 25; See Nicholas d'Ombrain's discussion of responsibility, accountability and answerability. Nicholas d'Ombrain, 2001, *Machinery of Government for Safe Drinking Water*, prepared for the Walkerton Inquiry, [online], [cited May 5, 2001]. Published in 2002 (Toronto: Ontario Ministry of the Attorney General), Walkerton Inquiry Commissioned Paper 4, Walkerton Inquiry CD-ROM, <www.walkertoninquiry.com/>.

[37] The following articles discuss consumer confidence reports: Jon De Boer, 2000, "Water quality and public health," *Water Supply*, vol. 18, no. 1–2, p. 126; Rich Anderson, 2000, "A New Round of Water Quality Reports Will Reach 254 Million Americans This Summer," *U.S. Mayor*, May 29, [online], [cited April 17, 2001], <www.usmayors.org/uscm/us_mayor_newspaper/documents/05_29_00/round_article.html>; United States, Environmental Protection Agency, *Consumer Confidence Reports: Final Rule*, EPA 816-F-98-007, [online], [cited May 8, 2001], <www.epa.gov/safewater/ccr/ccrfact.html>.

can use them to expose inadequacies in the system. Since 1971, the U.S. EPA and the Centers for Disease Control and Prevention have collected data associated with outbreaks in drinking water and recreational water from state, territorial, and local public health departments that voluntarily submit the information.[38] Nongovernmental agencies can also keep track of this type of information. For example, in Canada, the Sierra Legal Defence Fund created a national report card, called Waterproof, to evaluate and draw attention to failings in the provincial and territorial efforts to protect Canadian drinking water.[39] Austria, the Netherlands, and the United Kingdom are alone in publishing countrywide annual reports on drinking water quality. O.D. Hydes observes that "in the UK water suppliers are required to maintain a public record of drinking water quality and in France the results of health department tests are displayed at the local town hall."[40] Thus, both consumer confidence reports and surveillance systems are important tools for making public and private actors more accountable to consumers for the quality of water that they provide.

Water quality systems, designed to ensure that water is safe, are a growth industry. Farkas Berkowitz & Company estimated that the water quality systems market amounted to US $86 billion in 1999 in the United States alone.[41] The International Organization of Standardization (ISO), in Geneva, Switzerland, has promoted an environmental management system (EMS), based on its ISO 14001 model, that is an important example of a voluntary water quality program.[42] Saeed Parto notes the potential benefits of adopting this type of environmental management system:

> An EMS could be an invaluable organizational tool to fulfill regulatory obligations and to coordinate, monitor, and continually improve environmental performance. Systematic gathering of information, as

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[38] Rachel Barwick, Deborah Levy, Gunther Craun, Michael Beach, and Rebecca Calderon, 2000, *Surveillance for Waterborne-Disease Outbreaks – United States, 1997–1998*, vol. 49 (SS04) (May 26), pp. 1–35.

[39] *Canada Newswire*, 2001, "Albertans among best-served when it comes to safe drinking water – but national report card identifies plenty of room for improvement" (January 18), p.1.

[40] O.D. Hydes, 2000, "Regulation of drinking water and wastewater," *Water Supply*, vol. 18, no. 1–2, p. 82.

[41] Farkas Berkowitz & Company, 2000, "Water quality systems," *State of the Industry Report* (Washington, D.C.: Farkas Berkowitz & Company).

[42] For more information about ISO 9000 and ISO 14001, see Edward Doyle, 2001, *Production and Distribution of Drinking Water,* prepared for the Walkerton Inquiry, p. 15, [online], [cited May 5, 2001]. Published in 2002 as E. Doyle et al., *The Production of Drinking Water* (Toronto: Ontario Ministry of the Attorney General), Walkerton Inquiry Commissioned Paper 8, Walkerton Inquiry CD-ROM, <www.walkertoninquiry.com>.

> prescribed by ISO 14001, could assist an organization to increase production efficiency and accrue savings in operational costs through minimization programs in materials use and waste generation.[43]

Partnership for Safe Water is another initiative that promises to optimize treatment plant performance. The purpose of the partnership is to provide a cooperative forum for the U.S. Environmental Protection Agency, the American Water Works Association, other drinking water organizations, and more than 200 surface water utilities. They can implement measures to protect consumers from microbial contaminants in the water supply, particularly those that the legislative framework alone does not fully address. Regulators and water suppliers work together through this voluntary initiative to improve the operation of the utilities that provide water to about 90 million Americans. They use continuous improvement techniques, which are designed to anticipate problems and not just to meet numerical standards in a narrowly legalistic way.

Four Types of Accountability

The literature on accountability mechanisms in the water sector, particularly as they relate to the private sector, is in its preliminary stages, which is not surprising, since the actual mechanisms are still in their infancy. A body of literature exists that examines some of the changes in accountability mechanisms that are associated with the government's decision to contract out its services.[44] The different types of accountability identified in the literature could be broadly characterized as political, administrative, legal, and market accountability. It is useful to consider the nature of these different types of accountability, identify the mechanisms that are commonly used to preserve them, and review some of the problems and benefits related to the use of each.

Political accountability is the obligation of politicians "to be answerable for fulfilling responsibilities that flow from the authority given them."[45] Hence, in a parliamentary democracy, such as Ontario, "ministers are accountable to the

[43] Saaed Parto, 1997, "ISO 14000 – Who needs it?" *Water News*, vol. 16, no. 3 (September), p. 4.
[44] Peter Barberis, 1998, "The new public management and a new accountability," *Public Administration,* vol. 76 (autumn), pp. 451–70; Linda Deleon, 1998, "Accountability in a 'reinvented' government," *Public Administration*, vol. 76 (autumn), pp. 539–58; Colin Scott, 2000, "Accountability in the regulatory state," *Journal of Law and Society*, vol. 27, no. 1 (March), pp. 38–60. See also Nicholas d'Ombrain, 2002.
[45] See the definition of administrative accountability in Kenneth Kernaghan and David Siegel, 1995, *Public Administration in Canada*, 3rd edition (Toronto: Nelson Canada), p. 357.

public, via Parliament, for their own decisions and for the work of their departments."[46] Political accountability mechanisms can encourage politicians to improve the water system in such areas as financial performance, adequacy of access, and quality of service, but politicians may also be inclined to adopt a short-term view of their responsibilities, consistent with the duration of their electoral mandate.[47] Colleen Flood has identified some of the common mechanisms that are used to preserve political accountability: "devolution; election; consultation; charters of rights and ombudspersons."[48] Audits could also be included in the list.

Some of the problems often associated with the utilization of political mechanisms include inefficiency, primacy of political expediency or ideology over informed analysis, and decision-making paralysis. Citizens may struggle with competency issues if they are expected to understand and authorize key decisions, since they often lack adequate access to the technical expertise for resolving the dilemmas confronting water services.[49] The benefit of political accountability is that customers, as citizens, can hold politicians accountable for water services provided in the community.

Administrative accountability in the public sector involves the internal answerability of civil servants to political and administrative superiors, and to any internal governmental authorities (e.g., central agencies), as required by law or the administrative hierarchy.[50] Traditionally, ministers cannot blame their officials for administrative failures because it would "violate the impartiality and anonymity of the civil service, so undermining the authority of democratically elected ministers. And if ministers are impaired, so too is Parliament since it is through ministers that Parliament seeks to bring the executive to account."[51] A problem with administrative accountability is that it is complex, since it flows in many

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[46] Barberis, 1998, p. 451.

[47] But writers have pointed out that short-term horizons can be a problem with the private sector as well. Companies may be tempted to "mine" the contract, by under investing in the longer-term infrastructure needs for the sake of maximizing short-term revenues. F.J. Shroeder, 1996, "Letters: privatization not inherently progressive, say readers," *Journal of the American Water Works Association,* vol. 88, no. 9, p. 4.

[48] Colleen M. Flood, 1997, *Accountability of Health Service Purchasers: Comparing Internal Markets and Managed Competition in the United Kingdom, New Zealand, the Netherlands, and the United States*, WPS #33-1997 (Toronto: University of Toronto, Faculty of Law, Centre for the Study of State and Market), p. 20.

[49] See Ezekiel Emanuel and Linda Emanuel, 1996, "What is accountability in health care?" *Annals of Internal Medicine*, vol. 124, no. 2 (January 15), pp. 229–39.

[50] Kernaghan and Siegel, 1995, pp. 357–58.

[51] Barberis, 1998, p. 451.

directions. In an industrialized country, a benefit of administrative accountability is that it is highly developed. Hence, it is difficult for the regulated bodies to find loopholes to avoid being held accountable.

Legal accountability, as described by Linda Deleon, exists "when there are two relatively autonomous parties, one who can mandate expectations with the force of law, and another whose responsibility is to implement the law (a fiduciary or principal-agent relationship). Legal accountability depends upon monitoring, auditing, and other forms of oversight."[52] For example, governments may sue water suppliers for non-performance. Jennifer McKay and Anthony Moeller identify three categories on which claims for damages caused by poor water quality are based in Australia: "First is common law negligence, which may include misleading statements. Second is conduct that is contrary to provisions in specific Acts such as the Fair Trading Act (Vic). Third is breach of contract, where a customer has entered into a contractual agreement with a water supplier,"[53] and the supplier has failed to meet the terms of the contract.

There are a number of drawbacks to legal accountability. Water experts, who are reluctant to take the risk of being held criminally responsible for their environmental decisions, may avoid employment in the public sector, because government immunity is declining, particularly in the United States.[54] As Rosemary O'Leary observes,

> even the most scrupulously honest public administrator may be caught in the legal quagmire surrounding federal and state environmental reporting and record keeping requirements. Environmental laws are complex, difficult to understand, and expensive to comply with. It is not hard to imagine a busy public administrator with a general education failing to keep up with environmental requirements, not being aware of environmental laws, or not having the funds to comply adequately with environmental regulations. Yet such individuals may be imprisoned or fined heavily for their ignorance.[55]

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[52] Deleon, 1998, p. 542.
[53] Jennifer McKay and Anthony Moeller, 2000, "Is it time for a new model of water quality laws?" *Environmental and Planning Law Journal,* vol. 17, no. 3 (June), p. 165.
[54] Rosemary O'Leary, 1993, "Five trends in government liability under environmental laws: implications for public administration," *Public Administration Review*, vol. 53, no. 6 (November/December), p. 542.
[55] Ibid., p. 545.

Large financial liabilities can also place a heavy burden on public and private organizations, with the costs being passed on to the consumers. William Goldfarb identifies the drawbacks of seeking judicial solutions to water management problems.

He considers the judicial process too slow for effective natural resources management. He notes that

> judicial decisions tend to be sporadic, 'one shot' affairs that do not establish general principles or plans on which regulators or the private sector can confidently rely. Courts also lack the ability to consistently monitor and evaluate solutions that they have devised … water is a public trust resource that should primarily be managed by institutions that are politically responsible to the public.[56]

One of the benefits of legal accountability mechanisms is that they give citizens and regulators the opportunity to sue utilities if the quality of their water is deficient. Hence water companies may have sufficient incentive to comply with regulation that they will devote resources to this end.

Market accountability is the use of market mechanisms by one party to hold another party responsible for its actions. Accountability can be maintained through such mechanisms as the ordinary open market, managed competition, or the internal market:

- An open market is "an area of business where buyers and sellers are in contact with each other and where prices in one area affect prices in another area."[57]

- Managed competition exists when individuals have the opportunity to choose between competing companies which are tightly regulated by a government-designated person or agency. Features of managed competition include standardized services so that companies can be easily compared, open enrolment, consumer awareness of premium differences, and continuous quality measurement.

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[56] William Goldfarb, 1993, "The trend toward judicial integration of water quality and quantity management: facing the new century," *Water Resources Administration in the United States: Policy, Practice, and Emerging Issues* (East Lansing: American Water Resources Association), pp. 82–83.
[57] The Diagram Group, 1993, *The Macmillan Visual Desk Reference,* glossary of key economic terms (New York: Macmillan Publishing Co.), section 6863.

- Internal markets have been described as "quasi-markets." Their funding can "be the purview of the government and come from general revenue."[58]

Market accountability is shaped by the relationship between the consumer and provider, rather than a system dictated by public administrators in a top-down manner. Proponents of market accountability argue that it is efficient and flexible instead of being bureaucratic and standardized like traditional methods of accountability.

The United States has begun to experiment with market-based incentives for reducing water pollution. The economic incentive systems in the water sector generally take two forms: pollution charges or tradeable permit systems, whereby, as Esther Bartfeld describes, "dischargers decide among themselves the optimal levels of abatement necessary to meet an aggregate pollution limit most efficiently; point-nonpoint source trading programs involve trading discharge levels between point and non-point sources within a given watershed."[59] In Bartfeld's opinion, "point-nonpoint source trading may hold promise as an innovative technique in water quality control. It provides a means to bring otherwise unregulated nonpoint source pollution under regulatory control, thereby incorporating ecosystem management into pollution reduction strategies."

Water distribution has often been treated as a public sector responsibility in large part due to its monopolistic nature. Profit margins tend to be low if universal access to water is treated as a priority. Water infrastructure development is capital intensive and locally based, so there is little incentive for companies to set up parallel pipes and facilities. Even England and Wales, the only countries that have attempted full water privatization, have limited competition. (This will be explored in the next chapter). As Charles Weir observes:

> Unlike some other UK utility privatizations that separated transmission from the selling function, no attempt was made to separate water distribution from either the treatment of sewerage or the retail provision of water. The industry was privatized as a single entity. As a result, there is no direct competition between firms in the industry.[60]

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[58] Monique Jérôme-Forget and Claude Forget, 1998, *Who is the Master: A Blueprint for Canadian Health Care Reform* (Montreal: Institute for Research on Public Policy), p. 12.

[59] Esther Bartfeld, 1993, "Point-nonpoint source trading: looking beyond potential cost savings," *Environmental Law*, vol. 23, no. 1 (January), pp. 43–106.

[60] Charles Weir, 2000, "Comparative competition and the regulation of mergers in the water industry of England and Wales," *Antitrust Bulletin,* vol. 45, no. 3 (fall), p. 811.

In cases where there is little competition between water companies, it is vital that the government set stringent regulations to ensure that markets do not compromise universal access and funding levels. Regulators must also ensure that information about cost and outcomes is readily available to the public so that consumers truly have a choice of purchasing agents. Cherry-picking is another concern; policymakers need to ensure that private companies do not expand exclusively in the most financially rewarding areas of the country, while leaving the less desirable water infrastructure and non-paying customers to the public sector.

Significance of Water Quality for Public Health

The importance of water quality for public and ecosystem health is widely recognized. Edwin Ongley notes the global dimensions of the water quality "crisis":

- an estimated five million human deaths from water-borne diseases
- ecosystem dysfunction and loss of biodiversity
- contamination of freshwater and marine ecosystems from land-based activities
- contamination of groundwater resources
- global contamination by persistent organic pollutants.[61]

Michael Gilbertson describes some of the negative health consequences – besides contagious disease – that can be related to water contaminants:

> The scientific community has recently become focused on the finding that many chemicals, including many persistent toxic substances that have been released to the environment, interfere with … chemical messengers and cause irreversible damage to the developing embryo and fetus. These effects include changes in the development and function of the reproductive system, deficits in neurological development affecting learning, and deficits in the development of the immune system.[62]

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[61] Edwin Ongley, 1996, *Control of Water Pollution from Agriculture*, FAO Irrigation and Drainage Paper no. 55 (Rome: FAO) as quoted in Edwin Ongley, 1999, "Water quality: an emerging global crisis," *Water Quality: Processes and Policy*, edited by Stephen Trudgill, Des Walling, and Bruce Webb (Chichester: John Wiley & Sons, Ltd.), p. 9.

[62] Michael Gilbertson, 1999, "Water quality objectives: yardsticks of the Great Lakes Water Quality Agreement," *Environmental Health Perspectives*, vol. 107, no. 3 (March), [online], [cited May 17, 2001], <http://ehpnetl.niehs.nih.gov/docs/1999/107-3/gilbertson-full.html>.

2.1.2 Ownership and Management Issues

Reasons for Interest in Public-Private Partnerships

The notion of involving the private sector in the delivery of public services is certainly not unique to the water sector. According to Leslie Seidle, governments are increasingly working in what are termed partnerships with the private sector for three reasons. Partnerships are perceived as mechanisms to reduce the cost and role of government, improve service delivery, and adjust the design and delivery of programs and public policy.[63] In terms of popularity, the pendulum for ownership regimes swings between the public and private sector. Jurisdictions emulate each other. The openness of borders to transnational investment is an impetus to privatization since local industry can take part in joint ventures with foreign-based multi-utilities (multinational companies in the utility sector), thereby gaining valuable expertise and access to capital, and an opportunity to compete in the global water market.[64]

Industry observers identify a number of factors that contribute to a relatively high level of interest in public-private partnerships. According to the Reason Public Policy Institute, two leading factors are responsible for the growing interest in public-private partnerships for municipal water services in the United States:

- unfunded congressional mandates related to requirements of the *Safe Drinking Water Act* (*SDWA*) and the *Clean Water Act* (*CWA*)

- the lack of public resources to address the nation's aging infrastructure.[65]

Thus, the private sector is expected to provide operations and management support and assistance in making capital investments.

In Canada, the limits on dangerous contaminants are not as strict as in the United States. As the Sierra Legal Defence Report notes, "Many dangerous

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[63] Leslie Seidle, 1995, *Rethinking the Delivery of Public Services to Citizens* (Montreal: The Institute for Research on Public Policy), pp. 144–45.

[64] See Clifford Daniel Wymbs, 1999, Transnational Investment in the Competitive Transition of Regulated Industries, Ph.D. diss., Rutgers, the State University of New Jersey, Newark.

[65] Reason Public Policy Institute, 2001, *Privatizing Water Utilities or Water Works: Trends, Cost Savings Potential, Best Practices,* [online], [cited March 30, 2001], <www.privatization.com/Collection/SpecificServiceAreas/Water-local.html>.

substances prohibited under the U.S. *Safe Drinking Water Act* aren't even listed in Canada's non-binding drinking water regulations."[66] Nevertheless, many Canadian municipalities are hard-pressed to meet even the lower standards because water rates are so low that the money is not available for water protection and contamination cleanup.[67] Furthermore, Canada does not have the level of funding support from the national government that U.S. states and municipalities enjoy. The municipalities are tempted to look to the private sector for funds and support for operations, maintenance, monitoring, and risk assessment, rather than face the political consequences of higher water rates or property taxes. Raising taxes may be a politically unpalatable option, and municipalities in some jurisdictions are constrained in their ability to raise taxes without the consent of the populace (e.g., in California after Proposition 13).

In Canada and the United States, the needed infrastructure improvements are expected to be costly. The Canadian Water and Wastewater Association estimated in 1997 that $90 billion would have to be invested in Canada over a 15-year period to improve the water infrastructure.[68] Estimates suggest that Ontario's water and sewer systems are currently in need of $9 billion to $40 billion in maintenance and upgrades.[69] In 2000, the Water Infrastructure Network (WIN) estimated that water and wastewater needs in the United States would be about $1 trillion over 20 years. "The WIN report also estimated that current capital investments by the water industry were US $23 billion per year below what should be spent to meet the needed capital investments."[70] It is difficult to predict the amount of money that is needed with any degree of accuracy; a great deal will be required to upgrade aging systems. Governments will be tempted to enter into build/own/operate/transfer projects with the private sector because it enables the public utility to "obtain 'off-balance-sheet' financing for a project, rather than adding to the municipal bond debt load."[71]

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[66] *Canada Newswire*, 2001, "Albertans among best-served when it comes to safe drinking water – but national report card identifies plenty of room for improvement" (January 18).

[67] Laurie Corbett, 2001, "The big drinking water issue," *Water News* (March), pp. 30–32.

[68] Canadian Council for Public-Private Partnerships, 2001, *Overview of Successful Public-Private Partnerships in the Water Sector* (Toronto: The Canadian Council for Public-Private Partnerships), p. 1.

[69] *The Toronto Star*, 2001, "Water privatization would hurt consumers" (January 25), p. 01.

[70] H_2O Coalition, 2001, *What Is the Infrastructure Problem and What Are the Solutions?* issue paper, (Washington, D.C.: National Association of Water Companies, February 9), p. 2.

[71] American Water Works Association Research Foundation, 1999, *Balanced Evaluation of Public/Private Partnerships,* project #455, prepared by Robert Bailey, Bevin Beaudet, Eric Rothstein, and John Spencer (Denver, Colo.: AWWARF, fall).

The American Water Works Association Research Foundation (AWWARF) shares the opinion of the Reason Public Policy Institute that the increasing interest in public-private partnerships can be traced to infrastructure needs and funding limitations in the U.S. context. The AWWARF also stresses the importance of market forces as drivers behind the organizational changes in the water industry: "In the 1990s, due to changes in the federal requirements for the privatization of grant-funded infrastructure, the incidence of water utility P3s [PPPs] – primarily in the form of contract operations – has increased significantly."[72]

Typology of Management Regimes

There are many different configurations for owning and operating water utilities, and a good number of authors and agencies have developed useful typologies. We will briefly describe two. A public-private partnership (PPP) spectrum is often used in the literature to show that the alternatives for ownership of water utilities range from total public ownership and operation to total private ownership and operation.[73]

The American Water Works Association (AWWA) presents one typology of the public-private partnership spectrum and describes the background, drivers, and potential benefits/disadvantages of each alternative. According to the AWWA, water utilities have these options for institutional innovation that involves the private sector:

- organization development
- limited outsourcing of services
- project delivery
- contract operations

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[72] Ibid.

[73] Variations of the public-private partnerships spectrum are provided in the following documents: American Water Works Association Research Foundation, 1999; R. Andreas Kraemer, 1998, "Public and private water management in Europe," *Selected Issues in Water Resources Management in Europe*, vol. 2, edited by Francisco Nunes Correia (Rotterdam: A.A. Balkema), p.335; Penelope Brook Cowen and Tyler Cowen, 1998, "Deregulated private water supply: a policy option for developing countries," *Cato Journal*, vol. 18, no. 1 (spring/summer), table 2, p. 28; Environmental Technology Advancement Directorate, 1995, *Canada's Untapped Resource: Public-Private Partnerships in Watersupply and Wastewater Treatment*, prepared by Thompson Gow & Associates, Toronto, for Environmental Technology Advancement Directorate, Environment Canada, Technology Transfer Series 2E, September, table 6; Canadian Council for Public-Private Partnerships, 2001, p. 4.

- private financing arrangements
- asset transfer.

To briefly summarize the AWWA's typology, organization development means that a publicly owned utility adopts techniques for quality improvement that may have originated in the private sector, without entering into a public-private partnership that involves the transfer of services or functions. Limited outsourcing of services entails contracting with outside entities for the provision of specific services, such as billing and collection, that account for 5% or less of a utility's operating budget. Project delivery comprises a variety of approaches to the delivery of capital projects via public-private contracts. These include partnering, sometimes with the goal of resolving difficulties during construction, and management of a defined set of essential functions, such as operations. Design/build and design/build/operate options also fall into the project delivery category. These functions are delivered by the private sector with the presumed outcome of reducing project costs and delivery time and introducing innovative designs. Contract operations are the short-term or long-term outsourcing of operations and/or maintenance to a third party. Private financing arrangements (e.g., facility lease, concession agreements, build/own/operate/transfer) imply that a private company pays the utility for "the ability to operate and maintain facilities and collect service fees, either from the utility or directly from customers."[74] Asset transfers are usually driven by a desire to avoid risk and raise capital for infrastructure, regulatory compliance, and/or cash flow modification. Under an asset sale model, the utility sells certain assets to a private buyer to operate water services for the public, sometimes for 20 to 30 years.

The World Bank has developed a series of "toolkits" to assist countries and communities in thinking through what role the private sector should play in water services and how it should be implemented.[75] Toolkit 1, *Selecting an Option for Private Sector Participation*, describes a spectrum: at one end are those options "in which the government retains full responsibility for operations, maintenance, capital investment, financing, and commercial risk – at the other,

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[74] American Water Works Association Research Foundation, 1999.

[75] World Bank, ToolKit 1, *Selecting an Option for Private Sector Participation,* [online], [cited May 5, 2001], <www.worldbank.org/html/fpd/wstoolkits/Kit1/contents.html>. World Bank, ToolKit 2, *Designing and Implementing an Option for Private Sector Participation,* [online], [cited May 5, 2001], <www.worldbank.org/html/fpd/wstoolkits/Kit2/contents/html>. World Bank, ToolKit 3, *What a Private Sector Participation Arrangement Should Cover,* [online], [cited May 5, 2001], <www.worldbank.org/html/fpd/wstoolkits/Kit3/contents/html>.

those in which the private sector takes on much of this responsibility."[76] The bank notes that

> even where the private sector takes on full responsibility for operations and financing, as in concessions and assets sales, it does so within a framework created by the government. The most important parts of this framework are regulatory arrangements to protect consumers from monopolistic pricing and enforce health and environmental standards, and subsidy regimes to ensure access to services for the disadvantaged.[77]

The bank displays a series of alternative arrangements, each one moving further across the spectrum towards fuller private participation:

- service contracts
- management contracts
- leases
- build-operate-transfer contracts
- concessions
- build-operate-own contracts
- divestiture.

Two things are apparent. First, this typology is different from, but closely parallel to, that of the AWWA. Second, the options bring the elements of ownership and operation together in different combinations, thereby approximating some of the real-world configurations that different jurisdictions have chosen. Indeed, the bank depicts each of the options with reference to several of its key dimensions: asset ownership, operations and maintenance, capital investment, commercial risk, and duration.[78]

Use of Service Contracts in the Water Sector

Bill Kingdom and Sharon Slade identify some of the reasons for the use of service contracts in the water industry. Service contracts may be used to avoid some of the problems associated with the public sector:

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[76] World Bank, ToolKit 1.
[77] Ibid.
[78] Ibid.

- limited innovation and risk taking
- inefficient and slow public sector procurement process
- management restricted by poor and protected labour practices/relations
- high levels of non-payment which cannot be resolved due to voter power.[79]

Service contracts may contain provisions that require the operation and maintenance contractor to meet schedule, cost, and/or performance guarantees. Thus, well-designed service contracts function as the mechanism for holding the contractor accountable for specific performance standards and outcomes. Sylvia Wenyon and Charles Jenne suggest that the key principles that should guide the use of service contracts in the water sector are competition, transparency, and a realistic design of the terms of reference.[80]

Private Sector Risk

Service contracts provide the water company with an opportunity to transfer the risks associated with a large capital project to a third party. These risks vary from project to project, but Garret Westerhoff notes that they may include: "technology selection; construction; repair and replacement; compliance with performance requirements; costs; industrial relations; indemnification; insurance; change of law; and value of currency." Aggressive private water service providers are sometimes willing to assume a high level of risk in a bid to increase their market share.[81]

A number of steps can be taken to minimize risk for one or both parties:

- Each risk should be allocated to the party best suited to manage it.
- Risks should reflect the distribution of benefits and profits.
- It is crucial that the government not keep the risks and hand off the profits.
- "Safeguards previously in place must be preserved, if privatization is to be successful in the long term."[82]

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[79] Bill Kingdom and Sharon Slade, 2000, "Special contribution," *Water Supply*, vol. 18, no. 1–2, table 1, p. 8.

[80] Sylvia Wenyon and Charles Jenne, 1999, "Water and sewerage privatization and reform," *Can Privatization Deliver? Infrastructure for Latin America*, edited by Federico Basañes, Evamaria Uribe, and Robert Willig (Washington, D.C.: Inter-American Development Bank), p. 215.

[81] Garret P. Westerhoff, 2000, "The use and management of service contracts: participation in the private sector," *Water Supply*, vol. 18, no. 1–2, p. 5.

[82] William Blakeney, 2000, "Walkerton a risk management nightmare," *Canadian Underwriter,* vol. 67, no. 9 (September), pp. 22–28.

As William Blakeney observes, "With government cut-backs, the possibility of statutory 'blind spots' becomes a serious problem. It is easy for a provincial ministry to cut staff and privatize certain functions, however it can take decades to pass legislation setting out the responsibilities of the replacements."[83] Governments cannot allow the water system to fail; therefore, the ultimate market sanction is not an option.

Regulatory Issues Pertaining to Different Management Regimes

Regulation involves the offloading of risk; therefore, if there is a water-borne outbreak and companies have met government standards, it is easier for them to avoid the blame. Water quality guidelines may be voluntary or mandatory. For instance, in Canada the federal government does not enforce water quality guidelines in all jurisdictions. However, British Columbia, Alberta, Ontario, and Quebec have incorporated elements of the national guidelines into their provincial regulations.[84] Some guidelines emphasize the process of water treatment; others emphasize the outcome. Regulations differ depending on the type of water that is involved. Typically, regulations for surface water are more stringent than for groundwater.

The United States has had a national mandatory drinking water standards program for 26 years and Europe has had one for 17 years. O.D. Hydes observes that the countries that joined the European Community (e.g., Austria, Finland, France, Germany, Italy, Netherlands, Spain, Sweden, and the United Kingdom) have all agreed to include the standards of the EC Directive relating to the Quality of Water intended for Human Consumption (80/778/EEC) in their national regulations.[85] The EC directive is one factor that is sometimes credited with encouraging Britain to improve the quality of its drinking and bathing water.[86] However, Andrew Jordan is critical of the EC standards. He adopts a historical institutional approach to explain the rigidity of current European water standards. He uses the case of drinking water in the United Kingdom to show "how institutions have gradually hemmed in decision-makers, locking states into a policy trajectory that most now regard as suboptimal in key respects."[87]

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[83] Ibid.
[84] See E. Doyle et al., 2002.
[85] Hydes, 2000, p. 80.
[86] See Elizabeth Brubaker, 1999, *Privatizing Water Supply and Sewage Treatment: How Far Should We Go?* (Vancouver: Fraser Institute).
[87] Andrew Jordan, 1999, "European Community water policy standards: locked in or watered down," *Journal of Common Market Studies*, vol. 37, no. 1 (March), p. 13.

Jennifer McKay and Anthony Moeller list their reasons for thinking mandatory regulations are preferable to voluntary guidelines:

- public health and safety (some pollutants are life threatening)
- external costs and market exchange ("In an unregulated market the cost imposed on a market transaction may not represent its cost on the broader community, including future generations.")
- monopolies and market failures (i.e., there may not be enough competition between companies to drive improvements in water quality)
- inadequate or insufficient information ("Firms in an unregulated market may not have the necessary incentives or self-interest to provide accurate and easily accessible information.")
- environmental racism and justice ("Poor water quality has been repeatedly identified as a concern for rural and remote indigenous communities.")
- inadequacies of common law with respect to negligence (i.e., lawsuits are not always allowed)
- technology diffusion and quality production (i.e., mandatory regulations can spur technological innovations).[88]

Decision makers have used a wide range of policy instruments to preserve water quality by addressing non-point source water pollution problems in the United States.[89] Carolyn Johns notes that there are similarities in the policy instruments that Canada and the United States have used to address point sources: "Public spending on water and sewage treatment infrastructure and monitoring and regulation of large, stationary, point sources have been the preferred instruments."[90]

A distinction is often made in the literature between the more traditional command-and-control mechanisms that impose specific uniform standards and emissions limits on polluters in order to meet water quality standards, and market-based mechanisms. Typical market-based mechanisms include pollution

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[88] McKay and Moeller, 2000, p. 165.

[89] "Point source pollution" is contamination from an identifiable source, such as dumped industrial waste. "Non-point source pollution" is contamination resulting from a general condition or practice, such as urban runoff or the contamination of aquifers by nitrates used in agricultural production.

[90] Carolyn Johns, 2001, *Effective Policy Regimes for the Management of Non-point Source Water Pollution: Ontario and the U.S. in Comparative Perspective,* prepared for the Walkerton Inquiry, [online], [cited January 5, 2002]. Published in 2002 as *Policy Instruments to Manage Non-Point Source Water Pollution: Comparing the United States and Ontario* (Toronto: Ontario Ministry of the Attorney General), Walkerton Inquiry Commissioned Paper 11, Walkerton Inquiry CD-ROM, <www.walkertoninquiry.com>.

charges and tradeable permits. Recent literature emphasizes the efficiency of market-based instruments and notes that the money recouped from sanctions can cover the cost of enforcing the regulations. Proponents of market-based mechanisms expect that

> given the freedom to choose among control technologies, facilities would seek innovative, low-cost methods to reach desired goals. Consequently, economic incentive provisions encourage innovation in pollution control, because investments in pollution control can lead to increased profits. With command-and-control regulation alone, no such incentive exists, and dischargers may find it cheaper to invest in litigation and delay rather than comply with regulations, especially when faced with high compliance costs.[91]

There is an emerging consensus that market-based mechanisms are highly effective (and inexpensive or even potentially lucrative for the regulatory body) when the incentive structures are carefully designed, re-evaluated, and adjusted over time, and supported by a backstop of the credible threat of more coercive/punitive regulatory tools if necessary.

2.2 Citizen Participation

Citizen participation in water management is important. It gives the public an opportunity to become environmentally aware and may increase the likelihood that rivers will be managed sustainably and conflicts of use will be resolved.[92] Citizen participation also enhances the transparency of the system. Transparency is important because, as Tony Balance and Andrew Taylor observe, "it enables all interested parties to have their say and influence decision-making processes. As such it is more likely that decisions are going to reflect the interests of stakeholders – although diverging interests would obviously need to be balanced in some way."[93] The World Health Organization identifies a wide range of participatory methods: public meetings, formal surveys, consultative committees, working through non-governmental organizations, and

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[91] Bartfeld, 1993, pp. 43–106.

[92] Margaret House, 1999, "Citizen participation in water management," *Water Science and Technology*, vol. 40, no. 10, p. 125.

[93] Tony Balance and Andrew Taylor, 2001, *The principles of best practice economic regulation*, a report commissioned by Water UK (April 10), [online], [cited May 15, 2001], <www.water.org.uk/magazine/bulletins/waterinfo/97.html>.

participatory rapid appraisals.[94] The organization suggests that it is important to employ participatory methods, particularly in developing countries, because local people and non-governmental organizations are essential allies, and have a wealth of experience that they can share.[95]

Public participation is valuable because it can help providers discover the drinking water conditions that are acceptable to their customers. For example, some communities may be willing to tolerate occasional boil water advisories, if it means that rates do not need to rise exponentially for investments in new technologies. The World Health Organization also recognizes the disadvantages of using participatory methods. It is difficult to keep discussants at public meetings on topic; only a few people are able to voice their opinion; some people may not feel comfortable with being seen as representatives of the community. Another disadvantage is the time and resources necessary to give the public an opportunity for meaningful and informed participation at the appropriate stages of decision making. Without technical and legal advice, for example, an invitation to public participation in standards-setting for water is at best a largely hollow invitation, and at worst it risks letting a privileged and unrepresentative few take on an inappropriate role as the public's voice.

2.3 Public Health Strategy for Drinking Water

Robert Douglas and Martha Sinclair describe the key components of a public health strategy for drinking water:

- Relevant health and water industry personnel should have frequent routine contact so that rapid and effective consultation can take place whenever unusual water quality events occur.

- A graduated response protocol should be established depending on the degree of health concern associated with different circumstances.

- The response protocol agreed to between health and water authorities should be subject to public comment during its development.

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[94] A participatory rapid appraisal is a technique that has been developed to allow local people to participate directly in the process of data gathering and analysis. World Health Organization, 2000, *Tools for Assessing the O&M Status of Water Supply and Sanitation in Developing Countries* (Geneva: World Health Organization), p. 43.

[95] Ibid., table 9.1, p. 43.

- The final response protocol should be made available to the public and the media. The protocol should set out the circumstances that would trigger a response, the investigative and corrective measures to be implemented for various levels of response, and the time period required to carry them out. Placing this information in the public domain in advance of any water quality events would help to address industry concerns over "duty of care" with respect to the time taken for confirmatory testing and investigations.[96]

2.4 Conclusion

Much scholarship and analysis has explored the array of actual and possible management regimes and ownership arrangements in the water and wastewater field. A great deal has been written as well on questions of water safety and water quality, much of it of a technical or scientific character. But rather less work has been done examining the nexus between these two sets of concerns.

Water quality varies in different jurisdictions, as do the modes of operation. Patterns of ownership of the assets vary as well. This survey of the literature has not uncovered empirical evidence linking water quality either to ownership patterns or to public/private operators in any particular way. The relationships are complex and heavily dependent on the specific circumstances of each case. A review of the literature reveals instances where the transfer of ownership to private sector actors has been associated with significant water quality improvements (e.g., in the United Kingdom). There are also instances where the reverse has been the case (e.g., in some developing countries). High and low levels of performance can be found in publicly owned systems as well.[97] Beyond questions of ownership, the same holds true whether public or private sector actors are operating all or part of the water and wastewater system in a given jurisdiction. Does that have an impact on water quality? No firm conclusions can be drawn from the evidence marshalled here.

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[96] Robert Douglas and Martha Sinclair, 1998, "*Cryptosporidium* in water," report of the consensus conference on *Cryptosporidium* in Water, Melbourne, October, *Communicable Diseases Intelligence,* vol. 23, no. 6, [online], [cited May 17, 2001], <www.health.gov.au/pubhlth/cdi/cdi2306/cdi2306b.htm>.

[97] For a discussion of the drawbacks of water privatization and the benefits of public sector operations, see David Hall, 2001, *The Public Sector Water Undertaking – A Necessary Option* (London: University of Greenwich, Public Services International Research Unit) (February), [online], [cited May 13, 2001], <www.psiru.org>.

Our working hypothesis is that the public or private status of the owner and manager is not the prime determinant of the system's performance. Our suspicion is that the matter is far more complex, that high quality water and water safety are characteristics of a system whose many interlocking parts work together to produce the desired outcomes and to correct deficiencies quickly and effectively when parts of the system fail.

We will return to this matter in the final chapter. Before arriving at that point, however, we will examine in chapter 3 the experience of several jurisdictions as they proceeded through significant system change or through actual system transformation. Our hope is that these accounts may help to display in more concrete form the factors that relate to our central question. Specifically, we will review the apparent impact on water quality of alterations in ownership and in the management regimes in jurisdictions in Canada, the United States, Europe, Australia, as well as a transitional economy, namely Poland, and selected developing countries, such as Argentina, Mexico, and Bolivia. In chapter 4 we turn to three different municipal models from the Toronto area.

3 Experience in Various Jurisdictions

3.1 Introduction

This chapter examines the experience of several jurisdictions in order to assess whether any relationship can be identified between a given ownership or management regime, and the quality or safety of drinking water.

In the literature, it is common for writers to advance generalized claims about the benefits of a public or privatized model of water delivery and to argue the disadvantages of the alternative; water quality is typically swept up in this general argument.

Private sector enthusiasts, for example, argue that the private sector should own and manage water services because it has advantages over the public sector that better enable it to meet quality standards:

- economies of scale in the provision of central administration services (e.g., personnel, finance, procurement, etc.)
- economies of scale in purchasing goods and services
- faster purchasing, with fewer constraints on the bidding process

- ability to develop relationships with suppliers
- access to a larger pool of technical expertise, providing improved solutions to operational problems
- minimum permanent staffing levels at any site, with peaks met from elsewhere in the organization
- more flexible staffing with cross-training being the norm
- more control over hiring and firing staff.[98]

Moreover, since the largest private water companies operate in many different countries, they can easily transfer technology, knowledge of best practices, and highly trained personnel from one jurisdiction to another. Proponents of the private sector also suggest that governments, acting in a regulatory capacity, are more likely to be diligent in enforcing quality regulations on a private water firm than on a public entity. Finally, privatization is, in many cases, seen as a solution to the high infrastructure expenses of protecting water quality and treating and supplying high quality, consistently safe drinking water.

Others question whether water supply, given its inherently monopolistic character and its importance to human health, social well-being, and economic growth, is an appropriate candidate for privatization. Opponents of privatization note that the problems of the public sector are not intractable and its advantages are considerable. For instance, David Hall suggests that too much attention has been given to promoting public-private partnerships and not enough time has been committed to considering how public sector water delivery could be improved.[99] Critics of water privatization argue that public utilities are better positioned to deliver quality water services because they are accountable to the community, unlike private companies, which are expected to generate profits for their shareholders.[100] Some have also suggested that the short timelines for returns on investment expected by private investors are incompatible with the

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[98] Bill Kingdom and Sharon Slade identify the comparative advantages of the private sector in their discussion of service contracts in the private sector. See Kingdom and Slade, 2000, "Special contribution," *Water Supply,* vol. 18, no. 1–2, p. 7. Note, however, that virtually all of these arguments could in fact be made in the Ontario context in considering the comparative advantages of Ontario Clean Water Agency (OCWA), the provincial public water corporation, and several could also be applied as arguments in favour of allowing or encouraging existing large, well-run water utilities in Ontario to provide water services to smaller communities struggling to meet quality standards.

[99] David Hall, 2001, *The Public Sector Water Undertaking – a necessary option* (London: Public Services International Research Unit), [online], [cited May 2001], <www.psiru.org>.

[100] Jan-Willem Goudriaan and David Hall, 1997, "The problems with privatizing water: private companies rife with corruption, incompetence," *The CCPA Monitor* (April), [online], [cited May 11, 2001], <http://mai.flora.org/forum/1997>.

long-term planning needs of the water sector, and that private operators may "mine" a water utility's capital assets by underinvesting, for short-term profit.[101]

Although water quality varies in different jurisdictions, as do ownership and management arrangements, we have been unable to establish a direct causal relationship between the public or private status of a water supplier and the quality of the water system. As the European Commission has observed: "Experience gained shows that all the approaches have certain merits in a particular situation, but no general conclusions can be drawn, and the historical development of the sector as well as the political situation has to be taken into account."[102] Nevertheless, experiences with privatization in various jurisdictional and political contexts provide some insight into the potential public health impacts of privatization. This chapter will review the matter of water quality in relation to the experiences of several countries: Canada, the United States, the United Kingdom, France, Australia, and Poland; and developing countries: Argentina, Mexico, and Bolivia. Several instances of water system failure will be discussed, and the possible contributions of public and private sector agents to these failures will be examined.

3.2 Canada

The private sector has traditionally been involved in many non-operational aspects of the water industry in Canada.[103] However, Canadian jurisdictions by and large have chosen not to follow the global trend toward entering into water management contracts with the private sector.[104] A number of municipalities have recently experimented with different types of public-private

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[101] F.J. Shroeder, 1996, "Letters: privatization not inherently progressive, say readers," *Journal of the AWWA*, vol. 88, no. 9, p. 4. A similar charge can be levelled at the public sector, however, where electoral mandates are of several years, while water-system planning needs to be framed in terms of decades.

[102] European Commission, 1997, *Handbook on the Implementation of EC Environmental Legislation*, section 3.5, p.12, [online], [cited May 5, 2001], <http://europa.eu.int/comm/environment/enlarg/handbook/handbook.pdf>.

[103] Canadian Council for Public-Private Partnerships, 2001. "Non-operational aspects" are those services that are peripheral to the water facilities' main mandate; for example, contracting for janitorial, cafeteria, billing services, and the like.

[104] Bruce Mitchell and Dan Shrubsole, 1994, *Canadian Water Management: Visions for Sustainability* (Cambridge, Ontario: Canadian Water Resources Association), p. 57. The Canadian Council for Public-Private Partnerships lists some of the reasons that government has retained most of the responsibility for the development, financing, and operation of water systems in Canada, despite the fact that there is no shortage of private sector interest in delivering water services. See Canadian Council for Public-Private Partnerships, 2001, p. 9.

partnerships.[105] The water facilities that the Canadian Council for Public-Private Partnerships identifies as successful cases are based in Hamilton, Ontario; Dartmouth, Nova Scotia; Moncton, New Brunswick; and Goderich, Ontario.[106]

3.2.1 Ontario

Since the structure of water distribution services in Ontario has been described in detail in other papers, it will not be examined here.[107]

Use of Public-Private Partnerships

The current interest in investigating public-private partnerships can be traced to a number of factors. The Canadian Council for Public-Private Partnerships states: "Many municipalities in Ontario face a new situation, where capital and technical needs are [due] for renewal and performance improvement, where ownership of major assets has been transferred from the Province, and where cost-effectiveness is the concern of both ratepayers and senior governments."[108]

Examples of Public-Private Partnerships

The Canada Mortgage and Housing Corporation, based on a report prepared by the IBI Group, gave a positive assessment of the public-private partnership in Hamilton, Ontario. However, as our case study in chapter 4 indicates, the relationship was not without problems.

In the mid-1990s, Philip Utilities Management Corporation (PUMC) entered into a contract to operate and maintain Hamilton-Wentworth's water treatment and sewerage facilities. In 1995, the IBI Group expressed the opinion that

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[105] For a discussion of public/private partnerships in Canada, see Garret Westerhoff, 2000, "The use and management of service contracts: participation in the private sector," *Water Supply*, vol. 18, no. 1–2, p. 5.
[106] Canadian Council for Public-Private Partnerships, 2000, *Overview of Successful Public-Private Partnerships in the Water Sector* (Toronto: Canadian Council for Public-Private Partnerships), pp. 1–12.
[107] Doyle, 2002.
[108] Canadian Council for Public-Private Partnerships, 2001, p. 9.

there were "no downsides" to the project. However, it did note that Philip Utilities had "discovered that the existing publicly run operation is not as inefficient as they had first thought it would be and realized that they would not be able, in the first few years, to actually save the $500,000 per year that they had predicted."[109]

The Canadian Council for Public-Private Partnerships viewed the privatization of the water and wastewater facilities in Hamilton positively in its assessment in 2000,[110] although other writers have been much more critical.[111] The council highlighted Hamilton as the first case study in its *Overview of Successful Public-Private Partnerships in the Water Sector*. It observed that Azurix North America, which has replaced Philip Utilities as the private sector partner, has followed through on its commitment to set aside $12 million over the life of the contract (in 1995 dollars) for guaranteed savings plus investment in Hamilton's water infrastructure. The council notes the other areas of improvement in Hamilton's water services:

- Effluent quality is improving due to enhanced processing ability based on new equipment and instrumentation, modified procedures and stringent monitoring.

- Advanced maintenance procedures and increased access to capital expenditure have shifted the ratio of preventative breakdown maintenance from 20:80 to 70:30.

- Azurix implemented a customer odour complaint line available at all times.

- Azurix has been in full compliance with environmental regulations, although there were three violations relating to two separate incidents that predate Azurix Corporation's acquisition of PUMC and assumption of operations under the Hamilton contract.

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[109] Canada Mortgage and Housing Corp., 1995, *Public-Private Partnerships in Municipal Infrastructure: Theory and Practice*, prepared by IBI Group (Ottawa: CMHC) section 5.14.3, p. 93.
[110] Canadian Council for Public-Private Partnerships, 2000, pp. 2–3.
[111] Anderson, John, 1999, *Privatising Water Treatment: The Hamilton Experience*, prepared for the Canadian Union of Public Employees.

3.2.2 Other Provinces

Use of Public-Private Partnerships

The Canada Mortgage and Housing Corporation (CMHC) also gave a positive assessment of the public-private partnership in Sainte-Marie-de-Beauce, Quebec. The city signed an operational partnership with Aquatech,[112] in order to control costs and gain access to highly qualified staff. According to CMHC, the partner achieved both of these objectives.[113]

The Canadian Council of Public-Private Partnerships observes that the design/build project, in the water treatment plant in Dartmouth, Nova Scotia,[114] which was procured as design/build/finance/operate project[115] has also successfully met the service improvements indicators:

- The plant delivers treated water that meets Canadian Drinking Water Guidelines on all parameters and surpasses the guidelines on turbidity and colour. Also, the plant significantly reduces the need for chlorine dosing.

- Several substantial construction challenges were overcome with no additional costs being passed on to Halifax Regional Water Commission ratepayers.

- The project was built in 18 months, which was 40% faster than Dartmouth's original 30-month schedule.[116]

The Canadian Council for Public-Private Partnerships presents the design/build/finance/operate water treatment project in Moncton, New Brunswick, as a successful case. The council observes that US Filter Operating Services (USF Canada Inc.) and the Hardman Group Ltd. guarantee that the water quality will

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[112] Jan-Willem Goudriaan and David Hall observe that the French company, "SAUR (now owned by Suez Lyonnaise des Eaux), operates in Canada through Aquatech." See Goudriaan and Hall, 1997.
[113] Canada Mortgage and Housing Corp., 1995, section 5.13.
[114] The City of Dartmouth was amalgamated with Halifax and Bedford in 1996 to form the Halifax Regional Municipality.
[115] The project was procured by the Lake Major Water Treatment Partnership, which was held on a 50/50 basis by Inland Pacific Waterworks, a member of the BC Gas Group, and CH2M Waterworks (Canada) Ltd.
[116] Canadian Council for Public-Private Partnerships, 2000, pp. 8–9.

meet or exceed Canadian Drinking Water Guidelines and take on the risk of the facility performance.[117] The private sector project appears to have been a welcome development, given Moncton's history of boil water advisories.[118]

Quality Initiatives in British Columbia

Public-private partnerships have not become popular in British Columbia. However, the B.C. government is moving quickly to enhance quality by developing a drinking water protection plan.[119] The Walkerton tragedy, the water-borne outbreaks in British Columbia, and the Auditor General's report noting the lack of integrated water-source management[120] have made the general public and interest groups all aware of the need to develop new laws to protect drinking water. The Ministry of Health noted that water-borne diseases, which are usually caused by the contamination of drinking water systems with the feces of infected animals or humans, are common in British Columbia and throughout North America. There have been 18 confirmed outbreaks in B.C. since 1985. There are currently about 240 boil water advisories in place, affecting about 15,000 people in the province.[121]

Canadian concern about water quality, as a result of the Walkerton tragedy as well as other situations such as the 1996 *Cryptosporidium* events in Collingwood and Kelowna, make it likely that the issue will rise on the policy agenda of governments.[122]

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[117] Ibid., pp. 10–11.

[118] For a review of Moncton's history of water quality problems, see Citizen's Water Quality Committee, 2000, *Citizen's Water Quality Committee: Final Report*, prepared for the Moncton City Council (March 10).

[119] The summary of public consultations on a drinking water protection plan is available at <www.elp.gov.bc.ca/wat/wq/dw/index.html>. See M2 PressWIRE, 2001, *B.C. Ministry of Environment, Lands & Parks: Public wants action to protect drinking water* (March 23), p. 1; see also British Columbia, 2001, *Health Act: Safe Drinking Water Regulation* (Victoria: Queen's Printer).

[120] British Columbia, Office of the Auditor General, 1998/1999, *Report 5: Protecting Drinking-Water Sources,* [online], [cited April 7, 2001], <www.oag.bc.ca/PUBS/1998-99/report-5/sec-1.htm>.

[121] British Columbia, Ministry of Health, 2000, *Waterborne Diseases in B.C.*, Health File #49A (February) [online], [cited May 11, 2001], <www.hlth.gov.bc.ca/hlthfile49a.html>. The likely cause of the Victoria outbreak of toxoplasmosis in 100 individuals in 1995 was a municipal water system that used unfiltered surface water treated with chlorine and ammonia. See W.R. Bowie, A.S. King, D.H. Werker, J.L. Isaac-Renton, A. Bell, S.B. Eng, and S.A. Marion, 1997, "Outbreak of toxoplasmosis associated with municipal drinking water," *The Lancet*, vol. 19, no. 350 (July), pp. 173–77.

[122] Canadian Council for Public-Private Partnership, 2001, p. 10.

3.3 The United States

In the United States, as in Canada, only about 15% of drinking water and wastewater services are privately owned.[123] In other cases, ownership resides with the municipality, a public corporation, or some other government or public body.

3.3.1 Position of Public-Private Partnerships

Canada's Untapped Resource: Public-Private Partnerships in Watersupply and Wastewater Treatment suggests that public-private partnerships have not flourished in the U.S. water sector because it is believed they can lead to significant problems for both private and public participants, such as

- financial losses for either party due to causes that could include inadequate contract specifications and insufficient private sector resources and expertise
- loss of public control over resources without adequate compensation
- possible collusion between private firms on contract bidding at the expense of the public stakeholders
- inadequate public accountability and responsibility.[124]

The Canadian Council for Public-Private Partnerships identifies some of the more successful cases of water or wastewater treatment privatization in the United States: Milwaukee, Wisconsin; Indianapolis, Indiana; and Buffalo, New York.[125] Some of these initiatives occurred after a significant failure in the system drew attention to problems.

In 1993, Milwaukee experienced one of the most infamous outbreaks of waterborne diseases.[126] More than 400,000 Milwaukee-vicinity residents suffered

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[123] For the U.S. statistic, see Kingdom and Slade, 2000, p. 11. For the Canadian statistic, see Canadian Council for Public-Private Partnerships, 2001, p. 9.

[124] Canada, Environment Canada, 1995, *Canada's Untapped Resource: Public-Private Partnerships in Watersupply and Wastewater Treatment*, prepared by Thompson Gow and Associates, for Environmental Technology Advancement Directorate, Environment Canada, Technology Transfer Series 2E (Toronto: September), p. 39.

[125] Canadian Council for Public-Private Partnerships, 2000, pp. 18–23.

[126] Lawrence Gostin, Zita Lazzarini, Verla Neslund, and Michael Osterholm, 2000, "Water quality laws and waterborne diseases: *Cryptosporidium* and other emerging pathogens," *American Journal of Public Health*, vol. 90, no. 6 (June), pp. 847–53; Neil Hoxie, Jeffrey Davis, James Vergeront, Raymond Nashold, and Kathleen Blair, 1997, "Cryptosporidiosis-associated mortality following a massive

from symptoms related to an outbreak of *Cryptosporidium*, even though the water met all existing state and federal standards for drinking water in effect at the time. This outbreak, more than any other, focused public, regulatory, and water industry attention on *Cryptosporidium* in particular, and on the need for more effective testing, better regulations, infrastructure financing, transparency, and enforcement for water quality in general.

A year later, *Cryptosporidium* infected thousands of people in Las Vegas, Nevada. Again, the water quality met or exceeded the state and federal standards for drinking water. In the Las Vegas case, the state-of-the-art water treatment plant was in better operating condition than the one in Milwaukee.[127] Susan Goldstein and her co-authors concluded that these outbreaks revealed the need for more surveillance for cryptosporidiosis, and guidelines for the prevention of the water-borne infection specifically among vulnerable populations, including people infected with human immunodeficiency virus (HIV). These and other smaller outbreaks have also highlighted the need for high quality operations, technical services, and training to provide safer water.

3.3.2 Cryptosporidium Outbreak in Milwaukee, 1993

During March and April of 1993 in Milwaukee, Wisconsin, a water-borne outbreak of *Cryptosporidium parvum* (protozoan/parasite) affected an estimated 403,000 people and hospitalized 4,400.[128] This was the largest water-borne disease outbreak in the United States since recordkeeping began in 1920.[129] At least 69 deaths, and possibly as many as 100 or more, resulted from the outbreak. About 85% of the people whose deaths were partially attributed to cryptosporidiosis

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waterborne outbreak in Milwaukee, Wisconsin," *American Journal of Public Health*, vol. 87, no. 12 (December), pp. 2032–35; William MacKenzie, Neil Hoxie, Mary Proctor, Stephen Gradus, Kathleen Blair, Dan Peterson, James Kazmierczak, David Addiss, Kim Fox, Jan Rose, and Jeffrey Davis, 1994, "A massive outbreak in Milwaukee of *Cryptosporidium* infection transmitted through the public water supply," *The New England Journal of Medicine*, vol. 33, no. 3 (July 21), pp. 161–67.

[127] Susan Goldstein, Dennis Juranek, Otto Ravenholt, Allen Hightower, Debra Martin, June Mesnik, Sean Griffiths, Angela Bryant, Rick Reich, and Barbara Herwaldt, 1996, "Cryptosporidiosis: an outbreak associated with drinking water despite state-of-the-art water treatment," *Annals of Internal Medicine*, vol. 124, pp. 459–68.

[128] William Mackenzie, Neil Hoxie, Mary Proctor, et al., 1994, "A massive outbreak in Milwaukee of *Cryptosporidium* infection transmitted through the public water supply," *The New England Journal of Medicine*, vol. 331, no. 3 (July 21), pp. 161–67.

[129] Michael H. Kramer, Barbara L. Herwaldt, Gunther F. Craun, Rebecca L. Calderon, and Dennis D. Juranek, 1996, "Waterborne disease: 1993 and 1994," *Journal of the American Water Works Association*, vol. 88, no. 3, pp. 66–94.

suffered from acquired immune deficiency syndrome (AIDS).[130] There is also evidence that HIV-positive people who suffered cryptosporidiosis during the outbreak were at a higher risk of death within a year of exposure.[131] This outbreak resulted in widespread reassessment of water-borne disease threats and to changes in the regulation of water quality in the United States and beyond.

One of the city's two municipal treatment plants, the south plant or Howard Avenue Water Treatment Plant, was implicated in the outbreak. Filtration and chlorine disinfection were inadequate to remove *Cryptosporidium* oocysts from source water from Lake Michigan.

Cryptosporidium, identified as a human pathogen in 1976, presents a particularly intractable problem for water treatment for a number of reasons. The oocysts are not inactivated by the standard disinfection procedure of chlorination, and monitoring for them is expensive. Although the parasite's effects are non-life threatening for most people (and it is thought that many water-borne outbreaks are therefore never reported), cryptosporidiosis can be fatal for the immunocompromised. There is no minimum safe threshold for exposure to *Cryptosporidium* oocysts. Doses of as few as 30 oocysts are known to be sufficient to cause *Cryptosporidium* infection in some healthy persons, although others have developed no infection after higher doses. A single oocyst may be sufficient to cause cryptosporidiosis in immunocompromised individuals.[132]

A combination of factors contributed to recognition of the massive Milwaukee outbreak: widespread absenteeism among hospital employees, students, and school teachers; increased emergency room visits for diarrheal illness; and a citywide shortage of antidiarrheal drugs. The etiologic agent, *Cryptosporidium*, and the water-borne nature of the outbreak were not identified until at least two weeks after the start of the outbreak.[133] In fact, there is now epidemiological

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[130] Hoxie et al., pp. 2032–35.

[131] Nimish Vakil, Steven Schwartz, Brian P. Buggy, Charles Brummitt, Mazen Kherellah, David Letzer, Ian Gilson, and Paula Jones, 1996, "Biliary cryptosporidiosis in HIV-infected people after the waterborne outbreak of cryptosporidiosis in Milwaukee," *New England Journal of Medicine*, vol. 334, no. 1, p. 19.

[132] Food Research Institute, 1996, "*Cryptosporidium* and *Cyclospora*," Food Research Institute Briefings, November 1996. Available at the National Food Safety Database Web site, [online], [cited April 16, 2001], <www.foodsafety.ufl.edu/consumer/fr/fr002.htm>, [author's files].

[133] Ibid.

evidence that water-borne *Cryptosporidium* infection occurred for over a year prior to the massive outbreak in the spring of 1993.[134]

At the time, monitoring for C*ryptosporidium* was neither required nor common practice in the water industry, and the problem was thus discovered through disease surveillance systems rather than by drinking water testing.[135] Originally diagnosed as viral gastroenteritis, the outbreak was reported to the State Health Department on April 5, 1993. A local Milwaukee doctor ordered a parasitic analysis from a patient on April 6, and on April 7 when C*ryptosporidium* was detected in the fecal smear, local and state officials were notified and a boil water advisory was issued.[136,137]

Milwaukee Water Works draws its water from Lake Michigan. The precise source of *Cryptosporidium* in this outbreak was not identified, though possibilities included cattle wastes, slaughterhouse wastes, and human sewage. Later research on differences between strains of the pathogen have suggested, but not demonstrated, that human sewage rather than animal contamination was the source of the oocysts. During a period of high flow resulting from spring rains and snowmelt runoff, oocysts from one or more of these sources could have been transported by rivers into Lake Michigan.[138] An investigative team from the Environmental Protection Agency (EPA) that advised Milwaukee officials during the outbreak noted that severe spring storms caused the lake's turbidity and bacterial counts to rise dramatically. Before March 1993, effluent at the Howard Avenue Water Treatment Plant had previously been consistently low-turbidity (with daily averages around 0.1 NTU).[139] Turbidity in the south plant effluent was highly variable between March 18 and April 8 (peaking near 2.5 NTU), indicating an increase in particles passing through the plant. Source

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[134] R.D. Morris, E.N. Naumova, R. Levin, and R.L. Munasinghe, 1996, "Temporal variation in drinking water turbidity and diagnosed gastroenteritis in Milwaukee," *American Journal of Public Health,* vol. 86, no. 2, pp. 237–39.

[135] Kim R. Fox and Darren A. Lytle, 1996, "Milwaukee's crypto outbreak: investigation and recommendations," *Journal of the American Water Works Association*, vol. 88, no. 9, pp. 87–94.

[136] Ibid.

[137] Richard L. Guerrant, 1997, "Cryptosporidiosis: an emerging, highly infectious threat," *Emerging Infectious Diseases,* vol. 3, no. 1 (January–March).

[138] Helena Solo-Gabriele and S. Neumeister, 1996, "U.S. outbreaks of cryptosporidiosis," *Journal of the American Water Works Association,* vol. 88, no. 9, pp. 76–86.

[139] NTU are turbidity units. For comparison, current Ontario regulations set maximum allowable turbidity at 1.0 NTU for plant effluent entering the distribution system, while the new U.S. requirement is less than 0.3 NTU.

water turbidity was also high and variable during this time.[140] *Cryptosporidium* oocysts apparently passed through the treatment process into the drinking water.

A class-action suit was launched by some of those affected in the outbreak. The number of plaintiffs was eventually reduced to several hundred from the approximately 400,000 people who suffered cryptosporidiosis. The suit named the City of Milwaukee, General Chemical Corp., which sold water-treatment chemicals to the city, and Sarah Lee Corp., a former owner of a company whose slaughterhouse in 1988 had illegally dumped potentially contaminated animal wastes.[141] Sarah Lee settled in 1998 and General Chemical in 1999, leaving the city as the sole defendant.

Others, like Lawrence Gostin, Zita Lazzarini, Verla Neslund, et al., have pointed the finger of blame not at operators or polluters but at the EPA and at federal regulations, which mandated that the EPA set maximum allowable limits on a variety of water contaminants.[142] They suggest that the effectiveness of protection against C*ryptosporidium* was reduced because plant operators were altering the treatment methods to deal with lower-priority chemical contaminants. In August 1992, the facility switched from aluminum sulfate (alum) to polyaluminum chloride (PaCl) as a coagulant. This change was an attempt to raise finished water pH and decrease corrosion, reduce sludge volume, and improve coagulation effectiveness in cold water conditions. On April 2, 1993, operators attempted to manage the turbidity problem by switching back to alum as a coagulant. This precipitated a spike in turbidity until coagulant dosages could be adjusted to near-optimal. The PaCl coagulant may have posed difficulties because of a lack of historical records to assist in establishing optimum chemical doses. Short residence time at the plant and rapidly changing raw water quality may also have made it difficult to optimize coagulant doses in order to keep turbidity low. Fox and Lytle note that "[s]ubtle changes in the turbidity of a filtration plant effluent may indicate large changes in the numbers of particulates passing through the filters," and add that these particulates may include pathogens.[143]

Subsequent regulatory change in the United States and elsewhere has recognized that low turbidity and low particulate counts are key indicators of protection against *Cryptosporidium*.

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[140] Fox and Lytle, 1996 .
[141] Infobeat news online, October 12, 1998, [online], [cited May 19, 2001], <http://scout18.cs.wisc.edu/net-news/98-10/98-10-12/0011.html>.
[142] Gostin, et al., 2000, pp. 847–53.
[143] Fox and Lytle, 1996, p. 94.

Current Structure of Milwaukee's Water System

Milwaukee's water and sewer systems are a self-financing business enterprise. Milwaukee Water Works (MWW) is owned and operated by the Milwaukee Department of Public Works. Its sewage collection is carried out via a contract with a private company.

The Milwaukee Water Works conducts water purification, distribution, engineering, customer service, billing and water meter installation, and maintenance for the city. It also supplies water on a wholesale and a retail basis to neighbouring communities. Its nine wholesale customers purchase their water supply and operate their own utilities including infrastructure maintenance and billing. The four retail clients are communities that receive full water services from MWW including system maintenance and customer billing. MWW also provides billing services to West Milwaukee, which operates its own water treatment and distribution system.[144]

In 2000, MWW generated 45 billion gallons of treated water (approximately 170 billion litres of water); for comparison, the waterworks for Metro Toronto and York Region treated approximately 547 billion litres, or slightly more than three times as much water.[145]

In 1993, the Water-Health Technical Subcommittee was struck, consisting of representatives of the MWW, the Department of Public Works, Milwaukee Health Department, Milwaukee Metropolitan Sewerage District, State of Wisconsin Division of Health, and the Wisconsin Department of Natural Resources. The group meets monthly to monitor water plant operational data, review reports on watershed testing and epidemiology, and discuss water quality and public health issues. Response plans have been developed for plant irregularities or water tests showing the presence of a pathogen. The Water-Health Technical Subcommittee is to convene immediately if such an event occurs, in order to assess plant performance data (e.g., particle counts, turbidity readings), operational data (e.g., chemical dosages, maintenance underway), environmental conditions (e.g., recent rainfalls), and relevant epidemiological

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[144] Milwaukee Water Works, [online], [cited January 15, 2002], <www.mpw.net/Pages/WaterWorks.html>.

[145] Toronto, Water and Wastewater Services Division, Annual Report 1999/2000 Review, "Water … Toronto treats It with Care," (Toronto: Water and Wastewater Services Division), [online], [cited May 5, 2001], <www.city.toronto.on.ca/water/annual_report.htm>.

data. The mandate of the committee is to assess the public health implications of the information, report to the Commissioners of Health and Public Works, and make recommendations for appropriate response.

Since 1993, two major infrastructure investments have been undertaken to protect against future *Cryptosporidium* or other water-borne disease: the extension of a water intake further into the lake, and introduction of ozonation (which deactivates *Cryptosporidium* oocysts and eliminates many taste and odour problems) at both water treatment plants.

To improve source water quality for the Howard Avenue Plant, the south intake was extended 4,200 feet farther into Lake Michigan, out of the path of contamination flowing from the Milwaukee harbour. The extended intake, completed at a cost of US$11 million, began supplying water to the Howard Avenue Plant in August 1996 from 11,600 feet offshore. Ozonation was installed in 1998, through a design-build contract for US$38 million with a Milwaukee construction company, J.S. Alberici, and a Kansas City company called Black & Veatch. New filters were purchased for US$14.2 million. Particle counters were installed, and in 1998 monitoring and control systems were updated.[146] Upgrades were financed through a federal infrastructure loan as well as bonds issued by the municipality.

U.S. Regulatory Change

The magnitude of the Milwaukee outbreak, together with the apparent fact that this outbreak was caused by water from a municipal plant that was operating within all state and federal regulations, spurred the development of regulatory standards aimed at preventing *Cryptosporidium* in drinking water. It provided incentive and political capital for tighter regulation of water quality in general, and also emphasized the need for improved public health surveillance and inter-agency coordination.[147]

In August 1996, the U.S. Congress signed the *Safe Drinking Water Act* Amendments, which introduced more flexibility for operators, and set up a

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[146] Milwaukee Water Works, [online], [cited May 17, 2001], <www.mpw.net/Pages/WaterWorks.html>.
[147] U.S. Centers for Disease Control and Prevention, 1995, "Assessing the public health threat associated with waterborne cryptosporidiosis: report of a workshop," *Morbidity and Mortality Weekly Report* (June 16), vol. 44, no. 6, pp. 1–19, [online], [cited January 15, 2002], <www.cdc.gov/mmwr/preview/mmwrhtml/00037331.htm>.

US$7.6 billion system of loans and grants to help water systems meet regulatory requirements. It also required greater public notification of contaminant occurrences, and contained annual report requirements.[148] Consumer Confidence Reports, publicly reporting water quality information, came into effect in 1999.

In 1997, a federally mandated regulation was put in place requiring drinking water systems to be tested for *Cryptosporidium* once a month.

State of Water and Wastewater Facilities

Milwaukee has taken significant steps to improve the quality of its water and wastewater treatment facilities and to restore the confidence of the public in the aftermath of the 1993 *Cryptosporidium* disaster. The water-borne outbreak cost an estimated US$37 million in lost wages and productivity, as well as human suffering and death.[149] The city's initiatives to upgrade the water system cost a total of US$85 million by 1997.[150] Its quality improvement efforts involved various forms of public-private partnerships. For example, in 1997, the City of Milwaukee entered into a contract with Black & Veatch and J.S. Alberici Construction for the design and construction of ozonation facilities at two water treatment plants. The project was finished under budget by US$11 million and soon proved its worth. According to Milwaukee Water Works: "A late summer algae bloom in 1998 caused tremendous taste and odour problems for utilities along the west shore of Lake Michigan except for Milwaukee. The ozone eliminated the taste and odour of the algae resulting in very few calls from customers. Customers called to ask MWW why it did not have these aesthetic problems that summer."[151] On the public relations front, Milwaukee hired a water quality manager to inform the public about improvements in the water system. Rob Shapard observes that Milwaukee's response to the water crisis of 1993 prepared it to handle the Environmental Protection Agency's Consumer Confidence Reports requirements.[152] Water

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[148] "Safe Drinking Water Amendment," PBS online backgrounder, [online], [May 17, 2001], <www.pbs.org/newshour/backgrounders/drinking_water.html>.
[149] Velma Smith, 1994, "Disaster in Milwaukee: Complacency was the root cause," *EPA Journal* (summer), [online], [cited May 13, 2001], <www.epa.gov/docs/epajrnal/summer94/06.txt.html>.
[150] Rob Shapard, 1997, "How safe is your water?" *The American City and Country*, vol. 112, no. 6 (June), pp. 30–42.
[151] Milwaukee Water Works, 1998, "Water quality exceeds mark!" *1998 Water Quality Report*, [online], [cited May 13, 2001], <www.mpw.net/wqreport98/Pages/mainreport.html>.
[152] Rob Shapard, 1997, pp. 30–42.

officials are now well versed in the art of answering the public's questions about water quality.

Although Milwaukee has made some headway in cleaning up its drinking water, its beaches are still polluted. However, the city has improved its monitoring techniques and now posts daily water quality reports online, indicating when the beaches are closed.[153] The EPA has suggested that approximately 63% of beach closings around the country have been related to sewage and stormwater overflows.

Milwaukee Metropolitan Sewerage District (MMSD) entered into an operations and maintenance contract with United Water in 1998. The Canadian Council for Public-Private Partnerships reports that service has improved, as measured by three indicators:

- Effluent criteria: Contract requires performance levels in excess of permit levels, equating to prior MMSD performance. The contract also stipulates penalties/rewards for performance compliance.

- Asset maintenance: United Water implemented a new computerized maintenance system to link all maintenance-related activities under one unified system.

- Cost/revenue base: The revenue base for MMSD grows with increasing demand for sewage services while the cost of the contract with United Water is fixed.[154]

United Water notes that this program won the Association of Metropolitan Sewerage Agencies' Gold Award for perfect compliance with environmental permits in 1998 and 1999.[155]

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[153] Doug Hissom, 2000, "Don't go near the water," *Shepherd Express Metro*, vol. 21, no. 36 (August 31), [online], [cited May 13, 2001], <www.shepherd-express.com/shepherd/21/36/cover_story.html>.
[154] Canadian Council for Public-Private Partnerships, 2000, pp. 18–19.
[155] United Water, 2001, *Public-Private Partnerships*, [online], [cited May 11, 2001], <www.unitedwater.com/municipal.htm> .

3.3.3 Atlanta

Structure of Water Distribution Services and Use of Public-Private Partnerships

In January 1999, the City of Atlanta entered into a 20-year contract with United Water, which is partly owned by Lyonnaise des Eaux, requiring the private company to be responsible for the operation, maintenance, and management of the city's two treatment plants.

The decision to enter into a public-private partnership at that time was prompted by several factors:

- The city needed to generate about US$1 billion to upgrade the water system in order to comply with stricter state and federal regulations. The investment was necessary because the water infrastructure had been neglected for years. Only a large injection of funds could help the city avoid the US$7.2 million environmental fines that it was paying annually for inappropriate discharges.[156] Thus, water quality had begun to be seen as an economic issue and not just a quality of life issue. As *The Atlanta Journal* observed, a federal court judge had threatened to halt economic development if pollution limits for the various contaminated metropolitan waterways were not introduced by 2001 and 2002.[157]

- New federal tax legislation had been introduced two years earlier, making it legal for the city to enter into 20-year privatization agreements for its water systems. Before 1997, the maximum duration of water contracts was five years. Bill Campbell, mayor of Atlanta, explained the significance of the tax legislation change: "[It] allowed Atlanta to begin the privatization process and save ratepayers US$400 million. The reason that the IRS changes are important is because the city, in essence, gets guaranteed

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[156] Bill Campbell, 2000, "A bold, innovative approach to privatization: Lessons learned from Atlanta," *Local Government Innovation: Issues and Trends in Privatization and Managed Competition*, edited by Robin A. Johnson and Norman Walzer (Westport, Connecticut: Quorum Books), p. 238.
[157] "Keeping it clean: A task force provides options for a regional water quality plan, but water management should always be viewed as a statewide concern," 2000, *The Atlanta Journal*, September 25, p. A6.

funding of the savings."[158] This policy shift expanded the range of potential agreements as well, allowing the calculation of costs and benefits to be made over a much longer time horizon.
- The mayor's office was committed to privatization.

Experience with Water Quality As It Relates to Ownership Regimes

By entering into the US$21.4 million annual contract with United Water, the city expected that it could save at least US$400 million over the next 20 years. That money could be used to upgrade the water and wastewater systems.[159] United Water promised to improve the operation of the water plants in the first few years by

- investing in automation, meter replacement, and other capital improvements to help produce savings;
- installing computer systems that would include a maintenance management system[160] and billing and collection systems;
- installing a centralized control system, remote robots for tank inspection, and new technologies for detecting leaks.[161]

The benefits of the public-private partnership were easily seen. United Water declared in its Consumer Confidence Report that the water it supplied in 1999 "met – and often surpassed – all the health and safety standards set by the United States Environmental Protection Agency (EPA) and the Georgia Environmental Protection Division (GAEPD)."[162] In order to enhance water quality, the company

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[158] Campbell, 2000, p. 246; see also Bill Campbell, 2000, "How Atlanta entered into the largest privatization contract in North America," *Making Government Work: Lessons from America's Governors and Mayors*, edited by Paul Andrisani, Simon Hakim, and Eva Leeds (Lanham: Rowman & Littlefield Publishers, Inc.), p. 136.

[159] Julie Hairston, 1998, "Atlanta water contract signed today," *The Atlanta Constitution* (November 10), p. C6.

[160] The maintenance management system was needed to eliminate the problems with tracking and duplication of service requests. When United Water Services took over the operations of the water system, it was faced with the problem of responding to the 7,000 requests for service inherited from the water department. See Ann Hardie, 1999, "Backlog damming water company's tries at timeliness," *The Atlantic Constitution* (August 30), p. B1.

[161] Campbell, 2000, p. 247.

[162] United Water Services Atlanta, 1999, *Water Quality Report 1999* (Atlanta: United Water Services Atlanta).

had installed particle counters to monitor filter performance and switched to a safer method of chlorine addition. United Water's accomplishments were recognized in 2001, when it won the U.S. Conference of Mayors Business Council's "Excellence in Public/Private Partnership" Outstanding Achievement Award for "Leading by Example in Outreach Efforts."[163]

3.4 Europe

3.4.1 England and Wales

There is an extensive body of literature on water services in the United Kingdom. The main water supply and sewage treatment functions in England and Wales have been operated by the private sector since 1989. Some authors, like Elizabeth Brubaker, view the British experience of water privatization in a positive light;[164] others are more cautious[165] or pessimistic about its socio-economic implications.[166]

In most instances of privatization, the question of public health impacts is not central to the debate. Instead, the policy is usually promoted and contested in terms of economics, values, and ideologies. Initially, the privatization of water in England and Wales was no exception. But as negative health impacts became apparent, they captured public attention and became a focal point for the more broad-based public displeasure over water privatization. In particular, the suite of related issues – water poverty, public health, and economic access to water – became a touchstone among those concerned to protect universality of water provision in the face of private ownership.

Nevertheless, there have been clear improvements in the quality of water since privatization, and the effects of changes in the ownership, management, regulatory, and policy regime as they relate to water quality and public health merit consideration.

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[163] United Water, 2001, "Public-private partnerships," *United Water: Municipal Info* [online], [cited May 11, 2001], <www.unitedwater.com/municipal.htm>.

[164] Elizabeth Brubaker, 1999; Elizabeth Brubaker, 2000, "Water and wastewater privatization in England and Wales," in Canadian Council for Public-Private Partnerships, 2000, pp. 14–17.

[165] Karen Bakker, 2000, "The greening of capitalism? Privatising water in England and Wales," draft, (American Association of Geographers meeting, Pittsburgh, 2000).

Structure of Water Distribution Services

John Hassan describes three different models of "form of ownership, industrial structure and regulatory regime" that have existed in England and Wales in the past few decades.[167] He refers to the pre-1973 model as a "devolved system of control and ownership … with a multitude of mainly local authorities executing water supply and sanitary responsibilities."[168] Structural reform in 1973 created "very large semi-nationalised authorities based around river basins." The *Water Act* of 1989 "left this structure intact, but the ownership and regulation of the industry were transformed: strictly regulated private monopolies (based on the former authorities) were brought into being."[169]

The following is a detailed history of transformations in the water and sewage sector in England and Wales. The sea change in public and private roles is considered from the point of view of public health implications. Ironically, privatization in the British case did not involve competition in its usual guise. In 1989, the Thatcher government decided to give all the English companies a regional monopoly for 25 years.[170] The Office of Water Services (OFWAT) introduced the concept of "comparative competition" in the 1990s, whereby companies' activities and operational performance are compared in order to identify poorly performing companies and facilitate the delivery of better services at a lower cost.[171]

The government introduced privatization of the water industry as part of a larger privatization program and promoted it as a financially rational approach. European Union directives on drinking water quality and environmental protection were raising the performance standards of the industry. These

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[166] Canadian Union of Public Employees, 2000, *Down the Drain: Privatized UK Water No Model For Canada*, CUPE's 2001 Annual Report on Privatization [online], [cited April 7, 2001] <www.cupe.ca/issues/privatization/showitem.asp?ID=2411&cl=22>; Léo-Paul Lauzon, Michel Bernard, François Patenaude and Martin Poirier, 1998, "L'erreur britannique: une leçon pour le Québec," *Privitisations: L'autre point de vue*, (Montréal: les Éditions du Renouveau québécois et la Chaire d'études socio-économiques de l'UQÀM), pp. 83–91.

[167] John Hassan, 1996, "England and Wales – an historical perspective," *The European Water Environment in a Period of Transformation*, edited by John Hassan, Paul Nunn, Judith Tomkins, and Iain Fraser (Manchester: Manchester University Press), pp. 100–21.

[168] Ibid.

[169] Ibid.

[170] Goudriaan and Hall, 1997.

[171] U.K. OFWAT, 2000b, *Comparing the Performance of the Water Companies in England and Wales in 1998-99 with Water Enterprises in Other Industrialised Countries* (Birmingham: OFWAT, September), p. 3 [online], [cited April 10, 2001], <www.ofwat.gov.uk>.

directives, together with a history of chronic under-investment in the leaky, aging water infrastructure system, led to a need for heavy infrastructure investments. The public utilities, constrained by strict debt limitations together with price caps on the water rates they could charge, were deemed unable to meet the need for heavy investments. Privatization, according to the Thatcher administration, would increase the sector's efficiency while raising the capital necessary for these investments.

Much of the initial debate about privatization, and the subsequent analysis of its success or failure, has been framed within this economic perspective. Discussion, however, began to focus on the distributional impacts of privatization, as well, as both prices and disconnection rates rose. Public health was affected – notably, the return of cholera to England and Wales.[172] This factor became central to the public debate about privatization during the years immediately following its introduction. However, there has been a dramatic improvement in water quality since privatization, driven by the stringent EU directives and greater public scrutiny.

Privatization has been accompanied by changes in water regulation arrangements. Although the responsibility for setting many of the new water quality standards has been reallocated to the supranational level of the European Union, regulation and enforcement have remained at the national level, and implementation has devolved to the region. The national government, having divested itself financially of the water industry, maintains control over regulation of health, environment, and resource management aspects through the creation of autonomous regulatory bodies. Privatization did not free the government from political responsibility for the functioning of the nation's water and sewerage systems.

The debate about public health and water privatization in England and Wales was shaped by the nation's historical experience with water and wastewater service provision.

History of Water Services in England and Wales

As in areas of continental Europe, the systems that provide water to contemporary urban centres in England and Wales are largely a legacy of public undertakings dating from the Industrial Revolution. In Europe's rapidly growing

[172] Colin Ward, 1996, *Reflected in Water: A Crisis of Social Responsibility* (London: Cassell).

towns, the urban poor were faced with crowded, unhygienic living conditions and contaminated water. Water supply and sanitation networks evolved as a government response to epidemics of cholera and other diseases.

A growing understanding of water-borne disease in the mid-1800s created the impetus for public intervention in water systems. An iconic moment in the history of water systems as a public health concern occurred in London in 1854, when Dr. John Snow traced a cholera outbreak to a particular water source and convinced the City of London to remove the handle from the Broad Street Pump.

Private water companies had been set up throughout the 17th and 18th centuries in urban areas where a sufficiently large and dense proportion of the population could afford the prices for set-up and maintenance. During this era of laissez-faire capitalism, water delivery was seen as a normal commercial venture. These companies filled in or covered over the open water networks, which had supported a variety of water uses for centuries, thus monopolizing water services.[173]

Under private control, water supply was sporadic, with selective rather than universal subscription. The poor bought water from private vendors in a few large cities, or collected it by bucket from wells, rivers, and public pumps (for which they often paid). The very poor begged or stole water. Sanitation systems were inadequate or absent altogether. Successive epidemics highlighted the public health implications of this arrangement.[174] Universal provision came to be understood not only as a health issue, but also as a social and economic imperative. The medical establishment and social reformers affirmed a link between clean material surroundings and moral rectitude. Water supply was critical for industrial production and a functioning labour force.

Private sector provision did not offer adequate access to water for all members of the community; therefore, Parliament enacted new legislation to allow municipalities to enter the business of water services. In the late 19th and early 20th centuries, the public sector began to crowd out the private operators, although the two continued to coexist. By the early 20th century, local authorities supplied approximately 80% of the water that was consumed. Public water supply systems expanded both spatially and in terms of numbers of

[173] Karen Bakker, 2000.
[174] Ibid., p. 8.

connections. By 1914, over 96% of dwellings in London were connected to a water supply, compared with only 17.5% for Paris.[175]

In the late 19th and early 20th centuries, responsibility for water resources was largely delegated to the Ministry of Health. Public health acts detailed the general powers and responsibilities of local authorities for water supply.

The mix of local authorities and private companies (called "statutory water only companies") persisted throughout most of the century. Yet a number of factors highlighted the limitations of fragmented local authority: pollution concerns mounted, as the same local authorities responsible for pollution from sewage works were the authorities left to enforce water pollution laws; a severe drought in the mid-1930s highlighted the limited water storage capacity of many of the smaller local supply systems; the post-war extension of networks in rural parishes required the spreading of costs over the ratepayers of the entire district.

During the post-war era, water provision was approached as a welfare service meeting basic needs. Domestic water was not metered. Water rates were, instead, based on the value of property (an indicator of ability to pay), and water supply served as an instrument of social policy for wealth redistribution. "This practice was underlain by an assumption that public utilities met basic needs, and supplied a service (provision of reliable, regular water supply), rather than a commodity (a specific amount of water at a specific time in a specific place)."[176] Parliament imposed limits on water charges and company earnings for both public and private water companies. The financial performance of the private water companies was much more tightly regulated than that of ordinary commercial firms. Although nominally municipal or private, the water industry was regulated to function like other nationalized industries.[177]

Implementing the 1973 *Water Act*, the government, in 1974, nationalized the country's public water systems and consolidated them into ten regional water authorities (RWAs). The geographic boundaries of these authorities corresponded to the boundaries of the nation's watersheds rather than to administrative or political boundaries. The multiplicity of public agencies providing water and sewerage services were dissolved. Local governments had

[175] Ibid., p. 9.
[176] Ibid., p. 11.
[177] Ibid., p. 11.

minority representation on the new authorities' boards (removed altogether under provisions of the 1983 *Water Act*).

Private water supply companies continued to function as licensed agents of the RWAs.[178] They supplied approximately one-quarter of the population and one-fifth of total consumption. Under the new water governance system, these companies purchased water supplies from the regional agencies that supervised them.[179]

In addition to water supply and sewerage, the RWAs were responsible for flood control and recreational uses of their basin's water bodies. Their major activities, however, were the treatment and distribution of water, the collection of wastewater, and the treatment of sewage. Each water authority was responsible for monitoring, policing, and prosecuting itself, as well as the remaining private water companies within its jurisdiction. Water company expenditures were severely limited by the central government. The results of this arrangement were decreased investment and deteriorating water quality.

Privatization and Regulatory Restructuring

John Hassan argues that the two factors that best explain the decision of the Thatcher administration to pursue privatization were the need "to resolve the persistent problems of control, management and finance,"[180] and the need to make UK water quality meet the standards required by European Union directives after decades of under-investment in water infrastructure. As a result of privatization, the water industry gained "certain new managerial freedoms, the creation of uncontested markets and escape from public-sector cutbacks," but it was forced to accept "the establishment of public watchdogs, with extensive powers to intervene on behalf of consumer and environmental interests."[181]

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[178] These water only companies continue to coexist with contemporary water-and-sewerage companies, although takeovers by water-and-sewerage companies as well as mergers have reduced their numbers, from 29 in 1973 down to 16 in 2001.

[179] Isabelle Fauconnier, 1999, "The privatization of residential water supply and sanitation services: social equity in the California and international contexts," *Berkeley Planning Journal*, vol. 13, pp. 37–73.

[180] John Hassan, 1996, "England and Wales – an historical perspective," *The European Water Environment in a Period of Transformation,* edited by John Hassan, Paul Nunn, Judith Tomkins, and Iain Fraser (Manchester: Manchester University Press), p. 116.

[181] Ibid.

The decision by the Thatcher administration to sell off the ten water boards that ran water services in England and Wales was announced in 1985. This sale, part of a larger privatization program in the United Kingdom at that time, was carried out in 1989. The publicly owned water authorities, including the infrastructure network and all other assets, were floated on the stock exchange as companies whose main subsidiary provided water and sewerage services. This wholesale sell-off to shareholders of the asset stock was unprecedented in water history.

In order to ensure that the flotation of shares was a success, the government sold the utilities at a loss, eliminating £4.95 billion in water-board debt and paying an extra £1.5 billion as a "green dowry" of subsidies for infrastructure upgrades. Taking this debt write-off into account, the proceeds of the sale were *negative* £1.6 billion. The shares were oversubscribed.[182]

According to the *New Internationalist* magazine this move to privatize water, unpopular in public opinion polls and condemned by farmers, heavy industry, and the European Community, was lobbied for by the British turnkey contractors selling water systems in developing countries.[183] In the sale of British water utilities, some of these contractors entered the British water market and have since been able to use their domestic expertise as leverage to expand overseas activities, thus profiting from the growth of international development projects in water and sanitation. Large French water companies also bought up several water boards.[184]

The *Water Act* of 1989 removed regulatory functions from the water authorities and instituted three new agencies to regulate the industry.[185] The Drinking Water Inspectorate (DWI) is responsible for ensuring that water companies supply water that meets all water quality regulations and is safe to drink. It also

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[182] Jean Shaoul, 1997, "A critical financial analysis of the performance of privatized industries: the case of the water industry in England and Wales," *Critical Perspectives on Accountability*, vol. 8, no. 5 (October), pp. 479–505; David S. Saal and David Parker, 2000, "Productivity and price performance in the privatised water and sewage companies of England and Wales," Report RP0029 (November), [online], [cited May 2, 2001], <http://research.abs.aston.ac.uk/wpaper/0029.pdf>.

[183] Turnkey contracts are described as water projects in which the private company, rather than waiting for a call for bids, approaches the potential customer (a government or government agency) to design and build water systems, which are then turned over to the customer to operate. See Geoffrey Baker, 1990, "The water privateers," *New Internationalist*, vol. 207, pp. 8–9.

[184] See Mairi Maclean, 1991, *French Enterprise and the Challenge of the British Water Industry* (Aldershot: Avebury).

investigates incidents that could affect water quality and complaints from consumers.[186] The Environment Agency (EA), formerly the National Rivers Authority (NRA), has responsibility for environmental regulation and implementation of European Community directives.[187] These standards, to a large extent, determine the investment program necessary for the companies. The EA also performs some operational functions relative to environmental protection, such as flood control initiatives. The Office of Water Services (OFWAT) is the economic regulator for the water industry.[188] All three agencies report to the Water and Land Directorate of the Department of the Environment, Transport and the Regions (DETR), which coordinates and sets water policy.

OFWAT's task is to protect the water companies from the ultimate sanction of the market, bankruptcy, while promoting efficiency and protecting customers from overcharging by the regionally monopolist companies. The government chose not to employ a policy of limiting rates of return and/or restricting dividends, which had until then been the methods for regulating the statutory water only companies. Instead, a new price capping formula was introduced, which uses "yardstick competition" between the ten water and sewerage companies as a surrogate for competitive market pressures. Price capping was intended to generate efficiency gains as well as pass these gains to consumers via lower prices in the future.

Analyses of the financial performance of the privatized water industry are deeply critical. The major cost reductions achieved by the utilities were through employment downsizing, which meant significant job losses.[189] Shaoul's analysis of industry performance until 1995 determined that privatization has failed to harness the profit motive to the benefit of water consumers. Greater efficiencies did not occur, since significant efficiency increases prior to privatization had left little room for improvements to efficiency without jeopardizing service levels and infrastructure integrity. OFWAT set price caps based on information submitted by the companies themselves on their projected expenditures,[190] but did not compare actual and expected expenditure. Cost savings by the

[185] For the portion of the *Water Act* 1989 that details the new regulatory bodies, see: <www.hmso.gov.uk/acts/acts1989/Ukpga_19890015_en_1.htm>.

[186] Information on the Drinking Water Inspectorate is available at <www.dwi.detr.gov.uk/>.

[187] Refer to the Environment Agency Web site at <www.environment-agency.gov.uk/>.

[188] For more information, refer to the OFWAT Web site at <www.ofwat.gov.uk/>.

[189] Fauconnier, 1999.

[190] Saal and Parker (2000) determined that such a formula creates incentive to overcapitalize on infrastructure and, in particular, to substitute infrastructure for labour wherever possible.

companies relative to their projections were not clawed back; thus savings were not passed on to the customers. The distributional effects of the privatization were to transfer wealth out of the industry to shareholders. In fact, in the first four years of private ownership, the parent companies had paid out dividends greater than the total original purchase price of £5.25 billion. Price caps, initially lax to guarantee industry profitability, were reset more tightly by OFWAT in April 1995 and again in April 2001.

The water companies remained highly profitable, outperforming the market, but water users experienced sharp price increases, especially in the period before 1995.[191]

Both the pre-privatization restructuring of the industry and post-privatization changes in operations involved considerable job shedding. From the 1975 high of 6,000 employees, staff was reduced to 4,900 in 1989, and further reduced to 3,300 by 1995. Much of the later downsizing was achieved by outsourcing.[192]

The implications of the removal of cross-subsidies and the increased price of water included, or were perceived to include, negative effects on public health as many of the poor experienced new economic limits to their water access.

Water Quality Changes and Other Health Effects

The water suppliers, OFWAT, and the Drinking Water Inspectorate (DWI) have thoroughly documented improvements in the quality of drinking and bathing water since the start of the new water regime.[193] For example, the DWI has reported that, "the number of tests failing the required standard has dropped dramatically from 32,322 in 1990 to only 6,245 in 1998."[194] There

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[191] Shaoul, 1997; Saal and Parker, 2000.

[192] Karen J. Bakker, 2000, "Privatizing water, producing scarcity: The Yorkshire drought of 1995," *Economic Geography*, vol. 76, no. 1, pp. 4–27.

[193] For example, see J.K. Banyard, 2000, "10 years of UK water privatisation – a stakeholder review," in World Water Council, *Changing Course: Report of the Technical Sessions*, 2nd General Assembly (Marseilles: World Water Council, October 18–20), pp. 36–40, [online], [cited January 15, 2002], <www.worldwatercouncil.org/reports.htm>.

[194] UK, Department of the Environment, Transport and the Regions, 2000, *Drinking Water Inspectorate: New EC Directive will make drinking water quality even better*, press notice 0079 (February 4), [online], [cited May 14, 2001], <www.press.detr.gov.uk/0002/0079.htm>. See also UK, Department of the Environment, Transport and the Regions, 2000, *Drinking Water Inspectorate: water guardian marks first ten years*, press notice 0011 (January 11), [online], [cited May 14, 2001], <www.press.detr.gov.uk/0001/0011.htm>.

are several possible explanations for the steady improvement in water quality since privatization:

- increases in the cost of water have meant that more money is available for infrastructure investments[195]

- privatization has led to an increasingly stringent regulatory regime in England and Wales[196]

- British legislators have adopted tough European environmental standards

- consumers and environmental groups have become more effective as lobbyists for water quality improvements since strict mandatory standards have been introduced, environmental quality data is readily available, and the European Commission has become another site to which citizens may take their quality demands.[197]

All of these factors were significant.[198] Although the number of prosecutions and convictions for providing "water unfit for human consumption" increased immediately after privatization, this fact was due more to changes in regulatory zeal and public expectations concerning water quality than to an increase in incidents of water quality failure.

Neil Ward provides an interesting case study of the improvements to beaches and bathing water quality demanded by British environmental groups such as Surfers Against Sewage in the 1990s.[199] Marshalling medical evidence of health impacts suffered by surfers along the nation's coasts and using empirical information on water quality generated by implementation of the European Bathing Waters Directive, the group has been calling for better enforcement of the directive to protect seawater from sewage contamination. The case study

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[195] The increases in the cost of water are documented in Emanuele Lobina and David Hall, 2001, *UK Water privatization – a briefing* (London: Public Services International Research Unit, February), p. 6, [online], [cited May 13, 2001], <www.psiru.org>. The infrastructure investments are recorded in Elizabeth Brubaker, 2000, "Water and wastewater privatization in England and Wales," in Canadian Council for Public-Private Partnerships, 2000, p. 15.

[196] Ibid., p. 462.

[197] Henry Buller, 1996, "Privatization and Europeanization: The changing context of water supply in Britain and France," *Journal of Environmental Planning and Management*, vol. 39, no. 4, p. 475.

[198] Shaoul, 1997.

[199] Neil Ward, 1996, "Surfers, sewage and the new politics of pollution," *Area*, vol. 28, no. 3, pp. 331–38.

illustrates two phenomena relevant to understanding recent changes in the drinking water industry of England and Wales. The first is the increased openness of the water policy process to public participation and the increased politicization of what was once a more closed, expert system. A second noteworthy aspect of this case is the role of the supranational government: the European Commission has not only raised the standards for water quality (in drinking water as well as bathing water), but Europe also provides "a new type of "court of appeal" for environmental pressure groups to pursue their grievances, "by-passing" the central government where need be."[200]

Prices have increased rapidly since privatization. Some estimates put the increase in average household water bills at between 20% in the first three years alone,[201] while others have calculated average water price increases at 40% in real terms over ten years.[202] All agree that price increases varied significantly between regions.

The distributional implications of increased water charges have received widespread attention from the media, non-governmental organizations (NGOs), and regulators. As bills have risen, lower-income families have seen a greater increase than higher-income families in the proportion of income spent on water.[203] Save the Children Foundation and other health and child-poverty NGOs drew public attention to the health-endangering measures taken by low-income families to conserve water. The British Medical Association condemned the privatization, declaring that a sharp rise in reported dysentery rates in the early 1990s was attributable to the rise in water prices.[204]

One of the immediate outcomes of the privatization was a substantial increase in the number of people threatened with disconnection or actually cut off from water service for failure to pay their bills. The number of disconnections rose from 480 in the year before privatization to a high of 21,282 in 1992.[205] Water rationing and disconnections among the poor had serious health implications, including a sixfold increase in the incidence of cholera.[206] The

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[200] Ibid., p. 334.

[201] Peter Saunders, 1995, "Consumers and privatization: The case of the water industry," *Privatization and the Welfare State: Implications for Consumers and the Workforce,* edited by Philip Morgan (Aldershot, UK: Dartmouth), p. 268.

[202] Saal and Parker, 2000.

[203] Karen Bakker, 1999, "The illogic of efficiency: Water regulation and social justice in England and Wales," *Economic Geography* working papers, Oxford University.

[204] Ibid.

[205] Farid et al., 1997; Bakker, 1999.

[206] Colin Ward, 1996, *Reflected in Water: A Crisis of Social Responsibility* (London: Cassell).

parliamentary campaign against water disconnection for non-payment of bills revealed figures showing a threefold increase in dysentery in a region where water disconnections had increased threefold during that period.[207]

Disconnection rates became a source of negative publicity for the water industry. OFWAT explicitly directed the water companies to find alternative payment strategies for consumers and to reduce disconnection rates. One response by the water companies was the introduction of Budget Payment Units (BPUs), a metering and payment system installed in customers' homes which allows self-disconnection for non-payment invisible to national cutoff statistics. I.C.R. Byatt, the director general of water services, decided, in accordance with a court ruling, that he would be forced to take enforcement action against water companies that used BPUs to cut off supplies.[208]

Recent Improvements in Water Quality and Services

Water cut-off frequency continued to fall between 1992 and 1999.[209] The *Water Industry Act 1999* brought in several new protections for consumers. It immediately prevented water utilities from cutting off domestic service for non-payment of water bills, as well as providing government funding for households meeting certain criteria related to high water needs because of family size or medical conditions. Companies were directed to provide optional, free meters for customers. No customer is obliged to accept metering, and any who choose metering (rather than property-value-based charges) are allowed 12 months in which to decide to revert to non-metered charges.[210]

A number of policies have recently been imposed on the water industry in attempts to improve the safety and security of water supplies. In part, this is a response to European Union directives. The Labour government has also been responsible

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[207] Meg Huby, 1995, "Water poverty and social policy: A review of issues for research," *Journal of Social Policy,* vol. 24, no. 2, pp. 219–36.

[208] I.C.R. Byatt, 1998, "MD 132 to managing directors of all water and sewerage companies and water only companies," *Budget Payment Units: Judicial Review, March 11* [online], [cited November 20, 2001], <www.ofwat.gov.uk/letterto.htm>.

[209] UK OFWAT, 1999, "Water disconnections fall for the seventh year running" (June 17) [online], [cited May 2, 2001], <http://213.38.88.195/coi/coipress.nsf/057df0a61a262f0880256735005a0868/f4f913fa4496567e80256793003eab3e?OpenDocument>.

[210] As of 1999, 17% of domestic users were metered. See U.K. OFWAT, 2000e, "Opting for a meter," Information Note No. 46 (June) [online], [cited January 15, 2002], <www.ofwat.gov.uk/pdffiles/in46.pdf>.

for initiating a number of policy changes in the water sector since 1997. Increased public awareness of water quality issues, initiated in part by the debate over privatization, has contributed to the pressure for responsive, accountable, and equitable provision of high-quality water. Recent changes include these:

- In 1999, a new policy helped the water poor through government subsidies, while outlawing disconnection for their failure to pay.

- Metering for households is at the request of domestic consumers.

- As of June 30, 1999, the United Kingdom was the first in the world to impose daily mandatory continuous testing for *Cryptosporidium* oocysts in all plants not meeting stringent exemption criteria (such as filter-to-waste treatment). There is now a legally enforceable maximum (10 oocysts/100 L), with criminal liability for companies failing to comply. This was the DWI's response to a series of small outbreaks of cryptosporidiosis, and in particular to a legal case in which the court ruled that Three Valleys Water could not be convicted because evidence gathered by an outbreak-investigation team is not admissible in court.[211] The water provider had to pay compensation to the affected households in North London but DWI was unable to prosecute.[212,213] Mandatory daily testing is an unusually expensive and unwieldy requirement, and is not emulated by Australia and the United States, who have had the most difficulties with *Cryptosporidium.*

- In March 2000, a *Competition Act* came into effect to deal with anticompetitive practices by water companies. In an attempt to bring direct competition to the industry, the act opened water supply systems to new entrants through common carriage, that is, by allowing multiple water suppliers to use the same distribution network. At present, common carriage is limited to large-volume users (industry, hospitals, and the like).

- OFWAT's most recent review of price caps has further lowered the rate of increase of water tariffs.

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[211] Christopher K. Fairley, Martha I. Sinclair, and Samantha Rizak, 1999, "Monitoring not the answer to *Cryptosporidium* in water," *The Lancet,* vol. 354, September 18, p. 967.

[212] Emanuele Lobina and David Hall, 2001, *UK Water privatization — a briefing* (London: Public Services International Research Unit), February, p. 20, [online], [cited May 13, 2001], <www.psiru.org>.

[213] UK, Department of the Environment, Transport and the Regions, 2000, *Drinking Water Inspectorate: New EC Directive will make drinking water quality even better*, press notice 0079, February 4, [online], [cited May 14, 2001], <www.press.detr.gov.uk/0002/0079.htm>.

- Although the number of prosecutions for providing water unfit for human consumption has been far higher post-privatization, this is not necessarily evidence of increased incidence of substandard water. Water quality, rather, has improved dramatically in the years since privatization, largely in response to DWI and EA enforcement of European Commission directives. Prosecution rates can be understood, in part, as symptomatic of increased regulatory and public vigilance in enforcing increasingly stringent quality regulations.

Yorkshire Drought of 1995

During the summer of 1995, reservoirs in the West Yorkshire region of England ran dry.[214] The failure of the private company in charge of water supply to maintain a well-functioning system was the most negative public-relations event experienced in the English and Welsh water industry since privatization. The Yorkshire drought became emblematic of problems in the privatized water system and motivated changes in the regulation and management of the industry as a whole.

History of the Drought

The winter of 1994–1995 was extremely wet, with above average rainfall filling reservoirs and raising groundwater levels. Yorkshire Water Services (YWS), the private company serving the region, began early in the summer of 1995 to supply water from upland reservoirs in West Yorkshire. This action saved on costs of pumping from rivers by a gravity-fed system; however, it resulted in drawing down reservoir levels.

In the summer of 1995, YWS paid a special dividend of £50 million to its parent company, Yorkshire plc. Nevertheless, it invested little to address growing leakage problems, or to mitigate the narrow margin between available supply and predicted demand (known as "headroom"). Rainfall in West Yorkshire was uncharacteristically low and temperatures unusually high that summer, and, as

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[214] The account above follows that given by Karen J. Bakker, 2000. For other accounts of the drought, see G. Haughton, 1998, "Private profits – public drought: The creation of a crisis in water management for West Yorkshire," *Transactions of the Institute of British Geographers*, vol. 23, no. 4, pp. 419–33; Karen Bakker and G. Haughton, 1999, "Exchange: Privatizing water, producing drought," *Transactions of the Institute of British Geographers,* vol. 24, no. 3, pp. 367–78.

water demand rose, reservoir levels fell rapidly. The water grid was set up to pump water from the normally wet west to the drier east, so no mechanism was available to supply water to parched areas.

Throughout the summer, YWS resisted declaring any extensive program to reduce leakage or planning any major improvements to the supply grid. Instead, it attempted to encourage conservation through advertisements to domestic customers as well as a much pilloried letter to business customers asking them to consider relocating outside of the Yorkshire region. In August, YWS imposed a garden hose ban in the west and north of the region, covering more than half of its 4.5 million customers. The company applied for special permits to allow increased river abstraction above licensed levels, six weeks after the company's own guidelines specified. River flows in some areas were reduced to all-time lows, which damaged the river ecosystems.

As rainfall levels in autumn remained below average, the company began to erect standpipes (public water taps to serve streets or neighbourhoods) in some areas of West Yorkshire. With the ensuing public outcry and incidents of vandalism, rota cuts (periodic cut-offs of domestic supply) were decided on instead, and YWS applied for a permit to institute such cuts. Meanwhile, in an attempt to avert the cuts, water tankers were employed from September through January to refill West Yorkshire's reservoirs. At the height of this operation, 700 trucks were in use 24 hours a day. Non-essential outdoor water uses were banned. Nevertheless, demand soared. Public officials warned of potential health epidemics and fire hazards, while schools and hospitals made emergency plans in case of a complete water supply failure.

In January, reservoir levels improved and the company withdrew its application for rota cuts. Infrastructure improvements were begun. Through the winter of 1995–1996, reservoirs remained low in west and south Yorkshire, and customers experienced problems with low pressure and poor water quality. The company added to public resentment by announcing an annual price increase of 5.6%, the maximum that OFWAT would allow.

Drought orders were extended across the entire Yorkshire region in April, and the company announced a £70 million emergency package of infrastructure investments to win back customers' confidence. It also announced a better-than-expected 14% increase in pre-tax profits, totalling £162.2 million, with dividends rising accordingly. In May, YWS applied for an extension to the existing drought order. The company's capital expenditure program was

expanded. The company was also ordered by OFWAT to reduce its price increases in subsequent years, and to compensate customers whose home or business water supply had been cut off. The drought order stayed in effect throughout the summer and was lifted in late autumn.

According to two independent inquiries into the drought, the company was guilty of mismanaging water resources and supply. Yet throughout the drought and after its end, YWS's share prices remained healthy. In November 1996, YWS's parent company announced a 10% increase in its interim pre-tax profits.

Regulatory Failure and Private Underinvestment

Analyses of the Yorkshire drought suggest a number of points of failure in the water regime:

- OFWAT employs a price capping system for economic regulation, rather than limiting rates of return. This system is intended to create a motive for efficiency, but in practice it can have a number of undesirable effects.

- More specifically, the water and sewage companies engage in a regulatory game with OFWAT to determine water tariffs. By maximizing forecast expenditures, and minimizing forecast revenue (e.g., by underestimating future water demand), companies maximize the predicted shortfall between projected income and expenditure. The regulator must allow increases in water bills, above the rate of inflation, in order to meet this shortfall. YWS's demand forecasts were consistently below actual demand, though usually only slightly.

- Because economic regulation is periodic, there is also an incentive for the industry to follow a cyclical pattern of investment and to defer capital investments as long as possible. Had improvements to the supply grid been implemented even six months sooner, rota cuts and tankering would not have been necessary.

- The company failed to meet its own leakage targets.

- Some water users, blaming the company for the drought, were motivated to resist rather than comply with requests for voluntary conservation. This

suggests that attitudes about water, and hence water-use behaviour, are changed by the re-casting of water users as customers rather than citizens.

- Both the company and the regulators failed to anticipate the drought. YWS relied on climate records which recorded the fairly hydrologically steady period of the 1930s to the mid-1970s, and ignored the droughts of 1929, 1933, and 1974. Although YWS had applied for garden hose bans and drought orders in nearly every year since privatization – and although company standards specified that hose bans should be applied no more than one in eight years and drought orders no more than one in 40 – YWS's hydrologists chose not to update rainfall records in the early 1990s. The frequent drought orders were seen as random occurrences, not statistically inconsistent with the assumption of climatic stability. Thus YWS continued to operate with insufficient margin of supply over demand until 1995 when the system failed.

- Poor decision-making appears to have been related to management restructuring within the utility, together with a loss of in-house expertise and capacity as the company adopted policies of outsourcing and downsizing. The employee profile of YWS managers changed from managers and engineers who had spent their careers in the water industry to professional managers from outside the industry. The flow of information in the company was impaired. The new management culture included an increased focus on financial efficiency at the expense of technical efficiency and resource conservation.

While water quality improved after privatization, resources and associated infrastructure were neglected in the first several years after privatization. Regulators and water utilities were focused on improving water quality and corporate efficiency, not on security of supply. Regulatory policies, aimed at minimizing price to consumers, promoted a high-revenue and low-capital investment program by water companies.

The Yorkshire drought served as an emblem of the failures of such a system and was used to legitimize changes in regulatory, management, and institutional framework. The government, the water industry, and regulators were forced to re-examine water management. The Labour government responded by calling a Water Summit in 1997 to discuss water policy, and instituted a windfall tax on privatized utilities. OFWAT and the EA have altered their resources strategy to take into account both climate change and increased supply headroom.

Although privatization was intended to remove companies from political interference and vigorous regulation, perceived company mismanagment and regulatory failures (such as the Yorkshire drought), together with greater openness and participation in the policy process, have resulted in increased public and government scrutiny.

The Yorkshire drought became a symbolic event, invoked by all stakeholders in the debate over the English and Welsh water system.

Lessons Learned from the English and Welsh Experience

The full privatization of the English and Welsh water industry is frequently cited as paradigmatic in the water literature; yet, more than a decade after the privatization was carried out, its model has not been widely emulated. Chief among the problems created by the dramatic shift in ownership has been an ongoing inclination on the part of water providers to put profits above social responsibility. Regulators have, over the years, responded to these problems and regulations have tightened. The regulators became more specific concerning infrastructure investment plans, and less generous in capping chargeable rates. Testing requirements and regulated limits have been imposed on *Cryptosporidium.* Because of the unwieldiness and questionable utility of such testing, other countries have managed quality through voluntary programs and turbidity limits.

Such criticisms notwithstanding, an analysis of the UK experience shows that the public enjoys cleaner, safer water now than at any time in the past. The improvements owe much to the following:

- strict regulations on treatment, source protection, and testing imposed by the EU, and instituted nationally by regulatory bodies that are independent of the economic concerns and objections raised by the affected companies. Sometimes this led to policies which are by some measures inefficient, but which do succeed in addressing the requirements of public health and the public interest in clean affordable water and a clean environment;

- government commitment to protect the public from monopolistic pricing, cut-offs, or other abuses;

- an open policy community in which NGOs and citizens' groups are aware of water issues and have access to meaningful participation in setting policy

within a regulatory framework that is widely recognized as legitimate and free of corruption; availability of information and transparency of process are keys to allowing ongoing public attention and active public involvement;

- responsiveness (or policy learning),[215] a frequent re-evaluation or re-calibration of regulations (including a willingness to change statutory requirements and claw back profits), within the constraints of an ongoing commitment to make privatization work.

3.4.2 France

The French case is particularly interesting for a study of the influence of different ownership and management regimes on water quality because public and private management regimes have coexisted for a long time. The French model is much more common throughout the world than the UK asset sale model. Many countries prefer to adopt the French model because it allows them to obtain private-sector investment and expertise without relinquishing overall public ownership. French firms have extensive experience in working with authorities and companies in other countries. The big French firms (e.g., Vivendi and Suez Lyonnaise des Eaux) share their technological know-how and research capabilities when they participate in overseas water treatment contracts, taking advantage of the opportunity to intensify their participation in the rapidly expanding global water market.[216]

Structure of Water Distribution Services

The role of the state is more pervasive in France than in the United Kingdom. Public ownership of water plants is the norm in France, but private companies have long played an important role in French water distribution.[217] Y. Mogno observes that "about 78% of the population is supplied by services that have been delegated to private operators."[218]

[215] See M. Leann Brown, 2000, "Scientific uncertainty and learning in European Union environmental policymaking," *Policy Studies Journal,* vol. 28, no. 3, pp. 576–96.
[216] John-Thor Dahlburg, 2000, "Tap water around the world developing a French flavor," *The Los Angeles Times,* (April 30), p. C1.
[217] John Hassan, 1996, "France: public responsibility – private execution," *The European Water Environment in a Period of Transformation*, edited by John Hassan, Paul Nunn, Judith Tomkins, and Iain Fraser (Manchester: Manchester University Press), p. 121.
[218] Y. Mogno, 2000, "National Report: France," *Water Supply*, vol. 18, no. 1–2, pp. 18–19.

The structure of water distribution services is localized in France, whereas it is regionalized in the United Kingdom.[219] The 36,000 communes (local municipalities) are entitled to decide whether their water supply and sewerage should be publicly or privately managed. Not all of the communes have their own individual water supplies, but over 15,500 supply systems exist in France.[220] Each commune has the option of directly managing the water supply or delegating responsibility for water delivery and treatment to a private company. The communes can also join together to form intercommunal groupings that assume responsibility for water distribution services or transfer management responsibilities to the private sector.

Several types of delegation contracts are popular in France and have served as models internationally. According to Garret Westerhoff, the approaches differ in terms of "whether investments are made into new works, whether the user pays for the service, whether there is a results-based profit-sharing and how the risks and the responsibilities are distributed."[221] In the words of Henry Buller, the *régie directe* or direct management model "represents the purest form of water delivery as a public service."[222] A delegated model (known as *affermage*) involves one of the communes' choosing to "delegate the functions of water delivery and treatment to a private company."[223] A *concession* means that all roles are transferred to the private operator except for political control and long-term ownership of the facilities.

Water management is highly decentralized and fragmented in France. The mayors bear responsibility for drinking water and sewerage services at the local level.[224] Participants in water management at the level of the *département*, in the catchment area, and at the ministerial level are also involved in implementing water policy. The water office of the environment ministry provides administrative supervision of the six water agencies (*agences de l'eau*), which partially finance the protection of water resources.

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[219] Frederico Neto, 1998, "Water privatization and regulation in England and France: a tale of two models.," *Natural Resources Forum*, vol. 22, no. 2, p.112.
[220] Henry Buller, 1996, "Privatization and Europeanization: the changing context of water supply in Britain and France," *Journal of Environmental Planning and Management,* vol. 39, no. 4, p. 463.
[221] Garret Westeroff, 2000, "The use and management of service contracts: participation in the private sector," *Water Supply*, vol. 18, no. 1–2, p. 2.
[222] Buller, 1996, p. 463.
[223] Ibid., p. 463.
[224] France, Ministère de l'aménagement du territoire et de l'environnement/Agences de l'Eau, 1998, *Water management in France: A well-known initiative,* [online], [cited January 16, 2002], <www.waterlink.net/gb/ageau2gb.htm>.

Water policy reflects the French principle that "water pays for water." Consumers, through their water bills, and polluters, through a pollution levy, assume the costs of regulatory supervision and infrastructure maintenance. Some critics suggest that the water bills, pollution levies, and fines are not high enough to pay for depollution. Brice Lalonde, French secretary of state for the environment, argued, in 1990, that the six water agencies needed to step up their efforts to fight water pollution as the use of nitrates became more pervasive. He asserted: "Farmers must pay levies for irrigation and the fight against the pollution of water by fertilisers. The domestic user pays for the water used and not for its 'depollution', the industrial user for the water used and for its depollution, the farmer pays for neither."[225]

Water management is governed by five other fundamental principles besides "water pays for water." These are identified in the government document *Organization of Water Management in France:*

- The geographic reality of large river basins must be taken into account as "water knows no administrative boundary."

- An integrated approach is necessary to meet all water use requirements while respecting aquatic ecosystems.

- Establishing partnerships and coordinating the actions of public authorities and developers are the roles of the six river basin committees, of the prefects, and basin coordinators and is the purpose of the Schémas Directeurs d'Aménagement et de Gestion des Eaux (SDAGE) and the Schémas d'Aménagement des Eaux (SAGE) – masterplans and schemes for water development and management.

- A multiyear plan defines priority investments within the framework of river leasing contracts and the Water Agencies' fifth program.

- The competence of each private or public contracting authority in its specific sphere, within the collective framework defined by law, is to be respected.[226]

Many countries, in Europe and elsewhere, have accepted the principle of integrated catchment area management, which has been widely adopted in France.

[225] *Agra Europe,* 1990, "French farmers accused of polluting water supplies," No. 1379 (March 9), p. N1.
[226] Institute for Water, 2001, *Organization of Water Management in France,* [online], [cited June 18, 2001], <www.oieau.fr/anglais/gest_eau/part_b.htm>.

State of Water Quality

A recent survey reveals that most French people believe that water pollution is a major problem and doubt that they are given accurate information about the state of water quality in their region.[227] John Hassan provides evidence that France's water quality has improved significantly since the 1970s, but he observes that the country still lacks "an optimal solution to water quality management."[228] The large French companies that dominate the global water market[229] are proficient at finding scientific and technical solutions to the problem of contaminated water. This is not surprising given the size of their research budgets and their many years of experience in purifying water.[230] Nevertheless, Henry Buller notes that France lacks "the political will to address diffuse pollution sources, and notably agriculture."[231] He lists the reasons for the imperfections in the French model:

> [The model] is frustrated, on the one hand, by its spatial fragmentation and the small size, particularly in rural areas, of the basic political-management unit, the commune and, on the other hand, by the increasing power and omnipresence of the major private water companies. Its spatial fragmentation is emerging as a constraint to effective responses to water shortages and contamination and is a limitation to efficient investment and long term financial planning. Furthermore, the dominance of the larger private water companies and their traditional closeness to local government has recently been exposed as giving rise to widespread financial and political

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[227] Institut français de l'environnement, 2000, "La préoccupation des Français pour la qualité de l'eau," *Les données de l'environnement,* numéro 57 (août), pp. 1–4.

[228] Hassan, 1996, pp. 128–35.

[229] Samer Iskander, David Owen, and Andrew Taylor note that "Vivendi and Suez Lyonnaise des Eaux, the French multi-utilities, have few rivals in a fragmented industry still largely owned by the public sector. The two, for example, won more than half of the biggest private-sector water contracts awarded between 1993 and 1997, worth $12.6bn. Suez last year delivered drinking water to 77m people around the globe."; Iskander, Owen and Taylor, 1999, "Making a big splash: with more than a century in the private sector, French water companies are showing the rest of the world how to manage their utilities," *Financial Times* (August 24), p. 17.

[230] John-Thor Dahlburg (2000) observes that, "Because of their size, the French rivals can afford to spend what appear to be unparalleled sums on research and development in the water sector, a total of nearly $200 million last year between them. Not surprisingly, many innovations in the field have been French."

[231] Buller, 1996, p. 466.

> manoeuvrings that have, on occasion, traversed the bounds of legality through the illegal financing of political campaigns to unfair trading practices.[232]

The auditor's report concurs that the French model has problems with corruption, price increases, and unequal power between local authorities and giant companies, as well as a lack of competition and transparency.[233]

France's experience reveals an important competitive advantage arising out of the long history of joint public-private water operations: French companies have grown into the world's largest transnational water corporations, supplying water systems and services around the world. However, the auditor's report suggests that small French communities – rather like, no doubt, the municipal governments around the globe that enter into contracts with the giant French companies – are at a disadvantage in terms of their capacity to negotiate with large and very experienced companies. This points to the importance of relative scale and relative strength and expertise from a management and contracting perspective.

Another problem the French system epitomizes is that of market share. In France, there are effectively only two corporations, Suez Lyonnaise des Eaux and Vivendi, which supply the lion's share of water in private contracts. Such an arrangement does little to harness the principle of competition for the market in order to win low-priced water services.

Case of Brittany

The problem of disparity in political power between agricultural interests and large private water companies, on the one hand, and more diffuse consumers' interests on the other is illustrated in Brittany. Over the course of many years, farmers excessively used fertilizers, livestock manure, and agro-chemicals, and, as a result, contaminated the surface and groundwater. Ecologists blamed the government for failing to apply the polluter-pays principle vigorously enough. Farmers did not have sufficient incentive to curb their use of pesticides and

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[232] Ibid.

[233] Cour des Comptes, 1997, *La gestion des services publics locaux d'eau et d'assainissement*, Rapport public particulier (janvier), [online], [cited May 5, 2001], <www.ccomptes.fr/Cour-des-comptes/publications/rapports/eau/cdc72.htm>, as quoted in World Water Forum, 2000, *It cannot be business as usual: Problems with the private models for water*, PSI Briefing on: The way forward – public sector water, The Hague, March 17–22, 2000, [online], [cited May 13, 2001], <www.psiru.org/>.

nutrients because they were not made to bear their share of the costs of polluting rivers. Lyonnaise des Eaux attracted some of the blame from the environmental group, Eaux et rivières, for failing to ensure that the level of nitrates in the drinking water it provided met EU specifications. The Court of Justice ruled that the French government was ultimately responsible for failing to devote enough material and administrative resources to the task of cleaning up the water.

Frederico Neto criticizes the French water pollution charge mechanism for failing to give agricultural polluters strong enough incentives to cause them to change their behaviour.[234] His description highlights the point that strong political lobbying at the local level can contribute to regulatory failure:

> The absence of the polluter-pays principle in the agricultural sector, together with the current policy of financial incentives for pollution abatement, can be seen as the result of a regulatory model in which the central government role is too weak, in comparison with agricultural interests, not to mention the private water duopoly. The big private water companies and the local farming lobby appear to exert considerable influence on decisions involving funding and expenditures by the river basin committees, sometimes at the expense of household users.[235]

The anonymous reviewer of a draft of this paper provided the description of the Brittany case that follows. It shows that the lack of an effective form of regulation in France can jeopardize water quality:

> Most cities in this region of nearly 5 million people employ private water suppliers on a *concession* or *affermage* basis. Nitrate pollution of surface and groundwater is extensive, mostly due to intensive farming practices (livestock – in particular pigs) and associated runoff, and in most of the *Départements* in Brittany, nitrate levels exceed the WHO limit – as a result, tap water is unpotable for much of the year and in most places.[236] A citizen's group in the town of Guingamp took the private water company, Lyonnaise des Eaux, to court over its failure to meet EU and WHO water quality

[234] For a description of regulatory failure in France, see Neto, 1998, pp. 107–17.
[235] Ibid., p. 115.
[236] The following citations were not included in the reviewer's comments, but could be consulted for a more detailed description of the persistent problem of agricultural pollution in Brittany. *Agra Europe,* 1990; *Agra Europe,* 1995, "French pig farm expansion threatens water quality" (September 29), no. 1664, p. N2; and *Agra Europe,* 1997, "Report highlights French agricultural pollution" (June 27), no. 1753, p. N3. Information about the quality of drinking water in Brittany can be obtained by contacting the French government's public health and social services department (DDASS). See *Drinking water in Brittany – 1999 edition,* 1999, [online], [cited May 5, 2001],<www.rnde.tm.fr/anglais/sy/sante/

> standards; the company lost, and is now suing the government. Water quality standards have in this case been consistently breached over the past two decades, yet despite France's long history with the delegation of management to the private sector, the allocation of risk and accountability is unclear.

The Court of Justice recently found the French government guilty of contravening the EU directive requiring it to limit nitrate levels in surface water that is used to produce drinking water (Case C-266/99) because it did not take timely or comprehensive steps to improve the quality of drinking water in Brittany.[237]

The French case reveals that an effective regulatory regime is a necessary concomitant to effective privatization in the water field. It also suggests that a balance in strength and expertise between private and public sector parties to a negotiation is required if an agreement is to be struck that meets both the public interest and the needs of the private operator.

3.5 Australia

3.5.1 Structure of Water Distribution Services

Most water treatment facilities in Australia are publicly owned. However, a number of states have experimented with various types of public-private partnerships "ranging from contracting out of all or part of operations through commercialization and downsizing and differentiating between wholesale and retail operations and consolidating smaller agencies."[238] National guidelines have been developed to steer the management of drinking water quality,[239] resulting in a fairly uniform approach across the country, even though the states are free to set their own standards for water quality and service.

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sysa0006.htm>. Recent reforms in agricultural policy in OECD countries, aimed at improving water quality, are discussed in the article: Wilfrid Legg and Michael Potier, 1998, "Reconciling agriculture and the environment," *The OECD Observer,* vol. 21 (February/March), pp. 32–36.

[237] *European Report,* 2001, "Environment: France and Luxembourg slammed over water directives" (March 14), p. 492.

[238] Barry Sanders, Peter Engler, and Kathryn Heaton, 2000, "National Report: Australia," *Water Supply*, vol. 18, no. 1–2, pp. 88–89.

[239] See Daniel Krewski, John Balbus, David Butler-Jones, Charles Haas, Judith Isaac-Renton, Ken Roberts, and Martha Sinclair, 2001, *Managing Health Risks from Drinking Water*, prepared for the Walkerton Inquiry, pp. 176–79, [online], [cited May 5, 2001]. Published in 2002 (Toronto: Ontario Ministry of the Attorney General), Walkerton Inquiry Commissioned Paper 7, Walkerton Inquiry CD-ROM, <www.walkertoninquiry.com/>.

3.5.2 Water Quality

Information about the success of water suppliers in ensuring high-quality drinking water is available on their Web sites.[240] However, observers have expressed their reservations about accepting the commentary at face value. For example, during the notorious *Cryptosporidium* scare of 1998, Nonee Walsh noted: "The New South Wales Health Department and Sydney Water have a joint Web site which is little more than PR. It assures the public that the water is being monitored 24 hours a day for health dangers. The fact that we don't know what the health dangers are, isn't mentioned."[241] During the Sydney water quality crisis of 1998,[242] it became painfully clear to water providers and the public that protozoan monitoring data is not always completely reliable.[243] Laboratory results, revealing a high concentration of *Cryptosporidium* oocysts and *Giardia* cysts, triggered an emergency response from health monitors and a formal government inquiry. Nevertheless, it was later found that the lab results in the original reports were likely in error. The following is a timeline and analysis of Sydney's water crisis.

3.5.3 Cryptosporidium Scare of 1998 in Sydney

The apparent discovery of *Cryptosporidium* and *Giardia* in the water supply system came during the summer of 1998, shortly after the construction of a new water treatment plant by a private company – and shortly before Sydney was to host the 2000 Olympics. Although no illnesses were reported, authorities took the precautionary measure of repeatedly issuing boil water orders to millions of residents.

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[240] For example, see Sydney Water, 2000, *Annual Environment and Public Health Report 2000*, [online], [cited May 11, 2001], <www.sydneywater.com.au/html/about_us/publications_index.cfm>.

[241] Nonee Walsh (producer), 1998, *Sydney's Cryptic Water Crisis*, Radio National's Weekly Investigative Documentary: background briefing, November 11, [online], [cited May 11, 2001], <www.abc.net.au/rn/talks/bbing/stories/s17169.htm>.

[242] Ross Chapman and Sandy Cuthbertson, 1999, "Sydney's water – a suitable case for private treatment?" *Public Policy for the Private Sector*, note no. 80 (Washington, D.C.: World Bank Group, Finance, Private Sector and Infrastructure Network) (April); James Vassilopoulos, *Sydney water crisis due to corporatisation*, [online], [cited May 11, 2001], <http://jinx.sistm.unsw.edu.au/~greenlft/1998/328/328p13.htm>.

[243] Jennifer L. Clancy, 2000, "Sydney's 1998 water quality crisis," *Journal of the American Water Works Association*, executive summary, vol. 92, no. 3 (March), pp. 55–66.

The public outcry over the perceived failure of the city's water supply safety system was accompanied by widespread unease over the role of the newly corporatized public entity responsible for Sydney's water, and over the private operation of water treatment facilities. The ensuing public inquiry found little evidence of any actual health risk or health impairments as a result of the incident, but determined both that the boil water orders had been an appropriate measure, and that the publicly owned water corporation had acted counter to the public interest on several counts in their handling of the situation.

Structure of the Water Industry in Sydney

Sydney's water board was corporatized on January 1, 1995, under the *Water Board Corporatization Act 1994* (WBC Act), to produce the Sydney Water Corporation (SWC). Its mandate was threefold, with each responsibility having equal weight: to protect public health by supplying safe drinking water; to be a successful business; and to protect the environment. An independent regulatory body, the Licence Regulator, was set up to audit SWC's compliance with the terms of its operating licence. SWC also has memoranda of understanding with the Environmental Protection Agency, the Water Ministerial Corporation of the Department of Land and Waters, and New South Wales Health (NSW Health).

The memorandum of understanding with NSW Health requires the company to immediately notify the health agency in the case of any event or monitoring result indicating the potential existence of a public health hazard.

The Sydney Water Corporation is a statutory state-owned corporation, wholly owned by New South Wales. SWC in turn owns Australian Water Technologies, which undertakes most of the water quality testing for SWC. In addition, SWC contracts the operation of four of its eleven water treatment plants to private companies.

In 1996, the state-owned SWC commissioned the construction of a new water treatment plant, the Prospect Water Filtration Plant, in a build-operate-own (BOO) agreement with a private consortium led by the French giant Suez

Lyonnaise des Eaux.[244] This was the largest filtration plant ever developed in a single stage (i.e., as a design-build contract).[245] Prospect and other smaller treatment plants were deemed necessary to protect Sydney's population as source water quality in the region had deteriorated as a result of urban growth in the catchment areas and increased demand. These factors, together with higher community expectations and more stringent technical standards, were behind the upgrades.[246]

The Prospect Water Filtration Plant supplies 85% of Sydney's water. The plant is owned by the Prospect Water Partnership (PWP) and operated by a company called Australian Water Services (AWS) under the 25-year BOO contract to SWC. Winning the bid and signing the contract were more work-, money- and time-intensive than was originally expected.[247] AWS and PWP were formed by a consortium consisting of Suez Lyonnaise des Eaux (formerly Lyonnaise des Eaux), P&O Australia, and Lend Lease Corporation acting as equal shareholders.[248]

The build-operate options (build-operate-own or BOO; build-operate-transfer or BOT; and build-operate-own-transfer or BOOT) enjoy certain advantages over separating design, construction, and operation stages. Reduced time for developing and implementing project designs is often cited, but other major advantages are also worth noting. In an infrastructure-intensive industry such as water and sewage, there are often trade-offs between infrastructure and operation costs, and between start-up and long-term costs. In the case of the Prospect plant, a 25-year BOO was chosen, with future operations left undetermined. Industry insiders explain that such an arrangement allows the company "to optimize every part of the process and the plant, with the goal of project optimization over the 25 years of the operation not just at the delivery stage."[249] For example, the process line was designed to allow the future inclusion of pre-ozonation treatment, in case new source water deterioration or regulatory

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[244] For more on Sydney Water, see their Web site: <www.sydneywater.com.au>.

[245] P Mazounie, F. Bernazeau, and P. Alla, 2000, "Removal of *Cryptosporidium* by high rate contact filtration: the performance of the Prospect Water Filtration Plant during the Sydney water crisis," *Water Science and Technology*, vol. 41, no. 7, pp. 93–101.

[246] Pierre M.J. Alla and David Manzi, 1996, "Sydney Water's public-private partnership," *Journal of the AWWA*, vol. 88, no. 4, pp. 108–15.

[247] Ibid.

[248] An article by Mazounie, Bernazeau, and Alla, three employees of Lyonnaise and AWS, explains the arrangements more fully. PWP is a joint venture between Suez Lyonnaise des Eaux, Lend Lease, and P&O Australia; AWS is a joint venture between Suez Lyonnaise des Eaux and Lend Lease. See Mazounie et al., 2000.

[249] Alla and Manzi, 1996, p. 113.

change should make such treatment necessary. Note, however, that the operating life of the plant may be well in excess of the 25 years stipulated in the contract, and the problem of infrastructure mining (i.e., underinvestment in upkeep or upgrades that would be of long-term benefit) is not fully resolved by such contractual arrangements.

The contractual agreement between SWC and AWS stipulated maximum allowable turbidity and discolouration levels, which the plant consistently met and exceeded. It did not specify set levels of pathogen removal (such as *Cryptosporidium* and *Giardia*), although the type of operation in place was, according to the company, understood to represent best practices in terms of pathogen removal.[250]

Throughout the contamination events of the summer of 1998, the plant was meeting its contractually mandated quality levels. Repairs to the plant prior to the first event in July may have constituted some upset to the operation, but no operational irregularities were correlated with the August and September events.

After the July event, SWC requested that AWS modify its treatment methods to maximize particle removal during treatment, as well as improving monitoring of water quality. High pathogen levels found by SWC led to the two subsequent boil water orders; these levels were not found through a parallel sampling program carried out by AWS. Subsequent audits and tests of the plant suggest that the plant was meeting what was considered a best practices guideline for removal of *Cryptosporidium* oocysts from source water.[251]

Brief Chronology of the Sydney Water Scare

The following account is based primarily on documents produced by the Sydney Water Inquiry, which was commissioned by the New South Wales government after the issuance of the first boil water directive.[252]

According to the inquiry, SWC first discovered *Cryptosporidium* and *Giardia* in its systems on July 21. SWC informed the health department, but levels were low enough that health concerns were not raised. On July 26, high levels

[250] Ibid.
[251] Ibid.
[252] Reports of the Sydney Water Inquiry are available from the New South Wales Premier's Department Web site at <http://water.sesep.drexel.edu/outbreaks/Sydney4thRpt/>.

were reported, and on the next day a boil water alert was issued for the Eastern Central Business District. The problem was thought to be local. Test results late on July 29 showed high contamination levels at the Potts Hill Reservoir, the Prospect Water Filtration Plant, and other locations downstream in the system. The decision was made to issue a boil water advisory only for the area served by the Potts Hill Reservoir, rather than to alert all consumers served by the Prospect plant, or about 85% of Sydney's residents.

On July 30, however, other sites tested positive for contamination and a boil water advisory was issued to approximately 3.7 million Sydney residents. *Giardia* and *Cryptosporidium* had been found in the municipal water supply. Both of these protozoan parasites can infect humans, causing diarrhea and other gastrointestinal symptoms. *Cryptosporidium* infection can also be fatal for the immunocompromised, including the elderly, chemotherapy patients, transplant patients, and particularly people with AIDS.

The *Sydney Morning Herald*, in reporting the boil water order, asserted that authorities had waited two days before issuing the advisory.[253] The press criticized the new, private treatment plant, which had cost taxpayers A$3 billion and was apparently inadequate to deal with *Giardia* and *Cryptosporidium* contamination. The media fed public fear by reminding Australia of the massive *Cryptosporidium* outbreak of 1993 in Milwaukee, which had affected hundreds of thousands and left an estimated 100 people dead. Press reports suggested that the city's reputation was being tarnished by the water crisis, and that the success of the upcoming 2000 Olympics was at stake.[254] Sydney Water's managing director Chris Pollett told the press that the system was being flushed and that he hoped it would be back to normal within 48 hours. Water mains were opened, and water ran down streets and curbs while residents boiled their tap water or bought bottled water from vendors.[255]

The boil water advisory was lifted for various neighbourhoods from August 2 to 4. On August 8, Peter McClellan Q.C. was appointed to chair an inquiry into the contamination event.

On August 24 and 25, in response to a second event, another boil water notice was issued to residents. This order was being progressively lifted when, on September 4, further contamination was identified. Most residents were told to continue to boil their water until September 19.

[253] Linda Doherty, 1996, "Two-day silence on tainted city water," *Sydney Morning Herald,* (July 29).
[254] Peter James Spielmann, 1998, "Tainted water causes panic in Australia," *Associated Press* (July 31).
[255] Ibid.

Despite high *Cryptosporidium* oocyst counts and substantially enhanced epidemiological surveillance, there was no evidence of increased disease among Sydney residents.[256] In fact, later analyses cast doubt on lab results, suggesting that the oocysts had either been inactivated by treatment, been of a non-virulent strain, or had in fact been misidentified altogether. Yet the *Cryptosporidium* scare generated outrage among Sydney residents, and loss of credibility for the water company, for the government, and for the policy of public-private water ventures.

Conclusions of the Sydney Water Inquiry

The inquiry, under tight time constraints, submitted its first interim report on August 28, shortly after a second boil water notice was issued. The first interim report focused on possible causes of the contamination:

- The lack of common national standards for acceptable levels of *Cryptosporidium* and *Giardia* in drinking water presents difficulties for the authorities involved.

- Although the source of contamination could not be determined, AWS (the private operator) provided a detailed case denying the possibility that the Prospect plant was the source of contamination; SWC (the public corporation responsible for water services) provided detailed evidence that the plant was indeed the likely source.

The second interim report, submitted in September, highlighted problems in management of the outbreak. The report attributed much of the mismanagement to actions taken by the SWC:

- The health authority acted appropriately on July 29 in issuing a boil water press release, in time for the late-evening news, in its original form as received from SWC to alert the entire population served by the Prospect plant. SWC first delayed informing NSW Health and then, in an apparent attempt to "kill" this warning, issued its own press release limiting the area of the warning to the Potts Hill region. This warning also omitted references to *Cryptosporidium* and mentioned only *Giardia*

[256] Australia, Commonwealth Department of Health and Aged Care, Communicable Diseases – Australia, 1998, "*Cryptosporidium* in water: report of the consensus conference on *Cryptosporidium* in water, Melbourne, October 1998," *Communicable Diseases Intelligence*, vol. 23, no. 6, [online], [cited May 6, 2001], <www.health.gov.au/pubhlth/cdi/cdi2306/cdi2306b.htm>.

contamination. The conflicting releases caused confusion in the media and the public.

- SWC failed to respond to the initial contamination by implementing an adequate testing regime.

- Communications between NSW Health and SWC, which were initially poor, ultimately broke down completely.

- When the Minister for Urban Affairs and Planning assumed responsibility for keeping the public informed, SWC failed to provide adequate and accurate information to the minister. For example, on July 30, SWC informed the minister that the Prospect plant was being bypassed when the plant remained in operation. Ultimately the private contractor operating the plant, AWS, informed the minister that it was still in operation.

- The report also noted significant communication difficulties between SWC and AWS as the crisis escalated.

The third report of the Sydney Water Inquiry, issued in October, suggested that the results generated by AWT, the lab responsible for testing (a subsidiary of SWC), were unreliable due to numerous deficiencies in testing and record-keeping. *Cryptosporidium* and *Giardia* may not have been present in the drinking water in the high numbers originally reported. Because of uncertainties in lab results, the role of the Prospect and other plants is unclear. There is some evidence that Prospect, as well as Warragamba and Orchard Hills plants, experienced some operational difficulties.

In order to investigate the contractual arrangements between Sydney Water Corporation and the plant operator, Australian Water Services, the inquiry was reconstituted in October as a Royal Commission with expanded powers. The fourth report of the inquiry was issued in December 1998.

The report describes the development of tighter national water quality directives in the 1980s, which created pressure for increased capital investment to maintain and upgrade the system. The Water Board determined that four new water treatment plants were to be built. This decision coincided with government policies allowing an expanded role for private investors in public works, and the board took advantage of that latitude to access the capital necessary for these projects. AWS won the contract for Prospect, the largest of the four plants,

in a competitive tendering process. The contract was to design, build and operate the new plant. The inquiry, while satisfied with the integrity of the bidding process, noted that the process of selection was concerned more with obtaining the lowest price than with ensuring the highest quality technology.

The Water Board commissioned a report on the health risks of *Cryptosporidium* and *Giardia,* which was completed in March 1992, and distributed to the scientists on the Water Board and the engineers responsible for the drinking water plant. However, it was withheld from the board's Environmental Management Unit (EMU) until March 1993. There is evidence that in 1993 the board's engineers had an incomplete understanding of the consequences for human health of these pathogens and of the effectiveness of filtration plants to remove that risk. Because of ongoing general deterioration in the quality of Sydney's drinking water, the engineers were worried, as information about these pathogens became available, that there would be a delay in the development of the filtration plants. The EMU expressed concern, and was advised by the water plant manager that the plants were appropriate for dealing with both *Cryptosporidium* and *Giardia*, an assertion that was not completely accurate. The debate over the effectiveness of the filtration plants occurred in the context of a contract, which had already been negotiated, prior to the EMU's completion of an environmental assessment that was to determine whether the project would be carried out.

The final report of the Sydney Water Inquiry was released in December 1998. One of its conclusions was that there is a need for public education and disclosure of information about water quality. For example, it suggests that immunocompromised people be made aware of the health risks of drinking water and be advised to boil all drinking water for three minutes. The need for public disclosure also extends to information about protection and treatment of the water supply, and the terms of contractual arrangements between the parties responsible for water. This need largely outweighs the private commercial interest in nondisclosure.

The inquiry was unable to determine with certainty how much of the reported *Cryptosporidium* in samples was a result of failure at the Prospect plant, how much was an artifact of procedural errors by the lab (as AWS, the plant operator, suggested), and how much resulted from other factors such as extraordinarily high turbidity and contamination loads in source water. In response to the inquiry's reports, the government made arrangements for future health and safety testing of water to be conducted by an independent laboratory.

The inquiry also concluded that protecting the catchment (source protection) was necessary as part of a multibarrier approach to ensuring drinking water safety. The report recommended stronger land-use planning controls, improved water-quality monitoring, and the creation of a body to oversee cleanup and protection of the catchment.

As a result of the inquiry, the Sydney Catchment Authority (SCA) was created with a mandate to protect public health and the environment, and to improve water quality. It is responsible for managing water supply and related infrastructure, protecting catchments and dams, and regulating activities that affect water quality in the catchment. It is also the water supplier to the Sydney Water Company and other smaller water providers in the region.[257] The chief executive of the SCA reports to the Minister of the Environment, and to a board appointed by the minister. The board includes a nominee of the NSW Farmers' Association, and a nominee of the Nature Conservation Council as well as five other members.

The inquiry recommended that the regulatory framework governing the operations of both SWC and the new SCA be tightened to increase their accountability to the government and the public. The role of the licence regulator should be substantially modified, through a process of public consultation, to enable it to take a stronger and more defined role in the management of Sydney's water.

The public inquiry, together with liability settlements for affected water users, ended up costing taxpayers tens of millions of Australian dollars. The water scare caused the resignation of both the chair and the managing director of the Sydney Water Corporation, and the dismissal of two senior managers. The crisis changed the regulatory framework for water quality protection in Sydney, and left a lasting stain on the public's confidence in their water safety.[258] All of this occurred, ironically, without anyone actually suffering health impairment from drinking water.

The Sydney experience points to the need for a strong regulatory framework and for effective mechanisms and rules around inter-agency communication. It suggests that a public corporation will not necessarily act in the public interest in prioritizing health over other water concerns. In this case the publicly owned

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[257] See the Sydney Catchment Authority Web site, <www.sca.nsw.gov.au/>.

[258] Steve E. Hrudey, 1999, "The Sydney water crisis – another lesson in health risk communication failure," [online], [cited May 8, 2001], <www.ucalgary.ca/~wleiss/index2.htm>.

corporation, SWC, had a mandate that gave equal priority to financial success and public health and the environment. The need for financial sustainability notwithstanding, it seems that any entity responsible for water should be charged first and foremost with protecting public health. The importance of accuracy and independence in water-testing labs is another important lesson. Risk communication emerges as another key issue in the Sydney case. The public perception that the company had delayed issuing a boil water order undermined public confidence in the water system. Public education and access to information are necessary for a variety of reasons, not least for the perceived legitimacy of water operations.

3.6 Poland

The experiences of transitional economies in Eastern Europe are of interest.[259] After the collapse of the Soviet Union, many of the transition countries of Central and Eastern Europe, such as Albania, Poland, Romania, and Hungary shifted the ownership and management of water utilities from the national or provincial government to the municipality. We will discuss Poland.

3.6.1 Structure of Water Distribution Services

Marek Roman notes significant changes in the ownership and organizational forms of water supply and wastewater disposal works in Poland. From 1918–1939, the municipalities, known as communes, supervised water companies. In 1950, local authorities were abolished and water companies were nationalized. In 1990, local self-governments were reinstated and water networks again became communal property. [260]

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[259] These documents include comprehensive examinations of water privatization in Eastern European countries: Richard Andrews, 1993, "Environmental policy in the Czech and Sloval Republic," in *Environment and Democratic Transition: Policy and Politics in Central and Eastern Europe,"* edited by A. Vari and P. Tamas (Boston: Kluwer Academic Publishers), chapter 2; Paul Nunn, 1996, "Water management in the transformation to the market: opportunities for Hungary," *The European Water Environment in a Period of Transformation,* edited by John Hassan, Paul Nunn, Judith Tomkins, and Iain Fraser (Manchester: Manchester University Press), pp. 136–55; C. Staddon, 1998, "Democratisation and the politics of water management in Bulgaria," *Theorising Transition: The Political Economy of Post-Communist Transformations,* edited by J. Pickles and A. Smith (London: Routledge), pp. 347–72.

[260] Marek Roman, 2000, "National report: Poland," *Water Supply,* vol. 18, no. 1–2, pp. 108–09.

3.6.2 State of Water Quality

In 1989, the Polish health ministry found that the city water systems were in a state of crisis: only 37.6% of the tests conducted by the ministry found good water.[261] The high level of contamination in the surface and groundwater could be attributed partly to the emphasis on heavy industry and the low level of environmental enforcement during the Communist era.

The Solidarity-led opposition, the outgoing Jaruselski government, and the newly elected democratic leadership met together at a historic round table in 1989. The creation of the environmental protocol was one of the outcomes of those discussions. Much of the protocol has now been implemented. As Halina Szejnwald Brown observes:

> All environmental and conservation responsibilities have been consolidated in the new Ministry of Environmental Protection, Natural Resources, and Forestry, which early on announced an ambitious national environmental policy for Poland. Working together, the ministry and Poland's parliament moved quickly to strengthen key parts of the enforcement system, increasing the powers and resources of the State Environmental Protection Inspectorate, an independent monitoring and enforcement agency; closing loopholes in existing environmental laws; and increasing environmental use fees. More recently, efforts have been made to provide a statutory framework for two important regulatory practices already entrenched in actual practice: negotiated compliance schedules for industry and increased access to information for the public.[262]

With Poland harbouring EU membership aspirations, there is evidence that water quality there has improved significantly since 1990.[263] Just as in the United Kingdom and France, improvements in the quality of Poland's water systems have aimed at meeting European standards of performance.

It is difficult, however, to identify the source of the improvements. As Halina Szejnwald Brown notes,

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[261] *San Francisco Chronicle*, 1991, "Shortage of clean water is a big problem in Poland" (April 22), p. C6.
[262] Halina Szejnwald Brown, 1998, "Environmental reforms in Poland," *Environment* (January–February), [online], [cited June 25, 2001], <www.findarticles.com/cf_O/m1076/n1_v40/20330011>.
[263] Ibid.

> these improvements could be due to factors unrelated to recent reforms in the environmental protection system, notably the decline of dirty industries, mitigation by a few large polluters, or the ongoing transition from an economy based on manufacturing to one based on services and trade.[264]

3.6.3 Bielsko-Biala Case

In 1990, the Municipality of Bielsko-Biala established AQUA S.A. for the provision of water and wastewater services. It is interesting because it is a public, limited liability company whose stocks are owned by the municipality. Although this is the only water services example of its kind in Poland, the form is used in many parts of the world and has apparently received less study than have other modes of water utility management. [265] A public, limited liability company lies between the corporatized utility and the delegated private utility on the privatization spectrum. The mode of water utility management could be considered more private than the corporatized utility since the public limited company falls under company law instead of public law. It could be considered more public than the delegated private utility since the local or provincial government owns the shares instead of private shareholders.

According to Braadbaart and his colleagues, AQUA's performance in operations management and financial management has been consistently positive in the decade since it was established as a joint-stock company for the provision of water and wastewater services in the Municipality of Bielsko-Biala. They note that the World Bank was willing to grant AQUA a substantial loan in 1996 because AQUA had public limited company (PLC) status:

> PLC arrangement does away with much of the ambiguity surrounding the relationship between local government and utility management, it generates a great deal of financial transparency, and it throws up a legally imposed buffer between local politics and the water business. All this communicates important signals to potential financiers. In 1997, AQUA took this investor confidence boosting strategy one step further by coming into compliance with the regulations of the Polish Securities and Exchange Commission.

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[264] Ibid.

Braadbart and his colleagues note that ownership of AQUA by the municipality of Bielsko-Biala is gradually becoming diluted. By the end of 1997, Bielsko-Biala's ownership of AQUA had declined to 78% from a high of 100% in 1990. Hence, AQUA appears to be moving closer to the delegated private utility model, where private shareholders own the shares, instead of the local government.

Braadbaart and his colleagues concluded from their study of public water PLCs in the Netherlands, Chile, Poland, and the Philippines that the mode could be considered as a promising reform option in countries where extensive private sector participation in water supply and sanitation is politically unacceptable and where public ownership of utilities is enshrined in law.

3.7 Developing Countries

3.7.1 Introduction

Developing countries face a unique set of challenges that make their experiences less relevant to an understanding of potential privatization impacts in Ontario. In some, a combination of weak regulatory environments, poor macroeconomic conditions, and unstable political structures can make it difficult for them to attract investment in infrastructure projects.[266] The capacity of governments to deal with experienced multinational corporations, the perceived legitimacy of the public sector in water regulation and/or provision, and the potential for both representative and direct democratic decision making may also be factors determining the success of a public or private water regime. The biophysical threats to water quality, and the extent of underservicing and infrastructure needs, particularly in rapidly growing urban and periurban centres, are also among the challenges in many of the world's less wealthy countries that differ from those faced in the relatively well-off water supply systems of Ontario. Moreover, as our reviewer observed, an important distinction "is the difference between extending networks (implying a significant proportion of the

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[265] Okke Braadbaart, Maarten Blokland, and Klaas Schwartz, 2000, *Private Business, Public Owners: Government Shareholdings in Water Enterprises* (The Hague, the Netherlands: Ministry of Housing, Spatial Planning, and the Environment), [online], [cited June 22, 2001], <www.ihe.nl/see/sum-core/PBP02.htm>.

[266] See Daniel Rivera, 1996, *Public Sector Participation in the Water Supply and Wastewater Sector: Lessons from Six Developing Countries*, (Washington D.C.: World Bank) (September), p. 3, [online], [cited May 5, 2001], <www.worldbank.org>.

population is not yet served by a reticulation network) and maintaining networks (the case in most OECD countries). Extending networks in developing countries raises questions of access, cross-subsidy, and equity, in a situation in which governments are working within a very different economic context and process of urbanization (the vast majority of private sector partnerships (PSPs) in developing countries are limited to urban areas)."

Nevertheless, it may be informative to explore the Argentinian and Mexican experiences of public-private partnerships since these two countries have been at the forefront of the move towards privatization.[267] Bolivia, which experienced massive civil unrest as a result of water privatization, is instructive in revealing the potential volatility of this issue.

3.7.2 Argentina

Structure of Water Distribution Services

Prior to 1980, the central government in Argentina controlled water and sanitation systems. [268] In 1980, the central government delegated its control to the provinces, where a few smaller municipalities ran their own systems; some services were run by cooperatives; and the provinces operated other systems. In 1989, the government included water and sewage in its major privatization program.[269]

Argentina has had a rocky history of water privatization, marked by a high level of political interference, and conflict between the private water companies and consumers. For example, in Tucuman, the government terminated its contract with Aguas del Aconquija, a subsidiary to Générale des Eaux, even though the previous policymakers had granted a 30-year concession to the company. The government cited problems with water quality and cost as motivating factors for its decision. Alexander Orwin notes that, as a result,

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[267] N. Johnstone and L. Wood have provided informative case studies of the social and environmental effects of private sector participation in the water sector in Argentina and Mexico. See Nick Johnstone and Libby Wood, 2001, *Private Firms and Public Water: Realising Social and Environmental Objectives in Developing Countries* (Cheltenham, UK and Northampton, Mass.: Edward Elgar).

[268] S.A. Mazzucchelli, 2000, "Private sector participation in water supply and sanitation in Argentina: balancing economic, social and environmental goals," *Water Supply*, vol. 18, no. 1–2, p. 697.

[269] Alexander Orwin, 1999, *The Privatization of Water and Wastewater Utilities: An International Survey* (August), Environment Probe, [online], [cited March 23, 2001], <www.nextcity.com/EnvironmentProbe/pubs/ev542.html>.

"The major partner in the consortium, Vivendi, is suing the region for compensation."[270]

A controversy also developed around Aguas Argentinas' operations in Buenos Aires,[271] where a private consortium was granted the management and investment responsibility for the water and sanitation systems in 1993. Aguas Argentinas found that its profits would suffer if it honoured its contractual obligations to provide new connections. It applied to the government for the right to increase prices ahead of schedule, which it was granted. However, consumers protested loudly and took the dispute to court. The high court agreed with consumers that the rate increase constituted a violation of the contract. Aguas Argentinas was forced to accept the court's decision but agreed to do so only on the condition that it would cut back on its promised infrastructure investments.[272]

State of Water Quality

Private companies managed to increase the number of customers that were connected to the water system in Argentina. However, the problem of low quality water has continued to plague the system. David Hall used the Aguas Argentinas example to show that the pursuit of excess profits can jeopardize expenditures on maintenance and operating costs, thus affecting quality:[273] "Although water tariffs doubled following the award, the company failed to accomplish the planned investment program, allowing the water supplied to turn brown."[274] Sergio Mazzucchelli, Martín Rodríguez Pardinas, and Margarita González Tossi list many problems related to water privatization in Buenos Aires, for example, the lack of three elements: effective pollution controls, a clear strategy for the provision of sanitation services, and incentives for the

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[270] Ibid., p. 2.

[271] Aguas Argentinas is "a consortium led by the French firm Lyonnaise des Eaux-Dumez (which would operate the water and wastewater system under the contract) and including Sociedad Comercial del Plata, Meller y Banco de Galicia (Argentina), Aguas de Barcelona (Spain), Compagnie Generale des Eaux (France), and Anglian Water (United Kingdom)." Daniel Rivera, 1996, *Private Sector Participation in the Water Supply and Wastewater Sector: Lessons from Six Developing Countries* (Washington, D.C.: The International Bank for Reconstruction and Development), p. 11.

[272] David Hall, 1999, *Water and Privatisation in Latin America, 1999* (Greenwich: Public Services International Research Unit), [online], [cited May 13, 2001], <www.psiru.org>.

[273] Ibid., p. 7.

[274] See P. Hudson, 1999, "Muddy waters – overview of troubles with Argentina's water infrastructure," *Latin Trade Business and Industry*, March 5, as quoted by David Hall, 1999.

expansion of services to disadvantaged neighbourhoods. Nevertheless, they note that privatization has resulted in some significant improvements: tariffs that are lower than they were prior to privatization; levels of turbidity, bacteria, and chlorine that meet international standards; and increased investment capacity for rehabilitation of existing infrastructure.[275]

3.7.3 Mexico

Structure of Water Distribution Services

The Mexican government's decision to promote public-private partnerships in 1993 was based on the realization that serious problems plagued the Mexican water system.[276] The quality of water was poor and leaks were (and still are) common. Some of the water treatment plants and canals were closed. Water was becoming more polluted at an alarming pace, as the population increased and huge discharges of industrial and domestic waste were dumped illegally.

The chronic problems prompted the government to turn to the private sector for help in cleaning up the mess. Consequently, public-private partnerships have become common throughout the country (e.g., in Cancún, Aguascalientes, Navajoa, Nogales, and Mexico City). Foreign-based water companies, such as Vivendi, Lyonnaise des Eaux, Severn Trent, and Azurix have successfully entered into bids to operate and, in some cases, own the water services. The international development banks have been willing to finance the consortia's investments in maintaining and operating the waterworks. Naomi Adelson observes:

> The Inter-American Development Bank (IDB) approved in 1996 a US$1 billion project to clean up the water mess in the capital. In

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[275] See also their public policy recommendations listed in Sergio Mazzucchelli et al., 2001 "Private sector participation in water supply and sanitation: realising social and environmental objectives in Buenos Aires," in *Private Firms and Public Water: Realising Social and Environmental Objectives in Developing Countries,* edited by Nick Johnstone and Libby Wood, 2001, pp. 106–09.

[276] For information on the privatization and quality of the Mexican water system, see the following: Oscar Lapuente, 1995, "Half empty, or half full?" *Business Mexico,* vol. 5, no. 10 (October), p. 8; Alexander Orwin, 1999, *The Privatization of Water and Wastewater Utilities: An International Survey*, Environment Probe (August), pp. 13–14, [online], [cited April 23, 2001], <www.nextcity.com/EnvironmentProbe/pubs/ev542.html>; Daniel Rivera, 1996, p. 12; Tim Weiner, 2001, "Mexico grows parched with pollution and politics," *The New York Times* (April 14), p. A3.

> the near future, Mexico City and the State of Mexico government will invest US$2.6 million, the IDB will loan US$365 million and the Overseas Economic Cooperation Fund of Japan will provide US$410 million in what is called the Valley of Mexico Sanitation Project.[277]

Mexico City has taken a more incremental approach toward privatization than Buenos Aires – a city which awarded a concession for operating an entire utility system to a private consortium. The government divided Mexico City into quadrants and awarded ten-year management contracts to four different companies.[278]

State of Water Quality

Mexico still has serious problems with the quality of its drinking water. For example, officials have estimated that "every year, more than 400,000 people are negatively affected by untreated water from the Federal District."[279] The multi-utilities that have entered into public-private partnerships in Mexico have taken the initial steps to improve water quality by introducing sophisticated technology for repairing pipes and testing water, and making it easier for the projects to obtain financing from international sources. However, it will take more resources (i.e., time, money, technology, and human resources) to resolve the problem of deteriorating water quality in Mexico.

Lilian Saade Hazin concludes that the government of Mexico City made a wise decision when it chose to use a phased approach that involved awarding management rather than concession contracts:

> A concession contract would have been far more complex and risky to implement than a service contract and would have required a more complex legal and regulatory framework … The phased approach has allowed for the generation of information which is necessary for designing better contracts and for improving the

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[277] Naomi Adelson, 2001, "Water woes," *Business Mexico*, p. 3, [online], [cited April 7, 2001], <www.mexconnect.com/mex_/travel/bzm/bzmwaterwoes.html>.
[278] David Haarmeyer and Ashoka Mody, 1997, "Private capital in water and sanitation," *Finance and Development* (March), pp. 34–35.
[279] Adelson, 2001.

> regulatory capacity of the public authorities. The phased approach has allowed for sufficient flexibility for mistakes to be corrected and adjustments made to cater for unforeseen circumstances.[280]

The Argentinian and Mexican cases illustrate the importance of designing flexible regulatory schemes that facilitate the implementation of innovative institutional solutions to deficient water and sanitation services.

3.7.4 Bolivia

Structure of Water Distribution Services

Bolivia suffers from the water problems common to many poor and rapidly urbanizing countries.[281] The number-one killer of the nation's children is diarrheal illness from contaminated water.[282] In the city of Cochabamba, as in much of the country, water supply is sporadic rather than 24-hours, and the water must be boiled before drinking.

Use of Public-Private Partnerships

Structural adjustment policies instituted in 1985, with a second round of reforms in 1993, have led to decentralization in Bolivia, and more powers have devolved to municipal governments. Many of the nationally owned enterprises have been privatized, with some observers charging that nepotism and corruption played a role in the sell-offs, and that even profitable enterprises were sold at a

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[280] Lilian Saade Hazin, 2001, "Private sector participation in water supply and sanitation: realising social and environmental objectives in Mexico D.F.," *Private Firms and Public Water: Realising Social and Environmental Objectives in Developing Countries,"* edited by Nick Johnstone and Libby Wood (Cheltenham, UK and Northampton, Mass.: Edward Elgar), pp. 181–82.

[281] Simon Marvin and Nina Laurie, 1999, "An emerging logic of urban water management, Cochabamba, Bolivia," *Urban Studies*. vol. 36, no. 2, pp. 341–57. This paper, which was submitted in its final form in December 1997, does not anticipate the anti-privatization protests of April 2000 and the government's decision to tear up the contract with Bechtel. It argues that, "The case study of water privatization in the city of Cochabamba, Bolivia, illustrates how this emerging [new style of water management] logic is reconfiguring the management of urban water networks with a shift from large supply options towards greater consideration of user needs and extension of the network to unconnected communities," p. 341.

[282] Gregory Palast, 2000, "New British Empire of the dammed: Bolivia's water supply is the latest acquisition of thirsty British firms in the service of Uncle Sam," *Observer*, London (April 23).

loss.[283] Municipal services such as water and electricity began to be privatized in 1995.[284] In 1999, the World Bank recommended that Cochabamba privatize its water system, and recommended against public subsidies for water.[285]

International Waters Ltd. of London, owned by the U.S. firm Bechtel, in partnership with United Utilities and some Bolivian companies, formed a corporation called Aguas de Tunari (registered through the Cayman Islands). Aguas de Tunari negotiated a contract guaranteeing it 16% return to operate the water system for Cochabamba. The guarantee, in effect, allocated financial risk to the public. The contract included a confidentiality clause that precluded the public (urbanites and farmers concerned about water pricing and quality, and farmers in the surrounding area who feared loss of tenure over irrigation water) from knowing the full terms of the agreement, which superseded national laws. All of the water systems in Cochabamba, including private wells and the many small community-owned water cisterns serving those too poor to have domestic piped service, became property of the company.

Experience with Water Quality As It Relates to Ownership Regimes

In January 2000, shortly after taking over the water system the company announced rate increases. In a country where the monthly minimum wage is less than US$100 and public subsidies had been the norm in the past, price hikes to US$20 a month or more were not well received. Nor were any improvements in water quality or service yet apparent. The company, rather than investing up-front in the costs of a water development project called the Misicuni dam, was charging customers in order to raise capital to build the dam. In January, a general strike and transportation stoppage shut down the city, one of the major food-distribution hubs of Bolivia, for four days. The national government promised to roll back the rate increases and re-evaluate the contract.

By early April, it was clear that the promised roll-back would not be forthcoming. Farmers, protesting a loss of control over rural water systems, marched on the

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[283] "The fight for water and democracy: An interview with Oscar Olivera," 2000, *Multinational Monitor* (June), vol. 21, no. 6, [online], [cited May 20, 2001], <www.essential.org/monitor/mm2000/00june/interview.html>.
[284] Monica Novillo, March 10, 2001, personal communication.
[285] "The fight for water and democracy: an interview with Oscar Olivera," 2000.

city. Cochabamban protestors, who were also angry at price hikes, joined the farmers. Seven days of massive protesting ensued, as the president declared martial law and pitted the army against the marchers. Cochabamaba's downtown district was filled with tear gas, and one protester, and possibly more, was killed by police using live bullets. Others were blinded, hospitalized, or taken from their beds in the middle of the night by police and spirited away to jails in the jungle. Only an intervention by the archbishop prevented a larger massacre, which might in turn have unleashed civil war. In order to win a short-lived hiatus in the protests at a key point when police were ready to use more widespread deadly force, the archbishop falsely announced that the contract had been cancelled.[286] The protests ended when the government agreed to tear up its contract with Bechtel, whose representatives had breached their contract by fleeing the country. The company is now suing the national government for breach of contract.

A return to public ownership has apparently led to improved service at rates of half to one-third those charged by the Bechtel consortium.[287] Nevertheless, neither private nor public provision seems to have solved Bolivia's intractable water problems.

3.8 Conclusion

A review of these national experiences reveals instances where privatization has been associated with significant water quality improvements (e.g., the United Kingdom, although the benefits did not materialize without travail). There are other instances, such as Hamilton, Ontario, where little seems to suggest that privatization has led to quality improvements beyond what a continuation of public sector delivery might have achieved. And there are some cases, the most dramatic example being Bolivia, where the results have been disastrous.

One notable finding arising out of this review of the experiences of different countries is that the success or failure of privatization initiatives is rarely a matter determined by the private companies themselves; the outcome is almost always determined as much by the sophistication, energy, and attention to duty and discipline of the government on the other side of the transaction.

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[286] Ibid.

[287] Jim Shultz, 2001, "Bolivian marchers under threat," *Democracy Center On-line*, vol. 37, (April 19), [online], [cited May 20, 2001], <www.democracyctr.org/onlinenews/vol37.html>.

Another matter worthy of remark is the fact that the European Union has played an important role in encouraging member countries to meet high environmental standards. Meeting EU standards has become a point of national pride. The desire to join the European Union may prompt key policymakers in transition economies to implement environmental reform programs and improve public access to information, as was the case in Poland.[288] Environmental groups in countries that are part of the European Union (e.g., France) have successfully appealed to the Court of Justice to censure their national authorities when their governments have failed to ensure that private companies meet EU water quality standards.

Finally, environmental groups have used the Internet to ensure that water standards are not breached with impunity. Journalists rapidly draw the attention of interested citizens around the world to failures of the public and private sectors to preserve the environment.[289]

4 York, Peel, and Hamilton: Different Approaches to Water System Administration

4.1 Introduction

This chapter examines three jurisdictions in Ontario that use different approaches in administering water and wastewater programs. The different experiences of the Regional Municipality of York, the Regional Municipality of Peel, and the City of Hamilton highlight some of the important issues facing public administrators.[290] A predominantly public approach is employed by York Region; an essentially private model is used by the City of Hamilton; the Region of Peel uses an approach that falls somewhere between the other two, with the Ontario Clean Water Agency (OCWA) operating its facilities.

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[288] Brown, 1998.

[289] Jim Schultz discusses the importance of the Internet for protesting Bechtel's water policies in Bolivia. See Schultz, 2000, "Bolivia's water war victory," *Earth Island Journal,* vol. 15, no. 3 (autumn), p. 28.

[290] A report commissioned by the Walkerton Inquiry describes the various approaches employed in Ontario. See Strategic Alternatives, 2001, *Methods of Service Delivery for Water and Sewage Systems,* prepared for the Walkerton Inquiry [online], [cited May 5, 2001]. Published in 2002 as *Governance and Methods of Service Delivery for Water and Sewage Systems* by Jim Joe et al. (Toronto: Ontario Ministry of the Attorney General), Walkerton Inquiry Commissioned Paper 17, Walkerton Inquiry CD-ROM, <www.walkertoninquiry.com>.

By examining the relevant issues and decisions, as well as the specific circumstances faced by public administrators in the work of delivering programs, this chapter will demonstrate the complexity of water system governance, and will raise the question of whether the search for one best way – or its close relation, a generally applicable, simple set of best practices – in water system governance is well conceived. Administrative choices are not really reducible to the narrow technical issues required for such methodological certainty. More than two decades ago, Plunkett and Betts point out that "[c]onventional wisdom has taken the position … that proper management of municipal affairs requires keeping it above politics, that a municipal function will be best performed if it is 'taken out of politics.'"[291] Yet politics, in its broadest sense, is inevitable. Indeed, the public administrators interviewed in this study show considerable appreciation for the complexity of their local situations. Accordingly, wider contextual issues along with program performance considerations are raised in this chapter. This discussion will advance a more thorough appreciation of actual administrative choices and show how the configurations adopted by the various jurisdictions fit within the governmental reform literature.

4.2. York Region

The Regional Municipality of York includes the municipalities of Vaughan, Richmond Hill, Markham, Whitchurch-Stouffville, Aurora, King, East Gwillimbury, and Georgina. The region is experiencing considerable population growth, and estimates that its current population of approximately 600,000 will grow to 934,000 by 2011, 1.1 million by 2021, and 1.2 million by 2031. Meeting water demand associated with population growth is, therefore, an important concern of the region. Exclusive of any demand management initiatives, the total average day water demand for the region is forecast to increase from 229 ML/d in 1995 to 278.3 ML/d in 2001, 357.5 ML/d in 2011; 418 ML/d in 2021, and 466.8 ML/d in 2031.[292]

In addition to population pressure, other environmental factors have shaped the region's water and wastewater program choices. York reports that being landlocked is an important concern. York is located near Lake Simcoe, but the

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[291] T.J. Plunkett and G.M. Betts, 1978, *The Management of Canadian Urban Government* (Kingston: The Institute of Local Government, Queen's University), p. 16.

[292] York Region/Consumers Utilities, 1997, *York Region Long Term Water Project: Master Plan* (July), section 2, pp.1–6. Megalitre (ML) is a metric unit of volume which is commonly used in water systems and reservoirs. A megalitre is equal to 1,000 cubic metres.

southern portion of the region – containing the bulk of its residents – is part of the Lake Ontario watershed. The region has no direct access to Lake Ontario. As well, the desire to have control over the regional water system has emerged as an important consideration.[293] Currently, York buys a substantial amount of its water from the City of Toronto.

Through its Water and Wastewater Branch, York provides services directly to the local municipalities. The branch has a complement of 78 full-time employees (FTEs) and total operating expenditures of approximately $82 million in 2000 (see table 4.1). Services are delivered through two primary areas: operations and engineering.

Operations (61 FTEs) has responsibility for maintaining all regional water supply and wastewater facilities. Engineering (16 FTEs) is responsible for infrastructure planning, approvals, design, and construction.[294] The region's infrastructure is relatively young, being about 35 years old. Some of the area municipalities, however, have distribution infrastructure that is considerably older.

The area municipalities provide water distribution and wastewater collection services to users. Water supplies are provided by York, through the operation of the Lake Simcoe water treatment facilities, municipal groundwater wells,

Table 4-1 Financial Background: Water and Wastewater Division – Operating Budget ($000s)

	1999	2000	2001	2002	2003
Salaries/Benefits	4,134	4,759	5,106	5,259	5,617
Maintenance	37,367	38,178	40,782	43, 229	44,958
Financing Charges	24,362	25,597	28,352	29,694	30,831
Reserve Contrib.	14,456	13,606	16,225	17,361	18,576
Totals	**80,319**	**82,140**	**90,465**	**95,543**	**99,982**

[293] Deborah Korolnek, director, Water and Wastewater, York Region, interviewed by David Cameron and David Whorley, May 10, 2001. See also Deborah Korolnek and Jeff Trudeau, 1999, "Waterworks under pressure: tapping into York Region's strategy for water supply," *Engineering Dimension* (July/August), pp. 29–31.

[294] York Region, "Transportation & Works: Water & Wastewater," Budget 2000, pp. 19–21. Canadian Union of Public Employees (CUPE) confirms that staffing levels have been roughly stable over the last ten years. Brian Atkinson, CUPE Staff Representative for York Region and Municipal Coordinator for Ontario, interviewed by David Whorley, July 3, 2001.

and pumping stations, reservoirs and transmission mains sourced through the City of Toronto. The York-Durham sewer system is a network of trunk sewers terminating in the Duffin's Creek Water Pollution Control Plant on Lake Ontario in Pickering. This facility treats approximately 95% of the region's wastewater. The remainder is treated through seven smaller water pollution control plants in Kleinburg, Stouffville, Schomberg Lagoons, Holland Landing lagoons, Mount Albert, Keswick, and Sutton. York sells its water to the area municipalities at a uniform rate of 79.23 cents per cubic meter for water and wastewater combined (see table 4.2). The municipalities then charge residents for water and wastewater services. York's philosophy is to charge a uniform regional rate even though residents of the northerly part of the region rely on ground water, a relatively less expensive arrangement.

York decided to develop a long-term water project intended to meet the region's needs to 2031. It was an ambitious undertaking, and the Water and Wastewater Branch initially estimated that such a program would cost approximately $850 million, a figure it thought beyond the region's financing capacity. Given the potential cost involved, York decided to explore the possibilities of public-private partnering as a way to manage costs, and devoted considerable attention to the possibilities of an eventual outsourcing arrangement, joint venture project, or a build-own-operate-transfer (BOOT) partnership. Accordingly, the region sought out potential partners through a competitive process that saw Consumers Utilities (CU) emerge as the successful candidate. The partnership involved the firm's working in a technical advisory capacity with the region to help it explore a range of long-term water supply options. CU financed the costs of the investigation and York agreed to compensate it for the study costs if CU was not chosen to be the contract operator.[295]

The region set out key evaluation criteria for the project:

Table 4-2 Water and Wastewater Charge (cents/cubic metre)

	2000	2001	2002	2003
Wastewater	36.89	37.89	38.65	39.42
Water	41.34	41.34	42.17	43.01
Total Charge	**78.23**	**79.23**	**80.82**	**82.43**

[295] Korolnek interview.

- secure water supply in support of future regional growth
- rate stability and cost minimization
- the capacity to finance future infrastructure (i.e., the spending requirements for the solution should not significantly influence York's current credit rating or ability to undertake other capital expenditures)
- participation in decision making
- environmental protection.

Other criteria emerged through the course of public consultations:

- independence (i.e., maximizing the proportion of water sourced from the region or facilities owned in whole or in part by York)
- reliability of supply
- source of supply (i.e., residents had preferences pertaining to the eventual source of the water, generally favouring other possibilities over Lake Ontario)
- economic benefits to the region.[296]

After using the evaluation criteria to examine options and cost implications of the rate and development charges, York realized that it had the capacity to finance a long-term solution. York decided on a publicly delivered system. In addition to having the required financial capacity, other important factors shaped the region's choice:

- The region had a good credit rating and could borrow money cheaply.

- The collection of development charges was restricted to municipalities.

- Since York had received provincial grants for water and wastewater infrastructure development in the 1970s, a move to contract out operations would require the repayment of those grants to the province.

- There were public concerns over the desirability of privatized operations; the potential for a disaster similar to the Yorkshire drought had some impact on the eventual choice of delivery configuration.[297]

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[296] York/Consumers Utilities, 1997, chapter 10, pp. 1–5.

[297] CUPE suggests that its efforts to stop any potential move to contract out services in York Region played a significant role in raising public concerns. In particular, it points to its work on bringing the question of contracting-out in the region to the attention of a television producer.

Nonetheless, the advisory partnership between York and CU seems to have been quite successful. The region was able to draw on the firm's experience and, in addition, saw the opportunity of working with CU as a chance to gain substantial staff development benefits for York. Administratively, CU, after having won the bid, was able to hire necessary sub-contractors for the various components of the study phase directly. This approach meant that the region did not have to go through its purchasing bylaw, a factor that York believes saved considerable time.

The long-term water project adopted by York has four components:

- Expanding the water supply from Toronto. The region requires a bridging arrangement that will see an expansion of supply obtained from Toronto until 2004 to meet shorter-term needs;

- Implementing a water efficiency program. The effort is aimed at saving up to 20 ML/d over three years;

- Constructing the Lake Simcoe water supply. This step involves the construction of a new water treatment plant in Georgina to replace the Sutton filtration plant, which is near the end of its useful life; and

- Achieving a longer-term source of supply. Initially, this final component involved the construction of a major water pipeline project from Lake Ontario through Durham Region to York.[298] While this remains a possible solution, the region now believes that it is more likely to enter into partnership arrangements with Toronto and/or the Region of Peel.

The region is making substantial inroads into water demand management through its water efficiency program, and staff estimates that the program has reduced demand by 11–12 ML/d. The program has four components: retrofits, water audits, public education, and leak reduction.

In retrofitting, the region offers to install various high-efficiency fixtures for residents free of charge. York conducts an ongoing maintenance and follow-up

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CUPE believes that the subsequent airing by the CBC's news magazine program *The Fifth Estate* of an item dealing with privatization in the UK and the possibility of private delivery in York Region did much to raise the issue's profile. Atkinson interview.

[298] York/Consumers Utilities, 1997, chapter 10, pp. 6–9.

program as part of the retrofit initiative to ensure that fixtures are working. In addition, the region performs spot audits for residents who enrol in the program, a feature that allows the region to monitor the level of water savings.[299]

Water auditing is provided free of charge to the region's heaviest water users. Professional engineers review the processes employed by the users and make recommendations regarding the installation of various fixtures to reduce water use, and provide a cost-benefit analysis to the user. Unlike the residential program, the costs of any upgrades are borne by the user. In support of the audit initiative, York has established a public awards program for water reduction efforts by the major users, and believes that it has been quite successful in promoting the notion that water conservation is a public duty as well as a cost saving measure.[300]

The public education program is a creative effort that saw the region take advantage of a gap in the province's revised science curriculum. York discovered that no teachers' guides existed for the implementation of the new provincial objectives for Grades 7 and 8. The region used teachers to create a guide that focuses on water resource protection, sustainable development, and water systems operations with specific examples from York Region. Teachers report liking the new resource since it fits within the science curriculum and fills an important gap. The public education component of the water reduction program has attracted considerable attention, and York has adopted a policy of giving the program to other jurisdictions on the condition that it will not be used for profit.

The leakage reduction component of the program involves testing the entire distribution system to locate and repair leaks. As well, York is undertaking a flow modulation control initiative that reduces system pressure overnight when demand is relatively low, thereby mitigating the impact of pin-hole leaks, which are difficult to locate. The region chose to model its water efficiency program on various municipal recycling programs and believes that it has been successful in altering residents' behaviour and attitudes toward water use.[301]

The effort to acquire a longer-term source of supply initially led the region toward the Durham West option, a major effort requiring the movement of

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[299] Korolnek interview. See also Korolnek and Trudeau, 1999, p. 30.
[300] Ibid.
[301] Ibid.

water from Lake Ontario to York. However, York is currently contemplating a number of public partnerships to solve its long-term supply program, options that make the Durham West option a less likely solution. One long-term option centres on a joint optimization study with Toronto. With the two partners engaging in a 50/50 cost sharing initiative totalling $1 million, York and Toronto will develop a sophisticated set of models to identify various pressure points in the Toronto water delivery system. The objective is to share the cost of investment in Toronto's system at the identified locations to deliver increased amounts of water to York. In return for sharing costs, the region would gain long-term access to Toronto's water system at stable rates.

A third option involves partnering with Peel Region. It was initially believed that York would require enhancements to its water supply in advance of Peel and therefore the potential for partnering was non-existent. However, Peel Region is currently facing substantial pressure to expand its system, and so the idea of a partnership, with York making financial contributions to Peel in return for long-term access at stable rates, has emerged as a possibility. The various potential partnership arrangements would allow for considerable capital savings compared to the more ambitious Durham West project, while still meeting the criteria set out in the long-term plan.[302]

Over the next ten years, York Region estimates that it will spend $900 million on water and wastewater infrastructure.[303] For 2001, water and wastewater capital programs are $72 million and $90.4 million respectively. The 2001 capital plan for water includes water mains – $24.4 million (33.9%); pumping stations, reservoirs, and filtration plants – $21.5 million (29.9%); wells and reservoirs – $10.2 million (17%); other – $15.8 million (22%). Major initiatives for 2001 include construction of phase 1 for the long-term water project in Georgina, including intake, water pumping station, treatment plant, and water mains; capital improvements, shared with Toronto; and design and construction of Newmarket West Reservoir. The wastewater capital program comprises trunk

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[302] Ibid. As well, CUPE points out with regard to the workplace environment that management has been supportive of training, an interest shared by the union, particularly concerning wastewater operations. Specifically, the last round of negotiations resulted in provision for a new job category and pay adjustment that recognized employees who had obtained level four certification in water and wastewater operations. CUPE observes that its position has been that publicly delivered services are preferable to those that are privately delivered, and that training is essential to support this position. The union notes that a spill approximately five years ago at the Leslie St. station was attributed to operator error. CUPE has therefore been supportive of training activities to prevent similar errors in the future. Atkinson interview.

[303] Please note, this report was written in August 2001.

sewers – $58.4 million (60.6%); pumping stations and treatment plants – $28.9 million (30%); and other – $9.0 million (9.4%). For the total water and wastewater programs, the region estimates that growth-related infrastructure requirements will be approximately $1.5 billion, with an additional $1 billion devoted to infrastructure that has reached 25 years of age and requires replacement.

York has made considerable efforts to raise its operating standards for its water and wastewater programs. It is using the ISO certification program, an international standard for environmental management systems. The wastewater program is currently ISO 14001 certified, and the water program is slated for ISO 9000 certification in the near future. In addition to being part of the region's continuous improvement program, efforts to achieve standards certification aim to encourage public confidence in the region's administrative capacity. Various local companies have engaged in ISO certification, and may therefore have some appreciation for the region's efforts. As well, York believes that the existence of ISO certified systems may have some impact on economic development and decisions to locate in the area. With regard to water monitoring standards, York has generally adopted provincial standards as its policy, though the staff speculates that it may become more active in setting higher standards in the future.[304]

Finally, the region stresses its commitments to active communication with the public, and to water and wastewater systems transparency; its work on long-term water project seems to support these beliefs. In the post-Walkerton period, York has not experienced substantially increased interest from local residents in the water system, though it is not certain how this should be interpreted. The region suggests, on the one hand, the public might not become strongly engaged in water or wastewater issues unless there is some potential for direct impact on residents' lives. On the other hand, the region has made considerable efforts around the administration of its water and wastewater programs. Local residents may be confident in the region's capabilities to deliver these programs. In addition to the importance of public involvement, York also points to the importance of the following objectives in its water and wastewater program: (1) ensuring the safety of the water supply, (2) maintaining confidence in the system, (3) investing in infrastructure at a sustainable cost, and (4) promoting a constructive workplace environment.[305]

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[304] Ibid.
[305] Ibid.

4.3 Peel Region

Mississauga, Brampton, and Caledon make up the Regional Municipality of Peel. Like York, the region forecasts substantial population growth. From its 1996 population of 853,000, Peel Region estimates that it will grow to 1,206,900 in 2011; 1,327,900 by 2021; and 1,430,000 by 2031.[306] Growth of this order will place considerable pressure on the region's water and wastewater programs. Mississauga and Brampton are currently supplied with water from Lake Ontario, and rely on two water treatment plants. The water mains and pumping stations that service this area make up what was formerly termed the South Peel System. However, as the system has expanded north to include parts of Caledon, it has been renamed the Lake Based Water Supply. This system is currently operated by the Ontario Clean Water Agency (OCWA).

The local distribution system is operated directly by the Region of Peel through the Public Works Department. Peel is also responsible for the supply and treatment of water in nine smaller communities in the Town of Caledon that are supplied through groundwater systems. The existing wastewater system services Mississauga, Brampton, and the communities of Bolton and Caledon East in the Town of Caledon. This system is made up of two separate gravity trunk sewer systems that terminate at Lake Ontario at the Lakeview and Clarkson wastewater treatment plants.

The Region of Peel has the lowest combined water and wastewater rates in the Greater Toronto Area (GTA); these rates have not increased since 1994. Current rates in Peel Region are 39 cents per cubic metre for water, and 48 cents per cubic metre for wastewater. The region has a single rate, though unlike York, the area municipalities do not add an additional charge for distribution. The water rates cover more than 100% of the water and wastewater program costs. In addition, the water rate finances the region's reserve fund for water and wastewater infrastructure – currently sitting at approximately $40 million. With growth, the region has taken in considerable money to create the fund with a view to long-term infrastructure stability. The development of the reserve has been helped by the fact that Peel's infrastructure is relatively new, with approximately 60% to 70% being less than 20 years old, though some of the infrastructure in the area municipalities is over 100 years old. Therefore, only relatively modest financial pressures

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[306] Regional Municipality of Peel, 1999, *Water and Wastewater Servicing Master Plan for the Lake Based System* (May), chapter 1, pp. 1–4.

are associated with refurbishment. In general, the region does significant plant expansion every five to seven years.[307]

In the wake of Bill 107, the region decided that it wanted to proceed with a contractual arrangement for its facilities. Bill 107, *Water and Sewage Services Improvement Act*, was passed in May 1997 and eliminated OCWA's ownership role. OCWA's facilities were transferred to the municipalities. Accordingly, before 1997, Peel's water and wastewater facilities were run through OCWA. In early discussions over the question of whether or not Peel should take over the operations directly, the region determined that there was little advantage in transferring OCWA staff to make them regional employees, and that there would be significant costs associated with the requirement for Peel to "skill-up" in order to run the facilities. Accordingly, the region competitively contracted with KMK Engineering to assist it with the process of locating an operator for its facilities. Similar to York's experience with Consumers Utilities, KMK was able to sub-contract as needed, and eventually brought Price Waterhouse and legal advisers on board during the process.[308] Peel issued a request for qualifications (RFQ),[309] and received submissions from Allied Water, OCWA, Operations Management International, Professional Services Group Canada Inc., South Peel Utilities, United Water Services Canada, and USF Canada.[310]

The region then issued a request for proposal (RFP)[311] that required respondents to compete in terms of technical experience and price. Notably, price was a smaller component of the evaluation, since the region did not want a potential vendor to simply "buy the contract." The steering committee of regional councillors agreed that the technical component should amount to approximately 65% to 70% of the evaluation. Eventually, OCWA was judged to have the best proposal. Peel reports that technically the agency and United Water were quite close, though OCWA was less expensive. The region also points out that, while OCWA's position as incumbent gave it an advantage

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[307] John Savage, director, Water and Wastewater Division, Peel Region, interviewed by David Cameron and David Whorley, May 15, 2001.
[308] Ibid.
[309] The Regional Municipality of Peel, 1997, *Request for Qualifications. Competitive Contract for the Operations and Maintenance of: South Peel Water and Wastewater Treatment Facilities,* Project 97-P-075, August.
[310] Savage interview.
[311] Peel Region, 1998, *Competitive Contract for the Operations and Maintenance of the South Peel Water and Wastewater Treatment Facilities, Request for Proposals*, May 27.

over the other competitors, it was prepared to take advantage of OCWA's more detailed familiarity with Peel's facilities.[312]

4.3.1 Ontario Clean Water Agency

In addition to being among the largest water and wastewater operators in the country, OCWA is unique in Ontario. It is a schedule IV government agency created under the *Capital Investment Plan Act*, and reports to the Minister of the Environment.[313] OCWA's chair and board of directors are Order-in-Council appointees, appointed in consultation with the minister.[314] At present, OCWA's board is made up of six deputy ministers. The agency's approximately 675 staff are public servants and are hired pursuant to the *Public Service Act*, with bargaining unit employees represented by the Ontario Public Service Employees Union (OPSEU). The agency receives no funding from the Ontario government but competes for operating and maintenance contracts. At present OCWA runs over 400 facilities in Ontario,[315] and had operating expenses in the order of $103.6 million for its 2000 fiscal year.[316]

OCWA reports that the fact it is clearly a government agency – operating under statute, possessing a public-sector board appointed in consultation with the Minister of the Environment, and made up of employees who are public servants – provides some reassurance to local government decision makers who had to make important choices about how to deliver water and wastewater services after the passage of Bill 107 in May 1997.[317] According to OCWA, this sense of comfort seems to have increased somewhat in the post-Walkerton/post-Bill 107 environment in which municipalities have become more aware of their increased due diligence requirements, and the risks attending the operation of water systems. This increased level of awareness may be an

[312] Savage interview.

[313] Ontario Clean Water Agency, *Memorandum of Understanding* (March 31, 1994) s. 1.5. The Minister of the Environment has chosen on a number of occasions to extend the MOU without changes.

[314] Ibid. s. 3.1 (a), (b).

[315] Ontario Clean Water Agency, [online], [May 5, 2001], <www.ocwa.com/frcorp.htm>.

[316] Ontario Clean Water Agency, 2001, *Financial Statements December 31, 2000*, April 11.

[317] Michael Brady, general counsel; Louise Morrow Wickson, vice-president Finance and Corporate Services; and Nick Reid, vice-president Business Development interviewed by David Cameron and David Whorley, June 13, 2001. See also OCWA's *Memorandum of Understanding* s. 3.1 that sets out the Minister of the Environment's responsibilities *vis-à-vis* the agency, and stipulates the minister shall "assume accountability for the activities of the Agency at Cabinet or any of its committees as required."

important underlying factor in the responses to OCWA's annual client satisfaction survey; the agency reports that it experienced a jump in overall levels of client satisfaction in 2000 and attributes this development to an improved degree of understanding on the part of local authorities.[318]

After an organizational review in 1996, OCWA established its hub and satellite system. Prior to the review, the agency was responsible for what amounted to several hundred stand-alone operations and felt that there would be collective benefits available through reorganization. In the hub and satellite configuration, OCWA now has regional plants surrounded by smaller nearby satellite operations. The new configuration delivers economy-of-scale benefits, introduces staffing flexibility, and facilitates information sharing that might not otherwise take place.[319] The agency suggests that smaller municipalities in particular seem to have benefited from the flexibility available through OCWA's organizational design. Smaller plants might, for example, only require half of a full-time equivalent (FTE) for their operation. By folding the smaller plant's requirements into the hub plant's overall duties, OCWA has been able to meet the marginal requirement efficiently. In this respect, smaller municipalities buy in to the expertise of the larger system and the benefits of mutual assistance that it provides.[320] OCWA reports that, in addition to enabling flexibility, the hub and satellite arrangement also facilitates information sharing within the system. The improved arrangement means that expertise can more easily be shared, thereby becoming a corporate resource rather than merely a local one.[321]

OPSEU reports that changes to the *Crown Employees Collective Bargaining Act* in 1995 had an important impact on OCWA's employees because they weakened contract restrictions on contracting out. The union estimates that staffing levels at Peel peaked at approximately 215 prior to 1995, while current staffing is approximately 60. Reductions were achieved through a combination of attrition and contracting out of functions.[322] There is some reason to believe that the

[318] Brady, Morrow Wickson, and Reid interview.

[319] Ibid.

[320] Ibid. See also Ontario Clean Water Agency, 1998, "Emergency preparedness: OCWA's got the situation under control," *Waterline: The Ontario Clean Water Agency Newsletter*, vol. 2, no. 111 (spring), pp. 1–3, [online], [cited May 5, 2001], <www.ocwa.com/frpub.htm> dealing with emergency preparedness in general, and the 1998 ice storm in particular. The agency points out that its "geographically diverse staff allows the agency the flexibility to move experts in and out of distress situations quickly." In the case of the ice storm, although 50 facilities were left without primary power, the agency was able to draw on backup equipment to ensure uninterrupted service during the crisis.

[321] Brady, Morrow Wickson, and Reid interview.

[322] Gary Stipe, President OPSEU local 584 interviewed by David Whorley, July 2, 2001. In this respect, OPSEU points out that the broader political agenda has led to changes at Peel. The

types of benefits derived from contracting with OCWA differ based on the size of the contracting municipality. The larger municipalities seem more likely to have in-house expertise on water and wastewater systems and are therefore more likely to be aware of the risks and responsibilities associated with these operations. Larger centres also seem more likely to have cost concerns in mind when making decisions around operating arrangements. By comparison, smaller municipalities seem less likely to have resident expertise, and therefore may operate in a state of relatively higher uncertainty compared to larger centres. OCWA reports that, although cost considerations will still be important, smaller municipalities tend to be motivated by the desire to mitigate risk and obtain expertise.[323]

The contract between Peel and OCWA took approximately one year to develop, and saves the region $67 million over 10 years. The arrangement is based on established workloads at the various facilities. The only price escalators allowed under the contract pertain to increases in hydro and natural gas. As part of the agreement, flows must stay within 5% of Peel's estimates. Investing its own money, the agency has developed a co-generation unit to cut down on natural gas and hydro costs – two major inputs in processing. Approximately 60% of the cost of supplying water pertains to hydro. In addition to reducing gas and hydro costs, the agency has cut staff and centralized maintenance.[324]

Even though OCWA and Peel had a relationship prior to the move to contracted operations, the new arrangement required attention, and Peel reports that some minor implementation issues had to be addressed. The contract altered the relationship between the two organizations. OCWA suggests that Bill 107 provoked a general change, one affecting municipalities more than it did the agency's operations. With the transfer of assets to the municipalities, local governments took on the role of owners and faced the associated increase in due diligence obligations.[325] With specific regard to Peel, one important change involves monitoring, and the region has put considerable effort into the supervision of OCWA. Peel has on-line access to OCWA's maintenance system and has two full-time equivalents to visit facilities and conduct spot checks.

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bargaining agent feels pressure to do more with less, and points to the desire on the part of OCWA to change operators to operator-mechanics as an example of such pressure. Overall, the union believes that OCWA will eventually be privatized, and that the downsizing and contracting-out efforts are indicative of the agency's preparing for such a development. In this respect, OPSEU believes that the more business-like environment has resulted in a more strained atmosphere where staff feel threatened by the prospect of further cuts.

[323] Brady, Morrow Wickson, and Reid interview.

[324] Savage interview.

[325] Brady, Morrow Wickson, and Reid interview.

Through its various monitoring efforts, the region believes that it is adequately informed regarding OCWA's operations. Under the previously existing relationship there was very little supervision, and the region was simply billed by the agency.[326] For its part, OCWA believes that the more it can interest municipalities in the operations of the facilities, the better the overall situation will be for the agency. In this respect it has made efforts toward transparency. Access to agency information has become a standard feature of OCWA's service arrangements, whereby clients can view information on finances, operating performance, and asset maintenance through Client Connection, OCWA's Web-based service.[327]

Peel is interested in standards programs. The region has created its own drinking water performance criteria that are generally stricter than the provincial requirements. To ensure that standards remained above the province's, the region mandated OCWA to meet the region's requirements as a condition of its contract. In May 1998, the South Peel water system became the first one in North America to achieve ISO 14001 certification.[328] Potential clients of OCWA are showing an increasing level of interest in ISO 14001 certification.[329] OCWA points out that ISO certification is simpler because its environmental management system (EMS) is based on the international standard. In the case of Peel, certification was obtained after three months, when a year is more typical.[330] The agency believes that the relatively short time needed to achieve certification gave it an important advantage over its competitors.

The region's efforts at achieving ISO certification and in using National Quality Institute (NQI) standards are, among other things, indicative of a quality management effort that encourages Peel to assess its programs systematically. The standards programs are intended to demonstrate to residents a high level of commitment to water and wastewater services. Peel is also reviewing water standards world wide – including EU, EPA, provincial, and federal developments – with a view to understanding broader trends and positioning Peel to be a leader in drinking water quality.

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[326] Savage interview.

[327] Brady, Morrow Wickson, and Reid interview. See OCWA's Web site at <www.ocwa.com>.

[328] Ontario Clean Water Agency, 1998, "Peel Water System First in North America to Receive ISO 14001 Registration," press release (June 22).

[329] The agency's Environmental Management System (EMS) is based on the ISO 14001 and operates in all OCWA facilities. Along with Peel, the EMS for the Sault Ste. Marie West Water Pollution Control Plant is also officially registered to the ISO 14001 Standard. See Ontario Clean Water Agency, 2000, *Sault Ste. Marie Pollution Control Plant Earns ISO 14001 Standard*, press release (July 26).

[330] Ontario Clean Water Agency, 1998.

4.3.2 Longer Term

Like York, Peel has a long-term plan in place for its water and wastewater programs, and has developed its *Water and Wastewater Servicing Master Plan for the Lake Based System*.[331] This plan sets out major growth-related capital investment until 2031 amounting to approximately $672 million ($1999) – see tables 4.3 and 4.4 – with approximately $276 million devoted to the water system, and the remaining $396 million to wastewater.[332] The plan calls for

- a water efficiency program in cooperation with area municipalities, the public and businesses, aimed at reducing per capita consumption by 10 to 15% over 20 years. This plan will be based explicitly on York Region's program. Currently, Peel sells high efficiency fixtures to residents at cost.
- an expansion of its water treatment plants, and the implementation of a plant optimization program
- establishing a new feeder main and reservoir system to service growth north of the airport and in east Brampton
- extending a new western feeder main and reservoir system from Meadowvale North reservoir to service west pressure zones in west Brampton
- increasing east-west transmission capabilities.

To meet demand pressure to 2031, the wastewater component of the plan calls for

Table 4-3 Water and Wastewater Master Plan: Forecast Capital Expenditures for Water System

	1999–2005	2006–10	2011–15	2016–20	2021–31	**TOTAL**
Expenditures ($000s 1999)	124,494	80,872	44,443	20,888	5,000	**275,697**

Table 4-4 Water and Wastewater Master Plan: Forecast Capital Expenditures for Wastewater System

	1999–2005	2006–10	2011–15	2016–20	2021–31	**TOTAL**
Expenditures ($000s 1999)	179,000	79,157	51,110	7,550	79,252	**396,069**

[331] Peel Region, 1999, *Water and Wastewater Servicing Master Plan for the Lake Based System.*
[332] Peel Region, 1999, *Water and Wastewater Servicing Master Plan for the Lake Based System: Appendices,* appendix F.

- constructing additional treatment capacity at both the Lakeview and Clarkson wastewater treatment plants
- making improvements to the Etobicoke Creek trunk sewer
- making a pumping station transfer from the west trunk to east trunk system in order to delay the need to increase conveyance capacity of the Credit River valley sewer until after 2021.

Since Walkerton, Peel reports an increase in requests from the public for water analysis, and more questions about sewage treatment. The region reports that it makes efforts to be open with the public and has an ongoing public education program distributing books, pamphlets, and bulletins to residents. Peel has historically been active with regard to public communication. Specifically, in advance of the provincially legislated requirement, the region was sending water quality reports to residents. Peel views the crisis at Walkerton as an opportunity to cement the relationship between the region and local residents.[333]

4.4 City of Hamilton

The current City of Hamilton resulted from the amalgamation of the former municipalities of Ancaster, Dundas, Flamborough, Glanbrook, Stoney Creek, and the old City of Hamilton: municipalities that made up the previous Regional Municipality of Hamilton-Wentworth. Unlike York and Peel, population growth is not a major factor shaping Hamilton's water and wastewater systems. Statistics Canada reports that the Hamilton metropolitan area's population grew relatively slowly at approximately 4.6% between 1996 and 2000, increasing from 642,000 to 671,000.[334] Although the population base is relatively stable, the challenge for Hamilton is to maintain the current infrastructure, which is quite old. The city's new Infrastructure Asset Management Strategy (IAMS) sets out the overall view for water and wastewater and notes that the system requires approximately $2 billion in the next ten years. "This significant amount required will address the accumulated deficit in infrastructure, as approximately 50%–60% of the systems are 50–100 years old."[335] Hamilton's water treatment plant, for example, was constructed in 1933 and underwent expansion in 1955, while the three wastewater facilities were constructed in the 1960s and upgraded in the 1970s. Many of the infrastructure pressures fall into what Hamilton

[333] Savage interview.

[334] Canada, Statistics Canada, Census of Metropolitan Areas [online], [cited May 5, 2001], <www.statcan.ca/engish/Pgdb/People/Population/demo05.htm>.

[335] City of Hamilton, 2001, *100 Year Report – Infrastructure Asset Management Strategy*, TOE1014, p. 3.

terms the "baby boomer bubble," that component of local infrastructure put in place between 1945 and the early 1970s that is moving from requiring major maintenance to rehabilitation.[336]

Approximately 50% of the wastewater system is a combination sewer that performs both sanitary and storm sewer functions. The question of temporary storage capacity is, therefore, an important concern for the city. A storm that passes through the city – or even only part of it – can cause a serious spike in processing requirements as storm water flows through. Presently Hamilton has five storage tanks in place and will be building two more. The largest tank will be 4 km in length and will take five years to construct. The addition of new sewage storage capacity will allow for better control over the system. The city is also putting in place real-time control and storm tracking systems that will allow for automatic system adjustment caused by increased sewage flow. The effort is being undertaken in cooperation with McMaster University. The new capability will be ready in approximately two years.[337]

To meet these demands the city put in place a 15-year plan that will see water rates increase annually along with storm sewer and road levies to meet the infrastructure deficit.[338] Over the next seven to ten years, rates will increase between 8% and 10% per year. Currently, the costs of the water and wastewater program are fully recovered through the program's own revenue.[339]

Table 4-5 City of Hamilton: Water and Wastewater Division Operating Expenditures

	1999 Budget ($000s)	2000 Budget ($000s)	% Change
Water	38,393.3	44,485.3	15.9%
Wastewater	38,373.8	41,118.6	7.2%
Storm Sewers	9,931.3	11,301.6	13.8%
TOTAL	**86,698.4**	**96,905.5**	**11.8%**

[336] Ibid. The city defines major maintenance as "maintenance and repair activities generally unplanned over the course of a year. These would include such events as repairing water main and sewer breaks, repairing valves, replacing individual sections of pipe, sealing, etc.," p. 7; rehabilitation is "a major scheduled activity [that] is typically required to upgrade or rehabilitate the system such that it can continue to provide service for an additional time period," p. 5.
[337] Robert Crane, director of Water and Wastewater Division, and Jeff McIntyre, manager of Water Quality, interviewed by David Cameron and David Whorley, May 17, 2001.
[338] Ibid., p. 4.
[339] Crane and McIntyre interview.

In recent years, the city's Water and Wastewater Division has been active in convincing council to endorse a sustainable financing arrangement for its infrastructure as part of Hamilton's overall IAMS.[340] The asset management program now in place involves reviewing the needs of the existing system and obtaining approval for the necessary expenditure and rate increases. Between 2000 and 2002, Hamilton will make additional capital expenditures of $180.1 million ($47.3 million on water, $101.2 million on wastewater, and $31.6 million on storm sewers). Between 2003 and 2019, the city will spend an additional $941.1 million on capital expenditures ($349.1 million on water, $410.2 million on wastewater, and $181.8 million on storm sewers). [341]

4.4.1 Philip Utilities Management Corporation and Philip Environmental

Although the city has responsibility for capital investment, day-to-day water and wastewater program delivery is the responsibility of a private contractor. In January 1995, the former Regional Municipality of Hamilton-Wentworth entered into a contractual agreement with Philip Utilities Management Corporation (PUMC), and Philip Environmental (PE) – later Philip Services Corporation – regarding the operation and maintenance of the city's water and treatment facilities, pumping stations, and reservoirs. PUMC was a subsidiary of Philip Environmental and charged with the primary responsibilities. [342] The eventual failure of PUMC's parent corporation, Philip Environmental, was a leading Canadian business story through 1998 and 1999 and was a matter of concern for the region and, later, the amalgamated city of Hamilton.[343] The

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[340] *100 Year Report – Infrastructure Asset Management Strategy*, p. 2.

[341] City of Hamilton, 2000, *Waterworks – New Program. Transportation, Operations and Environment 2000 – 2009 Capital Budget*, April 25.

[342] The parent corporation was, among other things, a guarantor for the contract. In this regard, section 24.01 provided that PE would guarantee the "performance by PUMC of its obligations pursuant to this agreement. Philip Environmental agrees that it is jointly and severally bound with Philip Utilities hereunder for the fulfilment of Philip Utilities' covenants and in the enforcement of its rights hereunder and the Region may proceed against Philip Environmental without first being required to proceed against Philip Utilities." *Plant Operations Agreement*, December 30, 1994.

[343] The agreement seemed to contemplate a number of possible scenarios under S. 18.04, the "Extraordinary Events of Default" provision. This section entitled the non-defaulting party to give notice of termination of the agreement. Under 18.04, one such instance of an extraordinary event of default would be "[i]f Philip shall make any assignment for the general benefit of creditors or shall cease or threaten to cease carrying on business or shall take or threaten to take any action to liquidate its assets or shall stop making payments to creditors in the ordinary course of business or shall institute or have instituted against it any proceeding under any statute or otherwise relating to insolvency or bankruptcy or if any custodian, receiver, manager or other person with like powers shall be appointed to take charge of all or any part of Philip Environmental undertaking business

parent corporation fell quickly, with shares going from a high of $29.90 in September 1997 to a low of 11¢ before the sale of PUMC went ahead in 1999.[344] In the spring of 1999 PUMC was sold off to Azurix Corporation, a subsidiary of Enron Corporation. The new firm took over PUMC's contract with the city in May 1999.[345]

In 1994, Philip Environmental approached Hamilton-Wentworth to explore the possibility of entering into a contractual arrangement to deliver the region's water and wastewater program. Philip promised to increase employment in the region and guaranteed program savings. The regional council directed staff to come to an agreement with Philip, thereby choosing to single-source the contract. In this respect, council was particularly interested in Philip since there were no Canadian companies working in the area of large-scale contracted water systems and council wanted the contract to go to a Canadian company.

The original negotiations were carried out by regional staff assisted by KPMG and contracted legal support. As well, Hamilton-Wentworth and PUMC both brought in contracted support to calculate the region's baseline information for its water and wastewater program – information that would eventually feed into the baseline operating criteria for the contract.[346]

The eventual deal was concluded in December 1994. Philip promised to create an international training centre in Hamilton, a requirement that was subsequently dropped in a later agreement. In addition, the company promised to create 100 jobs in the region and to invest a further $15 million locally. As well, Philip committed to keep its head office in the city. Hamilton believes that Philip substantially met the economic obligations. The contract was for $187 million over ten years and guaranteed Hamilton a $700,000 rebate per year. After the rebate, the contractor would retain the first $1 million in savings. Savings in excess of $1 million would be shared on a 60/40 basis between the contractor and the city respectively. Although the savings level has never

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property or assets or if Philip Environmental shall commit any other act of insolvency or bankruptcy." In the light of subsequent events encountered by PE, it was a provision that the region would have some opportunity to consider.

[344] Philip Environmental's problems did not stem from PUMC, but rather from revelations in January 1998 that over US$90 million in Philip's metals division had been lost through unauthorized copper trading (in press).

[345] Azurix Corporation's purchase of PUMC became the basis for Azurix North America. Mark Hudson, Marketing and Public Relations, Azurix North America. Correspondence with David Cameron, June 29, 2001. See also Azurix Corporation, *1999 Annual Report*, p. 13.

[346] Crane and McIntyre interview.

exceeded the million dollar threshold for the sharing mechanism to trigger, the city reports that savings are nearing this point.[347] Azurix North America reports total staffing of 130 for Hamilton in January 1, 1995, with 121 bargaining unit employees and nine non-bargaining staff. Since then, this staffing level has been reduced from 130 to 47, of which 31 are in the bargaining unit.[348]

Hamilton notes that there were significant problems with contractor supervision – problems that it since has taken steps to correct – and points out that the regional council initially believed that in entering a contract with PUMC it had transferred all liability to the contractor. Under the agreement, however, the city still retains ownership of all facilities and continues to have ownership responsibilities. Initially the region had only one employee to manage the relationship with the vendor. In September 1998, two staff were allocated, though the amount of work required in monitoring all of the region's various stations, along with three wastewater plants and a water treatment plant, could not be adequately covered by the pair. The city has since approved six more staff, bringing its monitoring efforts to eight FTEs in its water quality group.[349]

Between 1996 and 1999 the region, and later the amalgamated city, experienced ten incidents pertaining to its wastewater system. There are currently 18 charges outstanding against the private operator and the city; these issues remain before the courts. The city believes that the various spills are all related to mechanical failures that cannot be attributed to the presence of a private contractor. Hamilton does not believe that the spills are related to staff layoffs, work reconfiguration, or changes to the computer monitoring system.[350] These points are, however, contested by employees.

The members of Local 772 of the International Union of Operating Engineers (IUOE), the major bargaining unit in the water system,[351] initially supported

[347] Ibid.

[348] Mark Hudson, Marketing and Public Relations, Azurix North America, correspondence with David Cameron, June 29, 2001 and personal communication with David Whorley, July 3, 2001.

[349] Crane and McIntyre interview. Azurix North America observes that "the eight FTEs are not solely dedicated to monitoring the ANA contract – they comprise the water quality group which oversees the entire region including the distribution and collection systems which ANA does not manage." Mark Hudson, Marketing and Public Relations, Azurix North America, correspondence with David Cameron, June 29, 2001. Azurix North America also notes that oversight activities of the eight FTEs also cover septic hauling, combined sewer overflow infrastructure, and capital works projects. Mark Hudson, communication with David Whorley, July 3, 2001.

[350] Crane and McIntyre interview.

[351] Operating engineers conduct work through the water and wastewater system. They are required to pass formal examinations in order to obtain certification through the Ontario Ministry of the

the region's privatization initiative, with 68% of the bargaining unit endorsing the change. In particular, the bargaining unit suggests that the employees felt PUMC would be a more effective manager than the region had been in its experience. As well, PUMC promised new opportunities to employees, including the possibility of work assignments in other industries in the Hamilton area and promised that no layoffs would commence prior to March 1996.[352] The support of the major bargaining agent therefore seemed to bode well for the region and PUMC.

The IUOE reports, however, that in December 1996, PUMC initiated a strategic planning exercise, an effort that included employee participation. IUOE members were interested in being involved in the exercise. Given general expectations of upcoming layoffs, they were concerned about problems related to older worker adjustment. No formal plans on the issue emerged from the exercise, a shortcoming that IUOE believes contributed to subsequent problems. Leading up to March 1996, PUMC changed work assignments, and in April that year laid off 30 employees including maintenance staff, stationary engineers, and operators. The layoffs were concentrated in the main Woodward Avenue plant, though the Dundas and Waterdown plants were also affected.[353] Restructuring continued through January 1997. During this time PUMC centralized operations, and staff were no longer permanently located in facilities outside the Woodward plant. In August 1997, PUMC laid off an additional 20 staff, including assistant operators and maintenance staff. According to the IUOE, the general shift to decreased staff levels and centralized operations created some worry in the minds of employees. In particular, they were concerned about adequate overall coverage, the travel time needed to get to the various peripheral facilities, and the fact that the existing equipment was quite old and of decreasing reliability.[354]

According to the IUOE, PUMC wanted to address the reduction in staffing, in part, through a preventive maintenance program, a view contested by Azurix North America. Employees were generally supportive of this initiative, one that typically involves setting standards and schedules for the replacement of

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Environment in water treatment and water distribution and wastewater treatment and collection. The level of certification required is based on the nature of the particular facilities. Certification runs from levels 1 to 4.

[352] Greg Hoath, Business Agent for the International Union of Operating Engineers, Local 772, interviewed by David Cameron and David Whorley, May 10, 2001.

[353] Ibid.

[354] Ibid.

various equipment components. In the IUOE's estimation, the process that emerged, however, was much more informal, involving a look, listen, sniff approach rather than formal standards setting and scheduling.[355] In July 1998, the operator started to collapse the existing 28 job classifications into eight generic job types, with a view to encourage multi-skilling. One goal of the classification overhaul was to have maintenance work performed by operators. The operators expressed some concern that they were not qualified to conduct such work. As well, PUMC announced plans for a training program. The initiative was controversial given that, according to the IUOE, employees viewed the program as a staff reduction exercise in which employees who failed to obtain the required grade would be laid off. Management and the IUOE spent most of the year in discussion regarding training and possibilities around early retirement for older workers. The bargaining agent proposed an early retirement program rather than requiring older workers to undergo training. Given the nearness to retirement of some employees, the IUOE suggested that the return on the company's training investment would be limited.[356]

In May 1999, PUMC was sold to Azurix, a subsidiary of Enron Corporation. This change in contractors required council approval. Council approved the sale and the continuation of contracted services through Azurix by one vote. Significant concern was expressed by city council regarding the fact that the company was American.[357]

Azurix North America (ANA) promised to spend $7 million on infrastructure in Hamilton. Subsequently, Enron made no secret of its desire to sell Azurix. Given speculation around the sale of Azurix North America, Hamilton city council discussed options regarding water and wastewater services, including the possibility of taking operations back in-house.[358] However, if the city takes this action, it will have to refund Azurix the $7 million it is spending on infrastructure.[359]

On June 6, 1999, the bargaining unit commenced a four-month strike. In the wake of the stoppage, Azurix North America agreed to put in place an early retirement program. Employees were offered a choice of layoff, early retirement, or training. Seventeen employees expressed interest in staying with the company;

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[355] Ibid.
[356] Ibid.
[357] Crane and McIntyre interview.
[358] Ibid.
[359] Ibid.

all others opted for layoff or early retirement. Given that Azurix had used replacement workers during the strike, the IUOE agreed to allow the company to use the replacement workers as a bridge until it could hire staff to run the system. Even so, the IUOE suggests that Azurix North America has had a difficult time hiring and retaining qualified staff and believes that the company's problems are explained by its reluctance to pay current market prices for the skills it seeks.[360] This belief is contested by Azurix North America, which suggests that its staff are among the best paid in the country.[361]

Although the city is confident the sewage spills that took place after operations were contracted out were not attributable to the presence of a private contractor or its staffing and operational decisions, the IUOE believes the explanation for the various incidents is more complex. Like the city, Local 772 points out that the wastewater system is quite old. However, prior to contracting out, the bargaining agent believes that staff were better able to catch breakdowns quickly as they emerged. Employees recognized that they were applying makeshift solutions to problems that needed more comprehensive treatment, even though they believed that they had become proficient at deploying various band-aids. According to the IUOE, the relatively fast response was made possible because staff were on site – rather than centralized – and they were familiar with the idiosyncrasies of various pieces of aging equipment. Thus, in the union's view, centralization, combined with increasingly unreliable equipment and diminishing staff levels, reduced the capacity of employees to respond quickly to breakdowns. The IUOE agrees with the city that given the condition of the equipment, various mechanical failures would certainly have occurred regardless of the operator in charge. However, the bargaining agent believes that the operator's choices regarding the assignment of work and staffing levels meant that the incidents were more serious than they needed to be. In this respect, the IUOE points to a pump failure in June 1998 where the resulting sewage spill lasted for an estimated 15 days before it was noticed.[362] For its part, Azurix North America contests this point, and notes that it has no information regarding the duration of such a spill.[363]

The IUOE believes that the problems experienced subsequent to privatization are attributable to poor planning. The union suggests that the vendor made

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[360] Hoath interview.
[361] Hudson, July 3, 2001.
[362] Hoath interview.
[363] Hudson, July 3, 2001.

important changes to work organization and staffing levels before investing in technology or infrastructure, investments that might have helped to mitigate the severity of some of the incidents. However, the general incentive structure of the contract requires the operator to generate savings for profitability. The bargaining agent suggests that this structure led the operator to prefer staff cuts – with the prospect of generating savings relatively quickly – over investment. In addition, the IUOE points to some important features of the contract that may have contributed to Hamilton's problems. With the shift from public to private operations, the bargaining agent believes that incident reporting has been less effective. Under full regional control, the reporting process was relatively clear and required the region, as operator, to report any spills immediately to the Ministry of the Environment. When ownership and operations are split, the IUOE observes that there is a disincentive for the operator to report quickly or frankly to the ministry, given that a particular spill may be cited as a failure to meet the performance standards of the contract.[364] Azurix North America contends that the IUOE's view on reporting is specious and that no such disincentive exists. The company states that its reputation depends on strictly following the rules.[365]

The IUOE suggests that another disincentive might reside in the threshold that separates maintenance from capital investment in the contract: the expenditure responsibilities of the operator and the owner respectively. According to the contract, single item expenditures in excess of $10,000 are deemed to be capital,[366] and therefore the responsibility of the city. The IUOE believes that this provision led the private operator to neglect maintenance activities until smaller issues compounded to become larger issues, which required expenditure in excess of the threshold.[367] Azurix North America rejects this interpretation.[368]

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[364] The IUOE points out that while it is not precisely clear what "violation" of the contract might mean in detail – that is, a single spill might not reasonably meet a definition – nevertheless, the level of spills experienced under the private operator suggests that the contract should have been terminated. Hoath interview.

[365] Hudson, July 3, 2001.

[366] See *Plant Operations Agreement*, Section 4.05 (1), (2), and (3).

[367] In particular, the bargaining agent points to problems with plant lighting that was allowed to deteriorate until repair costs exceeded $10,000. Hoath interview.

[368] Hudson, June 29, 2001. Azurix North America adds that the maintenance budget has always been expended and that repairs and replacements are agreed upon jointly between the operator and the city. Also, Hudson, July 3, 2001.

4.4.2 Azurix

Azurix Corporation[369] is a Houston-based subsidiary founded by Enron Corporation. Azurix Corporation owns 100% of Azurix North America and is itself owned by Enron (33%) and the Atlantic Water Trust (67%). Fifty percent of the Atlantic Water Trust is controlled by Enron, and the remaining 50% is controlled by the Marlin Water Trust, which is owned by private investors.[370] Azurix Corporation was created in 1998 as part of Enron's efforts to play a leading international role in strategic water and wastewater management. In Hamilton, Azurix North America has made substantial expenditures of approximately $13.4 million: headworks ($6.9 million); the supervisory control and data acquisition (SCADA) system ($3 million); centrifuges ($3 million); flight and chain ($310 thousand); and the sludge facility ($200 thousand).[371]

Azurix Corporation was launched with some fanfare. It was initially headed by Rebecca Mark, a long-time executive with Enron and considered one of the most powerful women in American business in the 1990s. Nonetheless, Azurix Corporation quickly found itself in financial circumstances that seem in some respects reminiscent of Philip's problems:

- Azurix's initial public offering (IPO) in June 1999 raised US$700 million, based on $19/share.

- In October 1999, Azurix Corporation and Enron were named in five class action lawsuits, filed under U.S. federal securities law. The suits were on behalf of investors who claimed that Azurix sold its stock at inflated prices.

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[369] There have been some important developments since this report was completed in early August 2001. In autumn 2001, Azurix North America was sold to American Water Works, the largest U.S. publicly traded enterprise devoted exclusively to the water and wastewater business. Before the deal was completed, the German conglomerate, RWE AG, acquired American Water Works. See: Eric McGuinness, 2001, "Hamilton's new water company serves millions," *Hamilton Spectator* (August 8), p. A03; *Hamilton Spectator*, 2001, "German giant buys city's water works" (September 18), p. D01; Eric McGuinness, 2001, "Azurix sale could place city in financial squeeze: councillor wants to explore civic operation of sewer and waste services," *Hamilton Spectator* (November 9), p. C03. Also in autumn 2001, Enron, the former parent company of Azurix, which owned Azurix North America, lost $61 billion in investor wealth in one of the most dramatic corporate collapses ever. See Gretchen Morgenson, 2001, "A roster of awards better off unawarded," *New York Times*, December 30, 2001, Section 3, p. 1. On December 2, 2001, Enron filed the largest Chapter 11 bankruptcy in U.S. history.

[370] Hudson, June 29, 2001.

[371] Ibid.

- In February 2000, eight months after its IPO, the company made a US$600 million junk-bond offering and used all but US$18 million to pay credit lines and a credit agreement with Enron.
- In August 2000, Rebecca Mark resigned as chairwoman and CEO of Azurix.
- For the quarter ending September 30, 2000, Azurix reported a loss of US$3.6 million, on revenue of US$170.5 million.
- By October 2000, 16 months after its IPO, Azurix's stock was trading for $3.75/share.
- Through 1999 and 2000, a number of senior executives departed Azurix, including the chief accounting officer, the chief financial officer and vice-chairman, and the president of Azurix's Internet venture WaterDesk.
- In December 2000, Enron purchased the 38.8 million publicly traded shares of Azurix, effectively taking the company private, and expressed interest in selling the company (in press).

After initially contracting with one vendor, Hamilton has experienced the arrival of a second firm, and now seems to be facing the possibility of a third operator. The change from PUMC to Azurix North America, and potentially to another vendor, has been driven by events at the level of the parent corporation and beyond. Azurix North America observes that "changes in ownership of service providers is not unusual in the water industry … [t]he water industry is capital intensive and service providers require more financial backing as they grow. ANA views the eventual purchase of the company as a positive move that will provide the capital resources needed to maintain our growth rate."[372]

Moreover, the company suggests that, at the local level, a change in ownership is a relatively minor issue.[373] Notwithstanding this view, however, both the union and the city report improved relations with the new operator compared to PUMC. The Water and Wastewater Division indicates that a more cooperative relationship has emerged with the shift from PUMC to Azurix North America and that there seems to be an increased willingness to meet the spirit, rather than the letter, of the contract.[374] Similarly, the division suggested that working with the new vendor amounts to a "lower maintenance" affair overall, and that Azurix North America

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[372] Hudson, June 29, 2001.

[373] Dave Clancy, senior vice-president Operation and Maintenance; Klaus Stolch, senior vice-president Engineering; Laird Smith, chief operating officer; and Mark Hudson, Marketing and Public Relations, interviewed by David Cameron and David Whorley, June 29, 2001.

[374] Crane and McIntyre interview.

does not address its obligations through the cheapest means possible.[375] For its part, the IUOE indicates that the workplace parties, notwithstanding the strike of 1999, seem to be working better together. However, the IUOE indicates that persistent issues remain, such as understaffing and under-skilling, that the bargaining agent believes are critical and in need of resolution in the short term.[376]

Azurix North America observes that the relationships have experienced an important change. The company indicates that "[s]ince purchasing the Hamilton contract in 1999, ANA has invested a lot of time and effort in improving labour relations at the treatment facilities," and reports "an impressive change in attitude which is reflected in the trend in grievances" that fell from 56 grievances in 1999 to 7 for 2000, and which are currently at nil.[377] Azurix North America reports that "relations with staff, the city, and union management have improved dramatically,"[378] and that these remain priority areas. The reported experiences of the city, the bargaining agent, and the firm seem to suggest that the change in ownership in 1999 was, in fact, significant. The parties indicate that relationships have not only changed, but they have generally improved. This example does not suggest that changes in operator ownership necessarily lead to improvements, but rather that their impact can be noticeable.

The city acknowledges that the PUMC experience constituted important learning. Faced with changes in the ownership of its contracted operator, the city says that it has taken the approach of "rolling with the punches," and suggests that it remains supportive of contracting out water and wastewater services.[379] City staff are reluctant to return to a public system, and indicate that the contracted-out arrangement has led to less political involvement by council.[380] City staff believe that council's involvement in contract control should be limited and that new regulations should be established so that fewer contract issues would need council's approval.[381] In the context of recent developments, the city of Hamilton is quite likely to face the prospect of a new operator in the near future and will encounter important choices about delivery of water and wastewater programs.

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[375] Ibid.
[376] Hoath interview.
[377] Hudson, June 29, 2001.
[378] Ibid.
[379] Crane and McIntyre interview.
[380] Ibid.
[381] Ibid.

4.5 Alternative Service Delivery and Water Systems

These general reviews of York, Peel, and Hamilton demonstrate a variety of methods available for the delivery of water and wastewater services. The set of case studies – while not exhaustive – do raise important issues for public administrators on how to configure service delivery. In this respect, it is useful to locate the cases within the recent administrative reform literature, given that these real life experiences help to demonstrate the complexity involved in making program choices: a complexity that the reform literature is not always eager to embrace.

Public sector reinvention gurus Osborne and Gaebler suggest that the question of structure turns on allowing various sectors to assert the natural order of things. In this widely influential view, the public sector excels at "policy management, regulation, ensuring equity, preventing discrimination or exploitation, ensuring continuity and stability of service and ensuring social cohesion."[382] The private sector is said to be better at "performing economic tasks, innovating, replicating successful experiments, adapting to rapid change, abandoning unsuccessful or obsolete activities, and performing complex or technical tasks."[383] Finally, the voluntary sector "tends to be best at performing tasks that generate little or no profit, demand compassion and commitment to individuals, require extensive trust on the part of customers or clients, need hands-on, personal attention … and involve the enforcement of moral codes and individual responsibility for behaviour."[384] It is disconcerting that this caricature of the public, private, and voluntary sectors has been embraced to a significant degree by governments in their efforts to restructure public services. The cases reviewed in this chapter strongly suggest that Osborne and Gaebler's view is in need of modification; as it stands, it is more prescriptive than descriptive. The three cases of Peel, York, and Hamilton provide the basis for a useful corrective.

Governments everywhere have engaged in substantial efforts to restructure their public services. These efforts, referred to as managerialism or the New Public Management (NPM), are, according to Donald Savoie,

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[382] David Osborne and Ted Gaebler, 1993, *Reinventing Government: How the Entrepreneurial Spirit Is Transforming the Public Sector* (New York: Plume Books), pp. 45–46.
[383] Ibid., p. 48.
[384] Ibid., p. 46.

> rooted in the conviction that private sector management is superior to public administration. The solution, therefore, is to transfer government activities to the private sector through privatization and contracting out. Given that all activities can hardly be transferred to the private sector, the next best solution is to transfer business management practices into government operations.[385]

Managerialist theory suggests that the appropriate roles for reinvented governments are those of chief policy setter and contract manager, but with a substantially diminished role in the direct provision of services. Given this view of government, various alternative service delivery (ASD) options become increasingly possible, such as contracting-out, privatization, establishing special operating agencies, and pursuing public-private partnerships.

In Ontario, the government has demonstrated notable commitment to the managerialist agenda. Perhaps most clearly, the *Common Sense Revolution* – the primary campaign document for the Progressive Conservative Party of Ontario in the 1995 provincial election – declares that the party's agenda "will have a significant impact on the way in which government and its employees do business on a day-to-day basis, because it will demand that **government does business *like* a business.**"[386] In support of this agenda, the government has developed its *Alternative Service Delivery Framework*, a document that echoes the views of Osborne and Gaebler in its emphasis on locating activities appropriate to government: "Focusing on the government's core responsibilities, ministries must review all their programs to determine which ones support those responsibilities and which do not."[387] It goes on to advise that governments should not be involved in operations, noting "[i]f a government function is largely operational as opposed to a policy function, there is often little need for a structure that comes under the direct control of the government."[388]

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[385] Donald Savoie, 1995, "What's wrong with the new public management," *Canadian Public Administration*, vol. 38, no. 1, p. 113.

[386] Progressive Conservative Party of Ontario, 1995, *The Common Sense Revolution*, 5th printing, p. 16. Boldface and italics in original.

[387] Ontario, Treasury Board Secretariat, 1996, *Alternative Service Delivery Framework* (Toronto: Queen's Printer), p. 10.

[388] Ibid., p. 11. On ASD in Ontario also see Carl Baar, 1999, "Integrated justice: privatizing the fundamentals," *Canadian Public Administration,* vol. 42, no.1(spring), pp. 42–68; Joan Price Boase, 2000, "Beyond government? The appeal of public-private partnerships," *Canadian Public Administration*, vol. 43, no. 1 (spring), pp. 75–92; Michael Jordan, 1999, "Ontario's integrated justice project: profile of a complex partnership agreement," *Canadian Public Administration*, vol. 42, no. 1 (spring), pp. 26–41.

Administrative choices are complex and informed by politics; in Donald Kettl's assessment, "public management is invariably about politics."[389] Managerialism, rather than being apolitical, is itself based on a particular set of political beliefs. According to Linda deLeon and Robert Denhardt,

> [t]he most basic premise of the reinvention movement is that the accumulation of the narrowly defined self-interests of many individuals can adequately approximate the public interest. By 'narrowly defined,' we mean the interests of individuals as they private[ly] apprehend them, unmediated by participation in the process of civic discourse.[390]

An endorsement of managerialist techniques requires a commitment to the notion of the public interest suggested by deLeon and Denhardt. The public interest is contentious, and limiting it to one political view that sees it as the sum total of the individual wants misses the considerable complexity of this concept, which is fundamental to public administration.

Managerialism also requires a commitment to the notion of the politics/policy – administration/operations dichotomy. The ability to make this distinction underlies Osborne and Gaebler's notion of readily definable roles for various sectoral actors and the Ontario government's view that an operational role for government is generally inappropriate. Distinguishing policy from operations, for example, allows for public services to hive off presumed non-core activities and assign them to the most appropriate sector. The dichotomy thereby assumes the absence of significant policy content in operational activities.

Arguments against separating the two concepts typically point to the significant choice-making that characterizes all levels of public organizations. According to this view, policy decisions are seen to occur throughout an organization. As Beetham states,

> [l]ack of clarity in policy goals may leave considerable scope to administrators over their interpretation. Or the allocation of inadequate resources may require that decisions on priorities have to

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[389] Donald Kettl, 2000, *The Global Public Management Revolution: A Report on the Transformation of Governance* (Washington, D.C.: The Brookings Institution), p. 68.
[390] Linda deLeon and Robert B. Denhardt, 2000, "The political theory of reinvention," *Public Administration Review*, vol. 6, no. 2 (March/April), p. 89.

> be made at the stage of implementation. Or the policy itself may intentionally leave considerable room for administrative discretion.[391]

Similarly, Henry Mintzberg and Jan Jorgenson have examined how corporate strategy (i.e., policy) comes to be. They point out that

> if policy or strategy is an expressly intended plan, then it follows that the process by which it is made should be highly rational. The essence of the resulting model is that cognition must precede action. In management, this has been institutionalized as the dichotomy between "formulation" and "implementation"… that none of this has ever worked was long ignored.[392]

When the realized strategy differs from the original policy direction, Mintzberg and Jorgensen suggest that a strategy be seen as a pattern of action, whether intended or not, rather than a fixed plan. This pattern is an organization's realized strategy and may differ considerably from its overall intentions.

Mintzberg and Jorgensen explain that the presence of an emergent strategy may account for a strategy that differs from the original policy direction. Actors within an organization – sometimes spontaneously – pursue actions that might be quite different from head office intentions. Such actions may modify an organization's intended direction, suggesting that "strategies can form without being formulated. Action can precede cognition, or parallel it."[393] Policy or strategy implementers make substantive decisions that can have important influence on an organization's overall direction. This suggests that if policy or strategy is in some essential way unknowable, then it becomes quite difficult to imagine a clean separation of this concept from operational actions for the purposes of establishing a contractual relationship that can be explicit in setting out the terms of performance – particularly over the longer run. The potential indivisibility of policy and operations makes the prediction of organizational direction problematic since various administrative decisions may contribute to an organization's emergent strategy. It is possible therefore to view policy and administration as inextricably bound together, not separated.

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[391] David Beetham, 1987, *Bureaucracy*, 2nd edition (Minneapolis: University of Minnesota Press), p. 96.
[392] Henry Mintzberg and Jan Jorgensen, 1987, "Emergent strategy for public policy," *Canadian Public Administration*, vol. 30, no. 2 (summer), p. 216.
[393] Ibid., pp. 220–22.

Other valid conceptions of the public and the associated notion of the public interest challenge the managerialist view.[394] Deborah Stone supports the idea that the public interest is a fundamentally contentious concept, one that she terms "an empty box" that people try to fill up. Specifically, the struggle over the very meaning of public interest – the contents of the box – is a feature of a different sort of political process that she calls "the polis," and distinguishes it from more market-based approaches discussed above:

> In a market, the public interest or general welfare is the net result of all individuals pursuing their self-interest. Given a well-functioning market and a fair initial income distribution, whatever happens is by definition the best result for society as a whole. What happens *is* the public interest. In a market, in short, the empty box is filled as an afterthought with the side effects of other activities. In the polis, people fill the box intentionally, with forethought, planning, and conscious effort.[395]

How all levels of government conceive of notions like the public and the public interest will necessarily affect how policy is made and how programs are configured.

In the three Ontario cases, it is possible to locate the various jurisdictions somewhere along a dimension from market to polis, or more traditionally, private to public. The case of Hamilton is a market model that endorses the politics of managerialism; the reliance on marketized service through a private company, along with an ongoing commitment by public servants to continue with this arrangement, clearly suggests this. For example, the Water and Wastewater Division is interested in limiting access to contractual issues by Hamilton's city council.[396] From a managerialist perspective, involvement by political representatives can be viewed as political interference once the notion of separating politics from administration is accepted. In keeping with the theory, public servants manage the contract while the private firm is responsible for operations; the involvement of politicians is therefore inappropriate. Overall direction of the water and wastewater program, in particular capital investment, remains the responsibility of the city, and is subject to Hamilton's budget process. However, the Water and Wastewater Division hopes to discourage the future

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[394] For an extended discussion of the notion of the public see H. George Frederickson, 1997, *The Spirit of Public Administration* (San Francisco: Jossey-Bass Publishers).

[395] Deborah Stone, 1988, *Policy Paradox and Political Reason* (Glenview: Scot, Foresman and Company), p. 16.

[396] Crane and McIntyre interview.

involvement of local politicians in contract management. Such a view supports Dobel's assessment that in its enthusiasm for efficiency, devolution of discretion, and entrepreneurship, managerialism sees "courts, legislatures, laws, and due process as constraints, not warrants of legitimacy."[397]

The case of York Region seems much closer to a more purely public model with its attendant political values. Discussions with York suggest that the primary reason for contemplating the possibility of a future ASD configuration for the delivery of water services was the initial estimate of the capital costs required for the system to meet the increased demand associated with population growth. After completing the study of various long-term delivery options and realizing that the region had the capacity to finance the project, the notion of using a private vendor was effectively off the table. Privatized delivery emerged as a second-best option. According to York, the ideological discussion that might be expected in making the choice between public or private provision of services never materialized; there were, according to the region, too many compelling reasons for keeping the system public.[398] Other factors suggest that York should be located nearer the polis end of the continuum rather than the market end. The region seems strongly committed to the idea of public involvement in decision making – often a difficult thing to achieve in local affairs. For example, in the wake of public consultations the evaluation criteria for the long-term water project were modified significantly based on the public's response. In addition to the original five criteria for the long-term water project, the region added a further four: independence, reliability of supply, source of supply, and economic benefits to the region.[399] Along with the standard open house approach to local consultations, the region made a considerable effort to poll residents about the project. Similarly, the region's water efficiency initiative seems reflective of less individualistic politics, particularly the recognition that the program could be linked explicitly to the public school science curriculum.[400] Finally, water conservation is seen as a civic duty, and the region's decision to give away the public education program for non-profit uses suggests a plan informed by political values located toward the public/polis end of the spectrum.

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[397] J. Patrick Dobel, 2001, "Paradigms, traditions, and keeping the faith," *Public Administration Review*, vol. 61, no. 2 (March/April), p. 167. See as well Laurence Lynn, 1996, "The myth of the bureaucratic paradigm: what traditional public administration really stood for," *Public Management as Art, Science and Profession* (Chatham, N.J.: Chatham House).

[398] Korolnek interview.

[399] York Region/Consumers Utilities, 1997, pp. 1–6.

[400] For a more extensive discussion of public participation in local affairs see K.A. Graham and S.D. Philips eds., 1998, *Citizen Engagement: Lesson in Participation from Local Government* (Toronto: Institute of Public Administration of Canada).

The case of Peel can be located between the idealized end points of polis and market. Although the region demonstrates a commitment to contracted operations, seen in its RFQ and RFP processes, the choice of OCWA as an operator is interesting. The region notes that the ongoing connection to the province is important to them, a view shared among many jurisdictions according to OCWA. Peel has advanced the notion of dichotomizing policy making and operations, yet the presence of the Ministry of the Environment as the entity to which OCWA reports seems to make the case less private, and – at least potentially – more subject to political supervision, a point considered in the following section.

4.6 Accountability and Redress

Using the notion of a social contract as a heuristic, Blanchard, Hinnant, and Wong point to the emergence of a new "social subcontract" as part of the general shift in the direction of market-based reforms to government.[401] Reformers, in their search for increased levels of program efficiency through managerialist measures, provoke an important change in the relationship between government and citizens as public administration shifts into the market. The cases examined in this chapter – ranging from more public to more private arrangements – have important implications for the ways in which citizens can hold government to account and seek correction for perceived mistakes. In this respect, it is useful to examine political and legal routes available to citizens and the features of each route under different administrative configurations.

In more fully public arrangements, local citizens have access to political mechanisms in order to ensure accountability. Here, accountability is used in the sense discussed by Richard Mulgan:

> It is *external*, in that the account is given to some other person or body outside the person or body being held accountable; it involves *social interaction and exchange,* in that one side, that calling for the account, seeks answers and rectification while the other side, that being held accountable, responds and accepts sanctions; it implies *rights of authority,* in that those calling for an account are asserting

[401] Lloyd A. Blanchard, Charles C. Hinnant, and Wilson Wong, 1998, "Market-based reforms: toward a social subcontract?" *Administration and Society*, vol. 30, no. 5 (November), pp. 483–512.

> rights of superior authority over those who are accountable, including the rights to demand answers and impose sanctions.[402]

Key democratic accountability relationships are between citizens and public office holders, and between elected public office holders and bureaucrats. Consequently, elections can usefully be viewed – in part at least – as accountability mechanisms through which citizens may express approval or disapproval of previous governmental conduct, and demand corrective action. Between elections, political accountability and redress may be sought by citizens with the objective of obtaining appropriate responses from decision makers. Citizens can also rely upon various review and appeal procedures for administrative actions including internal processes leading to bodies such as the Ontario Municipal Board and subsequently judicial review. Both of these routes are available to citizens under more explicitly public forms of organization and are quite familiar.

Important changes occur, however, once market actors are introduced into the mix, changes that have an impact on the workings of accountability. Jon Pierre has observed how recent efforts to reform public services not only alter the character of those services, but provoke a change in the identity of those who interact with them. The ideology of the reform movement includes the transformation of citizens into customers, a shift from political empowerment to economic empowerment.[403] This transformation informs the concerns of Blanchard and co-authors when they observe that "market-based reform efforts potentially replace traditional conceptualizations of the social contract between citizens and government with a social subcontract between citizens, the government and private-sector interests."[404] Once under contract, it becomes difficult for citizens – either through in-term political mobilization or periodic voting – to remove a contractor or alter the terms under which a contracted service provider is operating; at the very least, local citizens face the prospect of their government's incurring financial penalty for such actions. In the assessment of Blanchard et al.,

> [i]f, in earlier times, citizens held administrative apparatus accountable almost solely through direct political mechanisms, then

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[402] Richard Mulgan, 2000, "'Accountability': an ever-expanding concept?" *Public Administration*, vol. 78, no. 3, p. 555. Italics in original.
[403] Jon Pierre, 1995, "The marketization of the state: citizens, customers, and the emergence of the public market" in *Governance in a Changing Environment*, B. Guy Peters and Donald Savoie, eds. (Montreal and Kingston: The McGill-Queen's Press), p. 65.
[404] Blanchard et al., p. 504.

> under the citizen-as-customer paradigm, this accountability path would be altered by government's increased use of the private market for public service delivery. Although citizens may evaluate government based on the performance of private contractors, the accountability arrangements that underlie the new citizen-as-customer paradigm may be less obvious.[405]

The capacity of citizens to pursue accountability and corrective action through political avenues is weakened.

Mark Aronson suggests that large-scale contracting poses two related problems for governmental contract managers: the challenge of comprehensiveness and contract inflexibility.[406] Major contracting efforts can be usefully contrasted with incrementalism or "muddling through," as described by Charles Lindblom, and share some of the problems associated with rational comprehensive planning.[407] In Aronson's view,

> [i]ncremental policy making and large scale outsourcing find it difficult to co-exist, because effective outsourcing requires great precision and foresight on the part of those designing the contract specifications. The contractor must know in advance exactly what is required, in terms of service and performance standards. This makes it difficult to be flexible when novel cases with policy implications arise. The concept of bounded rationality can be useful here, in indicating a practical limit to the government's contractual capacities.[408]

Precision over the long run requires something rather like comprehensive rationality, a capacity generally not believed to be attainable. In any event, the cognitive limits imposed on contract makers by bounded rationality help to ensure that they will not be able to foresee all eventualities and therefore necessarily neglect provisions for important – though unforeseeable – contingencies. Problems with contractual inflexibility and limitations on contract-making necessarily become more troublesome the longer the term of the contract and the more complex the contracted services.

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[405] Ibid., p. 505.
[406] Mark Aronson, 1997, "A public lawyer's response to privatisation and outsourcing," *The Province of Administrative Law*, Michael Taggart, ed. (Oxford: Hart Publishing).
[407] See Charles Lindblom, 1959, "The science of muddling through," *Public Administration Review*, vol. 19, spring, pp. 79–88 for what is perhaps the best-known statement on incrementalism.
[408] Aronson, 1997, p. 57.

Faced with the prospect of contractual incompleteness and difficulties in effecting changes politically, citizens, now transformed into customers, must seek accountability through markets. The case of Hamilton, however, is instructive in this respect since it demonstrates an important issue in market accountability. The residents of Hamilton were PUMC's local customers for water and wastewater services. However, other powerful market actors competed with the residents for PUMC's attention. The company's lenders and investors enjoyed considerable ability to gain Philip's attention and subsequently influence action. Although PUMC should not be simply equated with the parent corporation, in this instance, the pressure on the parent corporation's bottom line and associated initiatives, such as Philip Environmental's cash conservation program and efforts to sell-off various components of the corporation – including PUMC – in response to the pressures of shareholders and lenders, had a local impact. The IUOE points out, for example, that PUMC experienced problems with local suppliers because of concerns about the company's credit, which had an impact on the program.[409] The drama of the larger financial dynamic highlights the power of distant capital market actors – investors and lenders – who were better able to achieve accountability than the local customers. The interests of these distant actors, however, had little to do with water or wastewater services in the Hamilton area. If accountability is in part about rights of authority, then it is more accurate to say that investors held most of those rights over Philip – and by extension PUMC – and not the local residents.

Even if contracts partially insulate market actors from local political pressure, there might be some possibility for local citizens to enforce accountability and seek remedies through legal avenues. However, there are problems associated with this route to accountability as well, again informed by the shift from citizenship to customership provoked by marketization of services. In other words, it does not seem possible to trade off political accountability for legal accountability in the context of public service reform. Specifically, in efforts to obtain judicial review of administrative decisions made by privatized operators, Mark Aronson has observed that "the complainant is typically conceived as a consumer with a consumer complaint, which is not the business of judicial review."[410] Marketization perceives the local citizen as a customer engaged in a private commercial role more appropriate to the market than the polis. Because of this transformation in roles, Freedland argues "[I]t would not be wholly surprising to find that … there were many situations in which the citizen as

[409] Hoath interview.
[410] Ibid., p. 47.

consumer had no sufficient interest to seek judicial review of the actions or policies of the government department which had procured the service in question."[411]

Even when the privatized provider has more public obligations, courts have shown little enthusiasm for enforcing them. For example, the concept of the community service obligation (CSO) has been developed in Australia in an effort to ensure that corporatized government business enterprises (GBEs) continue to deliver public goods. CSOs attempt to correct for the problem of market actors' deciding not to provide essential services to people who might not be able to pay for them. Allars describes CSOs as "broadly expressed duties to exhibit a sense of social responsibility by having regard for the interests of the relevant community, and by providing it with accessible services, while operating efficiently."[412] CSOs represent an approach quite different from would-be comprehensive contracting; CSOs are general obligations. The Australian case of *Yarmirr v. Australian Telecommunications Corporation* is instructive for understanding the problems associated with enforcing a CSO. In *Yarmirr,* representatives of a number of remote aboriginal communities sought judicial review to enforce Telecom's CSO to provide all Australians with standard telephone service.[413] The effort was unsuccessful. The communities argued that their high frequency radio service did not constitute a standard telephone service, and, accordingly, that Telecom was not meeting its obligations. The court found that the matters of cost and need were more appropriate for Telecom to determine rather than the courts, and were reluctant to spell out what the CSO might mean in detail. Aronson comments on *Yarmirr* that "[t]he court stressed that the relevant CSO was better regarded as an aspirational ideal, than a legally enforceable obligation."[414] Concerning CSOs more generally, Aronson suggests that their enforcement "is deliberately cumbersome, and is designed to minimise any distractions from the firms' principal focus, which is commercial."[415] The arrival of market actors, therefore, causes substantial

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[411] Mark R. Freedland, 1994, "Government by contract and public law," *Public Law*, spring, p. 100.
[412] Margaret Allars, 1994, "Private law but public power: removing administrative law review from government business enterprises," *Public Law Review*, vol. 6, no. 1, p. 69.
[413] According to the *Australian Telecommunications Corporation Act* 1989: "Telecom shall ensure: (a) that, in view of the social importance of the standard telephone service, the service is reasonably accessible to all people in Australia on an equitable basis, wherever they reside or carry on business; and (b) that the performance of standards for the standard telephone service reasonably meet the social, industrial and commercial needs of the Australian community." In Allars, p. 70.
[414] Aronson, 1997, p. 67.
[415] Ibid., p. 66.

change, transforming public power into private power and limiting avenues for redress, even in cases where a public interest is evident.

The intermediate case of Peel Region and its contracted service provider OCWA provides the intriguing potential for a continuing public accountability capacity even though the service provider works under contract for the region. Certainly, the problem of the social subcontract and the issues associated with incomplete contracting and limitations on access to judicial review are possible in the case of Peel and OCWA. However, important accountability links continue to exist between OCWA and the Ministry of the Environment (MOE), and between the ministry and citizens. These links hold some capacity for future political engagement with MOE to address potential shortcomings associated with the agency's performance.

Regarding the centrality of politics, Wiseman and Whorley discuss administration as "rather a residual category which may potentially be fully subsumed by politics; it is what is left once a political contest has attained equilibrium, if however temporarily."[416] In the context of Westminster politics, for example, political actors struggle to control the scope for political engagement, with governmental actors generally working to minimize it, and oppositional actors trying to maximize it, and thereby enable themselves to be involved with as wide a range of matters as possible. According to Wiseman and Whorley, through such political contest

> [t]he boundary thus established is only in temporary equilibrium since changes in resources or circumstances may cause it to shift. Seen from this perspective, "administration" is subject to transformation in the event that conditions permit oppositional actors to expand the scope of politics through confrontation, or conversely, governmental actors to shrink it. This approach supports the views of analysts who point to the fact that, in the end, anything can be "politicized."[417]

They examine the case of the British Columbia Ferry Corporation and the fast ferries scandal.[418] When the opposition's relative political capacity changed, it

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[416] Nelson Wiseman and David Whorley [forthcoming, 2002], *Government as a Business: Lessons on the Centrality of Politics from Canadian Crown Enterprise*, edited by Chris Dunn (Toronto: Oxford University Press).

[417] Ibid.

[418] In 1994, then NDP premier Glen Clark announced that B.C. Ferries Corp. would build three fast ferries to replace larger vessels on one of the routes between the mainland and Vancouver

was able to implicate the B.C. industry minister in what the government had designated as operational issues pertaining to the fast ferries project. The minister tried unsuccessfully to address this development by asserting a distinction between administration and policy, with personal responsibility extending only to the latter category.

The opposition's successful challenge to the British Columbia government has some lessons for Ontario. The links between OCWA and MOE, and between the ministry and citizens, allow for an arena outside of local institutions in which residents – potentially assisted by their local government and other actors – might pursue political accountability and redress for serious problems that cannot be resolved locally. By virtue of these links, MOE remains an interested actor in the delivery of water and wastewater services in Ontario. If the ministry and OCWA have established temporary equilibrium regarding how – for now – MOE's policy role and OCWA's operational role are defined, there remains some potential for this boundary to shift, depending on future events and changing allocations of political power. As Wiseman and Whorley suggest.

> almost any matter can become politicized given the mobilization of sufficient resources in the context of supportive circumstances. Therefore, the range of issues that may be safely labeled "non-political" is always in doubt because power is changeable. Given this, attempting to specify what it means for something to be administrative is not helpful; it may obscure – or in the worst case inhibit – a broader democratic dynamic.[419]

In the event of serious and irresolvable breakdown, the link to the provincial government can be viewed as an overarching public accountability mechanism with the potential to be activated through political action. Activation need not be restricted to the efforts of residents and/or their local government when

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Island. The construction of the ferries advantageously created jobs in British Columbia, but the B.C. Free Press alleges that Clark ordered the fast ferries for "purely political reasons." See B.C. Free Press, 2000, "Wanted – expert to sort out fast ferry mess," March [online], [cited January 19, 2002]. <www.bcfreepress.bc.ca/page118.html>. The ferries cost $463 million to build, more than double the original estimates. They were expensive to maintain and did not meet performance standards. In 2000, they were put up for sale for $40 million each, but no offers to buy them came for more than a year. Liberal leader Gordon Campbell promised a public inquiry into the fast-ferry debacle and political interference in the management of B.C. Ferries; however, the inquiry was quashed by NDP politicians. See B.C. Free Press, 2000, "'Keep your mouth shut!' – sez NDP," March [online], [cited January 19, 2002], <www.bcfreepress.bc.ca/page113.html>.

[419] Ibid.

facing some critical form of marketized deadlock with their contractual service provider. Certainly the opposition parties at Queen's Park, with their interest in expanding the scope of political contest, would have an important role to play. Additionally, as in Walkerton, local issues have the potential to galvanize national feeling and mobilize governments. In this respect, one attendee at the recent service marking the one-year anniversary of the Walkerton tragedy observed that "it's not the people of Walkerton alone who are the victims of this tragedy, but all Canadians."[420] The case of Peel suggests a useful method for taking advantage of "contestability,"[421] that is, the advantage of competition, while maintaining a strong and explicitly public link to the provincial government and the explicitly accountable minister.

We have looked in detail at the quite different approaches adopted by York Region, the Region of Peel, and the City of Hamilton to provide water and sewage services to their populations. By examining the relevant issues and decisions, as well as the specific circumstances faced by York, Peel, and Hamilton public officials in the work of delivering programs, this chapter reveals the complexity of water system governance. In concrete circumstances such as these, the search for "one best way" – or its close relation, a generally applicable, simple set of "best practices" in water system governance, is probably misguided. This does not mean that one cannot learn from another's experience, but administrative choices are not really reducible to the sort of narrow technical calculations a generalizable science of public administration would yield.

It has been pointed out that "[c]onventional wisdom has taken the position … that proper management of municipal affairs requires keeping it above politics, that a municipal function will be best performed if it is 'taken out of politics.'"[422] Yet, in its broadest sense, politics is inevitable, the conventional wisdom notwithstanding. Indeed, the public administrators encountered during the course of this study show considerable appreciation for the complexity of their local situations, and a commendable determination to make the decisions they judged best for their communities, regardless of what abstract theory might require. In doing so, they charted distinct paths of management and development. In this chapter we have sought to explain their diverse trajectories, to set them in context, and to deepen our understanding of the relationship between administrative regimes and performance.

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[420] Colin Perkel, 2001, "Walkerton marks first anniversary," *Globe and Mail* (May 21).
[421] Kettl, 2000, p. 40.
[422] Plunkett and Betts, 1978, p. 16.

4.7 Interviewees

York Region
Deborah Korolnek, Director, Water and Wastewater Division. May 10, 2001.

Region of Peel
John Savage, Director, Water and Wastewater Division. May 15, 2001.

Ontario Clean Water Agency
Michael Brady, General Counsel. June 13, 2001.
Nick Reid, Vice-President Business Development. June 13, 2001.
Louise Morrow Wickson, Vice-President Finance and Corporate Services. June 13, 2001.

City of Hamilton
Robert Crane, Director, Water and Wastewater Division. May 17, 2001.
Jeff McIntyre, Manager of Water Quality. May 17, 2001.

Ontario Public Service Employees Union
Tim Hadwen, Legal Counsel. May 14, 2001.

International Union of Operating Engineers
Greg Hoath, Business Agent, Local 772, Hamilton. May 10, 2001.

Azurix North America
Dave Clancy, Senior Vice-President Operation and Maintenance. June 29, 2001.
Klaus Stolch, Senior Vice-President Engineering. June 29, 2001.
Laird Smith, Chief Operating Officer, June 29. 2001.
Mark Hudson, marketing and public relations. June 29, 2001.

5 Observations and Conclusions

We began our study with the following questions: Is there a relationship between water safety and water quality, on the one hand, and who owns or who operates the water system, on the other? Does it make a difference whether a private firm or a public body owns all or part of the water system? Does it matter whether the water system is operated by a for-profit company or by a public agency?

With respect to the question of ownership, first, our tentative probe into this field suggests that who holds title to the assets is a relatively unimportant consideration in achieving good water quality, compared to a variety of other factors. We have reported on systems characterized by different ownership models; these systems have delivered high performance outcomes in some cases, low performance in others. The limited number of cases and literatures we examined in this study do not lead in a single direction, suggesting that a link, if one exists at all, may well be feeble and unimportant.

As for the difference between public and private operators, the picture is more complicated. It is clear that a significant private sector presence in the operation of a water system affects the entire management regime, just as its absence creates a significantly different context and set of processes. But the particular question before us in this study is whether the fact – namely, the presence or absence of private sector actors as such – has any significant bearing on quality performance. Although the systems may be shaped rather differently, depending on the relative roles of the public and private sectors, the public and private elements in the equation seem to be relatively minor factors in the construction of a system that delivers safe water.

Our hunch is that other considerations have a good deal more to do with determining the performance of a water system than who owns the pumping station or whether a private firm has been put in charge of delivering the water and collecting the sewage. The water quality produced by the ongoing operations of a water system depends on many factors:

- the skill and training of staff
- the overall management regimes
- the state of development of water engineering and water technology
- the condition of the infrastructure
- the existence of effective monitoring capabilities and adequate feedback loops.

Necessary for the preservation of the long-term viability and high performance of a water system are a number of factors:

- sensible water pricing policies
- the development of and adherence to long-term capital plans
- the timely renewal and expansion of the water system's infrastructure.

To reduce safety risks to a minimum, a jurisdiction should equip itself with a fully articulated operating system for water management. The recently developed Australian/New Zealand Framework for Management of Drinking Water Quality offers one of the fullest descriptions of what such a system needs to contain.[423] It constitutes an integrated system of approaches and procedures providing "directional guidance on a comprehensive preventive strategy for drinking water quality management from catchment to consumer."[424] The central feature of the framework is "to understand the entire water supply system and the events that can compromise drinking water quality and safety."[425]

The framework articulates a dynamic cycle of performance, which proceeds through the following stages:

- commitment to drinking water quality
- assessment of the drinking water supply system
- planning – preventive strategies for drinking water quality management
- implementation – operational procedures and process control
- verification of drinking water quality
- incident and emergency response
- employee and awareness training
- community involvement and awareness
- research and development
- documentation and reporting
- evaluation and audit
- review and continual improvement.

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[423] Australia, National Health and Medical Research Council/Agriculture and Resource Management Council of Australia and New Zealand Co-ordinating Group (NHMRC/ARMCANZ), 2001, *Framework for Management of Drinking Water Quality: A Preventive Strategy from Catchment to Consumer* [online], (Canberra: Australian Government Printing Services), [cited May 5, 2001], <www.nhmrc.gov.au/publications/synopses/eh19syn.htm>.

[424] Ibid., p. 6.

[425] Ibid., p. 6.

Each element is important because each supports the effectiveness of the others: "Training, communication, documented operational procedures, commitment, emergency response, community awareness, etc., are all necessary for the effective management of a drinking water system."[426]

Although the approach borrows from the quality management approaches developed in the private sector, what is relevant to our inquiry is that none of these elements assumes any particular ownership model, nor does it rule out or assume the presence of a private sector operator. The framework is, and is intended to be, generic in its application; as such, it can be applied to any of a variety of types of private-public configuration, thus implicitly confirming that, in the minds of its authors, the public or private status of the asset owners or service deliverers is not central to the reduction of risk and the protection of safe water.

This view does not imply that the choice of system makes no difference. Clearly, the logic of the situation shifts according to whether there is a single public service provider, several public agencies, or a mix of public and private actors. These different models, and others like them, yield distinctive program, organizational, and accountability patterns.

The public model enshrines the public interest as its supreme value. The model seeks to deliver a high level of public service through a public accountability system in which the electorate holds the elected representatives – usually city or regional councillors – responsible for the operation of the water system.[427] It is also a model that permits political "interference" – the intervention of politicians in what some may judge to be technical, professional, or administrative matters. This model can reduce the planning horizon for the system to the political cycle faced by the politicians, or starve the long-term needs of the system for the short-term benefit of the political actors. Its advantages have to do with transparency, political accountability, social equity, responsiveness, and citizen access. Some observers contend that the necessary regulatory function is rendered more problematic because one public body (e.g., the province) is monitoring the performance of another public body (e.g., the municipality). There may be a kind of common-culture softness in the system, and – where the regulated entity is partially dependent on fiscal transfers from the regulating entity – this softness could be seen as a programmatic conflict of interest.

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[426] Ibid., p. 7.

[427] Clearly, in the Ontario case, there are two layers of accountability – the municipal and the provincial. The provincial role is particularly focused on the general oversight of health and safety standards and environmental impacts.

The private model is designed to serve the public interest by hiving off a part of the system and its responsibilities and allocating them to a private firm. In that hived off area, the reigning value is the interest of the private sector owners, the shareholders of the company, to whom the company officers and staff are ultimately responsible. Profit making is the key requirement in satisfying the interest of the firm. The contract binding the private firm to certain undertakings and levels of performance is the central instrument for insuring that the private operator serves the public interest as well. The contract is where the public and the private interest meet; if, in the negotiation of the deal at the outset, the two sets of interests are not addressed to the satisfaction of the negotiating parties, the contract will not be consummated and the partnership will not be implemented. Thus the public interest, specified and formalized, must be expressed and embedded in the terms of the contract. The risks associated with the operation of the water system will also have been assigned to one contracting party or the other. Once the agreement goes into operation, the public benefits envisaged in this association with the private sector will be realized by the firm's compliance with the contract and its performance of the contractual terms. The public actor will have a continuing responsibility to monitor compliance. Beyond the contract, a public sector body or bodies will retain responsibility for the general regulatory oversight of the operations of the private-sector actor.

In public-private partnerships, the contract is essential. An inevitably complex relationship must be reduced to clauses in the agreement; vagueness and indeterminacy are to be scrupulously avoided. A meticulous approach is important because the allocation of costs, benefits, risks, and responsibilities to each side will be governed by the agreement for the life of its term. The terms of these agreements have tended to become lengthier in recent years, reflecting the more enduring and long-term functions the private sector has been assuming of late. This places a premium on far-sightedness and a capacity for long-term planning, since the scope for significant in-course adjustments is limited.

The centrality of the contract means that the planning, design, and negotiation of the contract need to be carried out on an equal footing between the public and private parties. Given that the private sector typically has had more experience in the negotiation of these relationships than the public sector, many municipalities have found it desirable to engage consulting and legal firms early in the process to help them achieve the ends they seek by equalizing the balance between themselves and the large, sophisticated water management firms whose services are on offer. A good private sector agreement implies a

disciplined, clear-headed public sector partner. This technique has served governments well in the cases we have examined, and it points to an unanticipated effect arising out of the simple contemplation of a move in the direction of privatization: the very act of preparing for a possible RFP has a beneficial impact, even if a decision is ultimately made to stick with a public delivery system. This is patently clear in the case of York Region, which employed Consumer Utilities to help them develop their long-range plan and to specify their future needs; at the end of the day, their analysis and planning led them to the unequivocal decision that they would be better off to deliver the water services directly themselves. But they would not have been in nearly so good a position to take this decision if they had not, with the assistance of the private firm, gone through a professional planning process.

The York example reminds us of the difference between theoretical models and practical reality. Which public-private category does the Regional Municipality of York fit into? Clearly, at the level of theory, into the public model. Yet, in making its decision to stick with direct public delivery, it was greatly aided by a highly productive relationship with the private sector. York came to understand its needs better; it reached a grounded appreciation of its financial position; and it learned about international norms and practices in part via its association with Consumer Utilities, a corporation created by North West Water and Consumers Gas. Indeed, York's sophisticated and award-winning water efficiency program was conceived primarily by Consumers Gas people who transferred their experience with energy conservation to the water conservation scene.

A similar story emerges out of the Regional Municipality of Peel, although in this case the ultimate decision was made to contract with a public corporation, the Ontario Clean Water Agency, to operate the South Peel water and wastewater facilities. Peel engaged a consulting engineering firm, an accounting firm, and a law firm to assist them in their long-term planning, their development of the bidding process, and their selection of the winning proposal. Not having operated the South Peel facilities and not having the in-house expertise, the politicians and the region's staff were clear from the start that they wished to hire these skills on contract. The issued a Request for Qualification (RFQ), which attracted eight responses; these were reduced to four qualified organizations that then bid in response to the RFP. In the judgment of the steering committee of municipal councillors and their expert advisers, the OCWA proposal was technically the strongest, and delivered savings of $67 million over the ten-year life of the contract, compared to what Peel would have had to pay had it simply extended the existing arrangement. This is a case in which private sector firms assisted in the

development of a bidding process that led to the selection of a public entity. It is also a case in which the presence of competition encouraged the public entity to identify cost efficiencies.

When governments enter into contractual relations with other organizations for the delivery of services, whether the organization is a private firm or, like OCWA, a public body, an aggressive system of monitoring contract compliance is essential if the full benefits of the agreement are to be realized. Interference in management functions is clearly inappropriate and would rapidly blur the lines of risk allocation and accountability, but ensuring compliance is desirable and entirely appropriate. Governments we spoke to that were effectively navigating in this partnership environment typically devoted significant staff resources to verifying that the stipulated terms of the contract were being met. Indeed, in some cases, such as US Filter's operation of Moncton's water treatment plant and low-lift pumping station, municipal staff enjoy real-time access to US Filter's computerized monitoring system so that they are able to observe from hour to hour what their contract partner is experiencing and doing.[428]

The Moncton experience sheds light on another matter. Given the public and political sensitivity that surrounds public ownership of water facilities, it is worth noting that, for at least some private-sector actors, ownership is not a business objective or even a necessarily desirable outcome. The original proposal the City of Moncton and US Filter, a division of Vivendi, discussed was a BOOT arrangement: the company would build, own, operate, and ultimately transfer the ownership of the pumping station and water treatment plant to the city. However, Canadian tax law made some aspects of this approach problematic, so that the following arrangement was made: US Filter would design, build, and pay for the $21.5 million dollar facility; Moncton would own it; US Filter would lease back the facility for 20 years and would obtain an exclusive right to sell water to the city for 20 years. The point was made in an interview with a company official that ownership of a potentially stranded asset is of little interest to the firm; the opportunity to generate revenues by building and managing the operation long enough to turn a reasonable profit was what US Filter wanted to do.[429]

An unquantifiable factor of importance that merits consideration in contemplating a shift – especially, a dramatic shift – from a public to a privatized regime is the

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[428] Interview with Wallace MacKinnon, USF Canada, May 18, 2001. Peel Region has a similar arrangement with their service provider, OCWA. See chapter 4.
[429] Ibid.

alteration in attitude and behaviour of citizens when they are confronted with this change. Perhaps the best example of this is to be found in England, which, at the end of the 1980s, underwent the most radical transformation in the ownership and management of its water and wastewater system that any country in the industrialized world has experienced. (Discussed in chapter 3). One of the privatized watershed authorities is Yorkshire Water Services. In 1995, Yorkshire experienced drought conditions. A number of factors, including corporate mismanagement, severely threatened the water supply. The Yorkshire authorities called on citizens to conserve their use of water. The citizens, who under the old regime might have been expected to respond sympathetically, instead refused and water demand went up. It is not clear from the information we have gathered what was happening in this case, and whether Yorkshire residents were responding as consumers or as citizens, but it appears that they took their anger out on a profit-taking company that had hiked the water rates, was harvesting tidy profits, and yet was now failing to deliver the service. This experience is a cautionary tale for any jurisdiction considering a wholesale transformation of its water and wastewater system; there is a sensitive political ecology as well as a natural environment within which these systematic changes are made, and it is vital that they be understood clearly.

Finally, the British experience suggests another point. Whatever one's opinion of the old system in comparison to the water system that exists in England and Wales today, there can be little doubt that the transition from one to the other was troubled, costly, and difficult for many of the residents. It is surely advisable that the most systematic analysis and planning be undertaken before any major alteration in a highly complex system is proceeded with. The human and financial transition costs of failing to do this can run very high; to the extent that they can be avoided or minimized, they should be.

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Beecher, Janice A. 2001. *Testimony on Water Infrastructure Needs Presented before the Subcommittee on Fisheries, Wildlife and Water Committee on Environment and Public Works, United States Senate.* On Behalf of the H_2O Coalition. Washington, D.C.: The Subcommittee on Fisheries, Wildlife, and Water, March 27 [online]. [Cited May 15, 2001.] <www.senate.gov/~epw/bee_0327.htm>.

Beecher's testimony is aimed at contributing to the dialogue about water infrastructure needs by debunking some of the myths and identifying the real challenges.

Beecher, Janice, G. Richard Dreese, and John D. Stanford. 1995. *Regulatory Implications of Water and Wastewater Utility Privatization.* Columbus, Ohio: The National Regulatory Research Institute.

The authors compile 30 cases of water and wastewater privatization and five cases of municipalization. They discuss the barriers and incentives for privatization in the United States, the role of regulation, and the global issues that arise with increasing competitiveness in the water industries.

Behm, Don. 1997. "Water firm wins some praise." *Milwaukee Journal Sentinel.* December 14, p. 1.

This article discusses the background of the public-private partnership between the Milwaukee Metropolitan Sewerage District and United Water Services.

Benidickson, Jamie. 2002. *Water Supply and Sewage Infrastructure in Ontario, 1880–1990s: Legal and Institutional Aspects of Public Health and Environmental History.* Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 1. Walkerton Inquiry CD-ROM. [Online.] [Cited autumn 2001.] <www.walkertoninquiry.com>.

This paper surveys the evolution of water supply and sewage arrangements in Ontario from the late 19th to the late 20th century. A list of provincial initiatives in the area of water quality is provided in Appendix 6.

Bjornlund, H. and J. McKay. *Are Water Markets Achieving a More Sustainable Water Use?* [Author's files.]

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This article examines the risk management and insurance issues that relate to the water contamination incident at Walkerton and describes the regulatory and legislative changes pertaining to water quality that were subsequently introduced in Ontario.

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The first volume of this report describes the role of the federal, regional,

and state agencies that regulate the region's water. The second volume draws attention to areas that are ripe for reform, such as overlapping authority between agencies and departments, conflicting mandates, lack of coordination, and other jurisdictional issues.

Bögeholz, S. *Water Services Credits: Towards a Growing Sustainable, Competitive, Reformed Urban Water Industry.* [Author's files.]

This paper argues that it would be reasonable to adopt storm water and rain water credits so that urban customers would be rewarded for installing environmentally friendly on-site water services technology, rather than relying solely on Roman drainage systems, which are a major source of disease.

Bond, Patrick. 2000a. "Economic growth, ecological modernization or environmental justice? Conflicting discourses in post-apartheid South Africa." *Capitalism, Nature, Socialism.* Vol.11, no. 1, March, p. 33.

The author uses three case studies to show "how the ANC government has dealt with its disastrous environmental inheritance via high-profile infrastructure programs and projects," (p. 33). He offers suggestions for building a stronger alliance between community, labour, and environmental activists as they seek environmental and social justice in South Africa.

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This document identifies the flaws in the World Bank's approach to municipal water infrastructure privatization in South Africa.

Bowie, W.R., A.S. King, D.H. Werker, J.L. Isaac-Renton, A. Bell, S.B. Eng, and S.A. Marion. 1997. "Outbreak of toxoplasmosis associated with municipal drinking water." *The Lancet.* Vol. 350, no. 9072, July 19, pp. 173–77.

This article traces a community-wide outbreak of toxoplasmosis in British Columbia to a municipal water system, which used unfiltered surface water that had been treated by adding chlorine and ammonia.

Braadbaart, Okke, Maarten Blokland, and Klaas Schwartz. 2000. *Private Business, Public Owners: Government Shareholdings in Water Enterprises.* The Hague, the Netherlands: Ministry of Housing, Spatial Planning, and the Environment.

The authors examine public water PLCs in the Netherlands, Chile, Poland, and the Philippines. They suggest that this model, which blends commercial business practice with public ownership, should be emulated in other countries if certain specified conditions exist.

Braddon, Derek, and Deborah Foster, eds. 1996. *Privatization: Social Science Themes and Perspectives*. Aldershot: Dartmouth.

This book explains the pervasiveness of privatization policies, particularly in the UK, with reference to the broader European and global contexts. The editors include a chapter on "OFWAT and the Regulation of Change" by Graham Taylor, who argues that the restructuring of water services in the UK has been part of a neo-liberal ideological shift that has fundamentally changed the discourse and practice of public service.

Brady, Donald J. 1996. "Basic comparison of structure and functioning of legislative, governmental and non-governmental bodies for water quality management in the USA and the CR: an American view." *Water Science and Technology*. Vol. 33, no. 4–5, pp. 27–30 [online]. [Cited May 5, 2001.] <www.iwaponline.com/wst/03304/wst033040027.htm>.

This article focuses on the importance of encouraging integrated water resource management by developing a Watershed Protection Approach. It notes that the Czech water act treats water management more holistically than laws in the United States. Recently, the U.S. Environmental Protection Agency has collaborated with other governmental agencies, interest groups, and private citizens in developing and implementing a Watershed Protection Approach.

Bray, Dale, Jiri Marsalek, Ken Raven, David Sellars, and Ed Watt. 2000. *Hydrological Science Research in Canada: Gaps, Issues and Needs*. Part 3. Prepared for the Canadian Water Resources Association and the Canadian Society of Hydrological Sciences [online]. [Cited March 26, 2001.] <www.cwra.org/hydrology/arts/research3/hydro_research3.html>.

This report identifies the research gaps in the study of hydrology in Canada. It recommends that a nationwide water quality database should be created. It notes the need for enhanced water quality controls.

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The Safe Drinking Water Regulation of B.C. outlines the microbiological, chemical, and physical drinking water standards.

British Columbia. Legislative Assembly of British Columbia. 2000. *Protecting Drinking-Water Sources*. Select Standing Committee on Public Accounts. Second Report. Victoria.

This report was submitted as a follow-up to the report of the Auditor General of British Columbia (1999). It focuses on issues that report did not address, such as water treatment and distribution systems. It suggests that the government's progress in meeting the auditor'general's recommendations should be reviewed by the Select Standing Committee on Public Accounts every six months.

British Columbia. Ministry of Health. 2001. *Water-borne Diseases in B.C.* Health file #49a. February [online]. [Cited May 11, 2001.] <www.hlth.gov.bc.ca/hlthfile/hfile49a.html>.

This file describes the nature and extent of the problem of water-borne diseases in British Columbia.

British Columbia. Office of the Auditor General. 1999. *1998/1999: Report 5 Protecting Drinking-Water Sources* [online]. [Cited April 7, 2001.] <www.oag.bc.ca/PUBS/1998-99/report-5/sec-1.htm>.

The report concluded that British Columbia "is not adequately protecting drinking-water sources from human-related impacts, and that this could have significant cost implications in the future for the Province, for municipal and regional governments, and for citizens in general. The key problem is the lack of an effective, integrated approach to land-use management."

Brockton, Municipality. 2000. *Report on the Hydrogeological Assessment Bacteriological Impacts Walkerton Town Wells.* Municipality of Brockton, County of Bruce, Ontario. Executive Summary [online]. [Cited April 7, 2001.] <www.ene.gov.on.ca/envision/news/exec.htm>.

This report provides the results of an investigation into the hydrogeological conditions near the municipal water supply Wells 5, 6, and 7 in Walkerton. It recommends that the Municipality of Brockton establish a wellhead protection area and develop appropriate land use management practices to protect the water supply.

Brook, Tom Vanden. 2000. "Clean water tab may hit $2 billion." *Milwaukee Journal Sentinel.* July 8 [online]. [Cited May 13, 2001.] <www.jsonline.com/news/metro/jul00/pollute09070800a.asp>.

This article reports that the proposed water regulations, which aim at cleaning up non-point pollution, could cost Milwaukee $2 billion.

Brookings Institution. 2000. "Improve water quality." *Government's 50 Greatest Endeavors.* Washington, D.C.: The Brookings Institution [online]. [Cited April 17, 2001.] <www.brook.edu/endeavors/endeavors/water.htm>

The article summarizes the federal government's efforts to raise water quality standards since 1948.

Brooks, Steven, M.D. 1998. Infrastructure Privatization: Stakeholder Perceptions in Two Ontario Initiatives. Ph.D. diss., University of Waterloo.

Brooks critically reviews the literature on privatization and provides detailed case studies of two water privatization initiatives in the regional municipalities of Halton and York. The responses to questions asked in the interviews with public sector and elected officials and consortia and consultants are summarized in Schedule C.

Brown, Halina Szejnwald. 1998. "Environmental reforms in Poland." *Environment.* January–February [online]. [Cited June 25, 2001.] <www.findarticles.com/cf_0/m1076/n1_v40/20330011/>.

The author analyzes the structure of Poland's environmental protection system. She is optimistic about the country's ability to achieve long-term water quality goals.

Brown, M. Leann. 2000. "Scientific uncertainty and learning in European Union environmental policymaking." *Policy Studies Journal.* Vol. 28, no. 3, pp. 576–96.

This article describes the role of organizational learning in the amelioration of scientific uncertainty and shaping environmental policy.

Browning, E.S. 1994. "Liquid assets: French groups plunge into rich U.S. market for supplying water," *The Wall Street Journal Europe.* March 2, p. 1.

The author describes the experience of the French multi-utilities with public-private partnerships in the U.S. water sector.

Brubaker, Elizabeth. 1994. "Privatizing water supply and sewage treatment: how far should we go?" *Fraser Forum*, April [online]. [Cited March 28, 2001.] <www.fraserinstitute.ca/publications/forum/1999/04/water.html>.

Brubaker explores the advantages of privatizing the operation and financing of water supply and sewage treatment services and the regulation of these systems in Canada. She uses the experience of privatization in England and Wales as evidence that privatization promises huge economic and environmental benefits for Canada.

———. 1997. "Bringing back our beaches." *The Next City*, summer.

Brubaker explains why many of Canada's beaches are not swimmable. She argues that privatization has improved the water quality at coastal beaches in England and Wales. She concludes that the British experience teaches Canadians the value of an independent environmental regulator.

———. 1999. "Toronto water fight," *Financial Post*, February 25 [online]. [Cited May 11, 2001.] <www.environmentprobe.org/enviroprobe/pubs/ev005.html>.

The author presents information about the privatization experiences of other countries in order to make the case that Toronto should consider privatizing its water and sewage system.

———. 2000a. "Privatizing water works." *National Post*, March 6.

Brubaker refutes the critics' claims that water privatization in England and Wales has been a disaster. She agrees that privatization has cost some workers their jobs in the water industry, but she argues that this has been a positive result because it has freed up money for investment in water infrastructure.

———. 2000b. "Water and wastewater privatization in England and Wales." In The Canadian Council for Public-Private Partnerships, *Overview of Successful Public-Private Partnerships in the Water Sector.* Toronto: Canadian Council for Public-Private Partnerships, pp. 14–17.

The author describes the benefits of water privatization in England and Wales. She refutes the arguments of Canadian critics of privatization in England and Wales. She argues that drinking water quality has improved steadily in the past decade.

Bruce-Grey Owen Sound Health Unit. (BGOSHU). 2000. *The Investigative Report of the Walkerton Outbreak of Waterborne Gastroenteritis, May–June 2000*. October 10, 2000. [online]. [Cited May 5, 2001.] <www.publichealthgreybruce.on.ca/private/Report/SPReport.htm>

This report describes the findings of government investigations into the outbreak of gastroenteritis in Walkerton, Ontario. It cautions that groundwater sources should not be assumed to be safe, especially under flood conditions. Appendix A provides an extensive review of the literature.

Buller, Henry. 1996. "Privatization and Europeanization: the changing context of water supply in Britain and France." *Journal of Environmental Planning and Management*. Vol. 39, no. 4, pp. 461–82.

This article examines the impact of water services privatization and Europeanization on the British and French regulatory models.

Byrne, Harlan S. 1996. "Precious fluids." *Barron's*, August 19. Reprinted in Empire State Report Supplement. *A Time of Choice, A Time of Change*, March 1997 [online]. [Cited April 15, 2001.] <www.waterindustry.org/barron1.htm>.

Byrne expects growth in the trend towards privatization and consolidation of water services. He asserts that investor-owned water companies have received higher marks for water quality than municipal water systems in the United States in recent years.

Campbell, Bill. 2000. "How Atlanta entered into the largest privatization contract in North America." *Making Government Work: Lessons from America's Governors and Mayors.* Edited by Paul Andrisani, Simon Hakim, and Eva Leeds. Lanham: Rowman & Littlefield Publishers, Inc., chapter 11, pp. 133–45.

Bill Campbell, mayor of Atlanta, advances his ideas about why privatization was successful in his city. He draws some basic lessons from Atlanta's experience for other city or regional authorities interested in privatization.

Canada Mortgage and Housing Corporation. 1995. *Public-Private Partnerships in Municipal Infrastructure: Theory and Practice*. Prepared by IBI Group. Ottawa: Canada Mortgage and Housing Corp.

This report examines Canadian public-private partnerships in many different sectors, including the water sector. It describes the cases of Sainte-Marie (Beauce) Water Treatment Plant, Hamilton-Wentworth Sewer and Water Treatment, and Halton Region.

Canada. Environment Canada. 1995. *Canada's Untapped Resource: Public-Private Partnerships in Watersupply and Wastewater Treatment*. Prepared by Thompson Gow and Associates, for Environmental Technology Advancement Directorate, Environment Canada. Technology Transfer Series 2E. Toronto: September.

This report examines the experience of several industrialized countries in using the private sector to deliver water services. It identifies potential economic and environmental advantages for Canadians if public-private partnerships were more common in the water sector.

Canada Newswire. 2001. "Albertans among best-served when it comes to safe drinking water – but national report card identifies plenty of room for improvement." January 18.

The Sierra Legal Defence Fund released Waterproof, a national report card comparing how well Canadian provinces protect drinking water. It gives Alberta the highest marks for meeting water quality standards, but notes that Alberta fails to legally protect its watersheds and wellfields from contamination by factory farms.

Canadian Council for Public-Private Partnerships. 2000. *Overview of Successful Public-Private Partnerships in the Water Sector.* Toronto: Canadian Council for Public-Private Partnerships.

This paper describes successful public-private partnerships that have improved water service delivery in Canada and the United States.

———. 2001. *Benefits of Water Service Public-Private Partnerships.* Presented to the Walkerton Inquiry. Toronto: Canadian Council for Public-Private Partnerships, January [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com/part2info/publicsubmissions/pdf/benefits of waternew.pdf>.

This paper describes public-private partnerships and argues that they can improve water delivery in Ontario.

Canadian Institute for Environmental Law and Policy. 1999. *Ontario's Environment and the Common Sense Revolution: A Four Year Report.* Toronto: Canadian Institute for Environmental Law and Policy [online]. [Cited May 6, 2001.] <www.CIELAP.org/infocent/pub/reports/index.html>.

Between 1995 and 1999 changes to Ontario's water resources protection system challenged every aspect of the system. The environmental protection section of this report describes the changes.

———. 2000. *Ontario's Environment and the Common Sense Revolution: A Fifth Year Report.* Prepared by Karen L. Clark and James Yacoumidis. Toronto: Canadian Institute for Environmental Law and Policy [online]. [Cited May 6, 2001.] <www.CIELAP.org/infocent/pub/reports/index.html>.

This report stresses the shortcomings of the government's approach to environmental protection during the Common Sense Revolution. It notes the dangers that government changes implemented in the past five years have posed for water resources.

Canadian Union of Public Employees. 2001. *Down the Drain: Privatized UK Water No Model For Canada.* CUPE's 2001 Annual Report on Privatization [online]. [Cited April 7, 2001.] <www.cupe.ca/issues/privatization/showitem.asp?ID=2411&cl=22>.

This report uses the British experience as a cautionary tale to deter Canadians from pursuing water privatization. It suggests that the impact of privatization on Canadian consumers and workers would be detrimental.

Catley-Carlson, M., C. Howe, P.M. Johnson, N. Amartiefo, L. Saade, R.M. Saleth, S.K. Sharma, H. Oda, J. Delli Priscolli. 1999. *Report of the Thematic Panel on Institutions, Society and the Economy and its Implications for Water Resources.* World Water Vision [online]. [Cited May 5, 2001.] <www.worldwatercouncil.org/Vision/Documents/Institutions-report.PDF>.

Annex 1 of this report identifies current institutional shortcomings at the international, national, provincial, and local levels that can compromise water quality and supply.

Cayford, Joel. *Community Participation – Key to Incremental Innovation and Integrated Water Management.* [Author's files.]

This paper argues that projects promoting community participation are likely to be more open to innovative thinking in the area of integrated water management than projects that minimize community input. It closely examines the case of a wastewater system in North Shore City, Australia, and concludes that the process of involving interested members of the public in formal consultations has led to serious consideration of technological alternatives that traditional engineering tends to avoid.

Chapman, Ross and Sandy Cubbertson. 1999. "Sydney's water – a suitable case for private treatment?" *Public Policy for the Private Sector.* The World Bank Group. Note No. 80, April [online]. [Cited May 2001.] <www.worldbank.org/>.

This note analyzes the Sydney experience of increased private sector involvement in treating water and suggests insights for other agencies contemplating private provision of water treatment services.

Chenoweth, Jonathan and Juliet Bird. Public Participation in Multi-Jurisdictional River Basins: The Murray-Darling and Mekong. [Author's files.]

This article highlights the challenges and rewards of involving the public in water management of river basins that are spread across several jurisdictional authorities.

Chi, Keon S. 2000. "Restructuring, quality management, and privatization in state government: an overview of trends and options." *Making Government Work: Lessons from America's Governors and Mayors.* Edited by Paul Andrisani, Simon Hakim, and Eva Leeds. Lanham: Rowman & Littlefield Publishers, Inc. Chapter 1, pp. 13–27.

The author examines the issues of organizational change and management, and productivity improvement, in order to set the context for his discussion of the privatization of state functions and services.

Chiefs of Ontario. 2001. *Drinking Water in Ontario First Nation Communities: Present Challenges and Future Directions for On-Reserve Water Treatment in the Province of Ontario.* Part II submissions to the Walkerton Inquiry Commission. Prepared by Blake, Cassels and Graydon with Derrick Kamanga, Michael Sherry, and Deborah McGregor, March 25 [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com>.

This report argues that the federal government's decision to download responsibility for supplying drinking water to band councils does not absolve it of its fiduciary obligation to provide the necessary resources to ensure the safety of the water.

Chour, Vladimir. 1996. "Basic comparison of structure and functioning of legislative, governmental and non-governmental bodies for water quality management in the USA and CR: a Czech view," *Water Science and Technology.* Vol. 33, no. 4–5, pp. 31–38.

This article describes the water quality management system in the Czech Republic. It was intended to serve as a basis for comparison of water legislation and management bodies in the United States and Czech Republic.

Citizen's Water Quality Committee. 2000. *Citizen's Water Quality Committee: Final Report.* Prepared for the Moncton City Council, March 10 [online]. [Cited April 7, 2001.] <www.moncton.org/english/eng/qualitycommittee.htm>.

The Committee reviewed the history of water management in Moncton and described "the successful public-private partnership construction of a water treatment plant and the initiation and follow through on the Greater Moncton Water Action Plan."

Civil Engineering. 2000. "Virtual plant software unites hydraulics and water quality data." Vol. 70, no. 12, December, p. 30.

This article describes one of Lyonnaise des Eaux' water quality innovations.

Clancy, Jennifer. 2000. "Sydney's 1998 water quality crisis." Executive summary. *Journal of the American Water Works Association.* Vol. 92, no. 3, March, pp. 55–66 [online]. [Cited April 13, 2001.] <www.awwa.org/journal/j300es2.htm>.

The author observes that over-reliance on faulty protozoan data can create a phantom crisis for a water system. She suggests that more emphasis should be placed on other steps to ensure the integrity of the distribution system such as watershed protection and process optimization.

Clean Water Action, Clean Water Fund, California Public Interest Research Group (CALPIRG) Charitable Trust, Campaign for Safe and Affordable Drinking Water. 2000. *Measuring Up*. San Francisco: Clean Water Action [online]. [Cited May 13, 2001.] <www.cleanwateraction.org>.

This report examines the extent to which California's Drinking Water Consumer Confidence Reports meet the new federal water quality disclosure rules. Measuring Up II: *An evaluation of water quality information provided to consumers in California, grades Consumer Confidence Reports from 249 water utilities and is available from the same Web site.*

Corbett, Laurie. 2001. "The big drinking water issue." *Water News*. March, pp. 30–32.

Corbett contends that the most pressing issue related to water is its price. The author identifies problems that may be aggravated by low rates, such as the underfunding of regulatory agencies and the lack of management training in small communities, and advises that subsidization should end.

Cowan, Simon. 1997. "Competition in the water industry." *Oxford Review of Economic Policy*. Vol. 13, no. 1, pp. 83–92.

The author discusses models of competition that could be adopted in the water sector in England.

Cowen, Penelope Brook. 1997. "Getting the private sector involved in water – what to do in the poorest of countries?" *Public Policy for the Private Sector.* World Bank Group. Note No. 102, January [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This article reviews the difficulties of private sector assistance in the water sector of developing countries. It suggests that a "stepwise approach" may be most effective, whereby private sector involvement begins with a management contract and builds up to a concession or divestiture.

———. 1999. "Lessons from the Guinea water lease." *Public Policy for the Private Sector.* World Bank Group. Note No. 78, April [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This article discusses the challenges of introducing commercial incentives to the private company that has been responsible for operating and monitoring Guinea's water system since 1989. Nevertheless, it argues that a strategy that relies on the private sector reduces risk in developing countries.

Cowen, Penelope Brook, and Tyler Cowen. 1998. "Deregulated private water supply: a policy option for developing countries." *Cato Journal.* Vol. 18, no. 1, spring/summer, pp. 21–41.

Cowen argues that institutional arrangements, such as price-controlled monopolies, discourage water utilities from providing low-income households with connections. She points out that the human costs of the institutional arrangements is high, since many citizens end up drinking contaminated water and suffering from diarrheal diseases. She proposes that unregulated privatization be considered along with the four other kinds of institutional regimes. She identifies these as "outright public provision of water (common throughout the world), government-supported natural monopoly with regulated price (the English model), government-supported natural monopoly with regulated rate of return (the American model), or a government-controlled franchise, lease, or concession agreement (the French model and its variants)." p. 22. Table 2 provides examples of private sector arrangements in water and sanitation throughout the world. p. 28.

Crapeau, Mark. 2000. "Changing the face of the water industry." Executive summary. *Journal of the American Water Works Association.* Vol. 92, no. 11, November, pp. 60–66 [online]. [Cited April 13, 2001.] <www.awwa.org/journal/j1100es1.htm>.

Crapeau suggests that water companies should consider outsourcing noncore activities such as information technology to free up resources for concentrating on core activities.

Dahlburg, John-Thor. 2000. "Tap water around the world developing a French flavor." *The Los Angeles Times*. April 30, p. C1.
The author describes Suez Lyonnaise des Eaux' international experience with public-private partnerships in the water sector.

Daniels, Ron and Michael J. Trebilcock. 1995. *Private Provision of Public Infrastructure: An Organizational Analysis of the Next Privatization Frontier.* Draft. WPS#3-1996. University of Toronto, Faculty of Law, Centre for the Study of State & Market, pp. 35–56.
This study discusses from a legal perspective the complexity entailed in the use of public-private partnerships involving physical infrastructure projects. One section reviews the distributional and political considerations relating to public/private infrastructure partnerships and the status of the government as a party to the contract. The case studies that are used are not related to the water industry.

Davidson, Julia O'Connell. 1993. *Privatization and Employment Relations: The Case of the Water Industry*. London: Mansell Publishing Ltd.
This book examines changes in employment relations in the water industry, using one of Britain's newly privatized water service companies as the focus of a case study.

DeBoer, Jon. 2000a. "National Report: USA." *Water Supply*. Vol. 18, no. 1–2, pp. 161–62.
This article discusses a number of issues related to drinking water quality: monitoring, public health threats, water-borne disease investigations, and penalties and legal actions.

———. 2000b. "Water quality and public health." *Water Supply*. Vol. 18, no. 1–2, pp. 125–29.
The author describes the monitoring of water quality and public health throughout the world.

De Yeregui, C., J. Mallevialle, and M. Bille-Genty. 1999. "Aguas Argentinas – the first years." *Journal of Water.* Vol. 48, no. 4, pp. 161–99.
This paper describes the first years of the Concession after 1989 when the government privatized water.

Deleon, Linda. 1998. "Accountability in a 'reinvented' government." *Public Administration*. Vol. 76, autumn, pp. 539–58.
The author examines the many types of accountability. She argues that "accountability mechanisms can be matched to public problems and agency structures and that changes in perceptions concerning the nature of public problems is at the root of contemporary enthusiasm for non-hierarchical modes of organization." p. 539.

Detroit News. 1996. "Suburban water alternatives: privatization vs. regionalization," May 5.

This article discusses the advantages, disadvantages, and roadblocks to water privatization and regionalization in Detroit. The author argues that privatization promises lowers costs, better services, and the absorption of current staff with comparable wages and benefits, as well as additional training.

Diemer, Ulli. 2000. *Contamination: The Poisonous Legacy of Ontario's Environment Cutbacks*. June [online]. [Cited March 23, 2001.] <www.connexions.org/walkerton/contamin.htm>.

Diemer, a resident of Walkerton, argues that the environmental cutbacks that accompanied the Common Sense Revolution resulted in the E. coli *outbreak in his community.*

Dinar, Ariel, Mark W. Rosegrant, and Ruth Meinzen-Dick. *Water Allocation Mechanisms – Principles and Examples.* Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This paper suggests economic principles of scarce water allocation. It identifies the advantages and disadvantages of government and private sector involvement in water management. It draws on the experience of many countries including France, Indonesia, the United States, Chile, India, Australia, and Portugal.

Dinar, Ariel, Trichur K. Balakrishnan, and Joseph Wambia. *Political Economy and_Political Risks of Institutional Reforms in the Water Sector.* Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This paper offers a framework for weighing the political risks associated with implementing institutional reforms in the water sector. Its examples are drawn from Morocco and Pakistan.

Dobel, J. Patrick. 2001. "Paradigms, traditions, and keeping the faith." *Public Administration Review.* Vol. 61, no. 2, March/April.

Dobel discusses dominant ideas about the relationship between public administration and management. He provides a positive review of Laurence Lynn's 1996 piece "The myth of the bureaucratic paradigm: what traditional public administration really stood for," in Public Management as Art, Science and Profession *(Chatham, N.J.: Chatham House).*

Douglas, Robert, and Martha Sinclair. 2001. "*Cryptosporidium* in Water." Report of the consensus conference on *Cryptosporidium* in Water, Melbourne, October 1998. *Communicable Diseases Intelligence*. Vol. 23, no. 6. Government of Australia, Commonwealth Department of Health and Aged Care [online]. [Cited May 17, 2001.] <www.health.gov.au/pubhlth/cdi/cdi2306/cdi2306b.htm>.

This conference reviewed the latest Cryptosporidium *research and suggested a public health strategy for drinking water.*

Doyle, E. et al. 2002. *The Production and distribution of Drinking Water*. Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 8. Walkerton Inquiry CD-ROM. [Online.] <www.walkertoninquiry.com>.

This report examines drinking water production and distribution in Ontario and other jurisdictions. It provides recommendations for making Ontario a world leader in the area of water treatment.

Duda, A. and M. Nawar. 1996. "Implementing the World Bank's water resources management policy: a priority on toxic substances from nonpoint sources." *Water Science and Technology.* Vol. 33, no. 4–5, pp. 45–51.

This paper shows non-point sources contaminate more water than point sources. It suggests that a greater effort should be made to ensure that polluters bear the costs of cleaning up contaminated sites.

Dumol, Mark. 2000. *The Manila Water Concession: A Key Government Official's Diary of the World's Largest Water Privatization.* Washington, D.C.: World Bank Publication. July 23.

Dumol describes the 1997 privatization of water and wastewater services in Manila. He discusses the main hurdles that were surmounted and the rationale behind some of the contract features. The book is intended for government officials facing similar challenges in other countries.

Dysard, Joe A. 1999. "Trends in privatization." Executive summary. *Journal of the American Water Works Association.* Vol. 91, no. 11, November, pp. 44–47 [online]. [Cited April 13, 2001.] <www.awwa.org/journal/j1199es1.htm>.

This article examines tools that public water utilities can choose in order to become more competitive while trying to meet cost, regulatory requirements, and other pressures.

Easter, K. William, Mark W. Rosegrant, and Ariel Dinar. eds. 1998. *Markets for Water: Potential and Performance.* Boston: Kluwer Academic Publishers.

The authors examine the economic and institutional aspects of water markets throughout the world. Chapter 15 discusses the welfare gains from potential water markets in Alberta.

The Economist. 1997. "Profit Stream." Vol. 342, no. 8010, March 29, p. 70.

This article reports on changing water prices in France.

Emel, Jody, Rebecca Roberts and David Sauri. 1992. "Ideology, property, and groundwater resources: An exploration of relations." *Political Geography*. Vol. 11, no. 1, January, pp. 37–54.

The authors examine the justifications and contradictions of property rights and their implications for groundwater in Texas and New Mexico.

Empire State Report Supplement. 1997. *A Time of Choice, A Time of Change*. March [online]. [Cited April 15, 2001.] <www.waterindustry.org/feldman.htm>.

Roger Feldman, an author of one of the articles in the supplement, discusses changes in U.S. federal tax laws that encourage public-private partnerships in water/wastewater infrastructure. An article entitled "United Water and Jersey City Sign Agreement for Water Services" notes that in 1996, United Water and Jersey City entered into the largest public-private partnerships for water services in the United States. An innovative contract allows United Water to lease the water system's workers from Jersey City.

Environmental Working Group. 2000. *Clean Water Report Card*. Executive summary. Washington, D.C.: Environmental Working Group. March [online]. [Cited March 23, 2001.] <www.ewg.org/pub/home/reports/reportcard/cwatext.html>.

This report observes that about 25% of major water polluters are operating without current permits, which may be a threat to water quality. It assigns grades to the states based on the level of compliance of the major National Pollution Discharge Elimination System permits.

Estache, Antonio, and Martín A. Rossi. *Comparing the Performance of Public and Private Water Companies in Asia and Pacific Region: What a Stochastic Costs Frontier Shows.* Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <econ.worldbank.org/docs/271.pdf>.

This paper discusses how cost and productivity indicators can be used to compare the performance of public and private water companies. It concludes that private companies are more efficient, but it notes that productivity indicators need to be applied jointly with indicators that take into account external factors, such as quality, population density, and technology.

European Report. 2001. "Environment: France and Luxembourg slammed over water directives." March 14, p. 492.

This article discusses the poor quality of drinking water in Brittany. The Court of Justice censured French authorities for failing to ensure that nitrate levels in Brittany met EU standards.

Evans, Peter. 1996. "Introduction: development strategies across the public-private divide." *World Development*. Vol. 24, no. 6, pp. 1033–37.
This article draws upon the social capital tradition and revisionist theories of the East Asian miracle to highlight the importance of state and civil society cooperation in developmental projects. It does not refer directly to water infrastructure, but provides a theoretical framework for thinking about public-private partnerships.

Farkas Berkowitz & Company. 2000. "Water quality systems," *State of the Industry Report*.
The authors provide an overview of the water quality systems that are used by public and private water entities in the United States. They discuss four market areas in detail: "privatization of government facilities; outsourcing of water and wastewater functions at industrial facilities; water conservation, reuse, and reclamation; and e-commerce as it pertains to the water and wastewater sector."

Fauconnier, Isabelle. 1999. "The privatization of residential water supply and sanitation services: social equity issues in the California and international contexts." *Berkeley Planning Journal*. Vol. 13, pp. 37–73.
The author explores the social equity issues related to the rapid spread of water privatization and explains why the trend toward water privatization has not been as pronounced in the United States as in countries such as France, Great Britain, and Argentina.

Fletcher, Philip. 2001. *Regulatory Developments: Moving Towards Total Competition For Utilities?* Office of Water Services (OFWAT). Talk. The Adam Smith Institute. 6th Annual Conference, The Future of Utilities, London, March 14 [online]. [Cited April 10, 2001.] <www.ofwat.gov.uk/speeches/philipfletcher/adams_institute_14301.htm>.
Fletcher contends that comparative competition will remain in force. He identifies the factors that make it more difficult to nurture competition in the water industry than in the gas and electricity industries. He discusses recent steps taken by OFWAT to increase competition in the water industry.

Foerster, Ronald. 2002. *Constitutional Jurisdiction over the Safety of Drinking Water*. Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 2. Walkerton Inquiry CD-ROM. [Online.] [Cited January 5, 2002.] <www.walkertoninquiry.com>.
This paper emphasizes "the scope of provincial power to regulate the safety of drinking water in Ontario." p. 2.

Food Research Institute. 1996. C*ryptosporidium and Cyclospora*. Food Research Institute Briefings, November [online]. [Cited May 17, 2001.] <www.foodsafety.ufl.edu/consumer/fr/fr002.htm>. [Author's files.]
This article describes the problem of parasitic protozoa in U.S. drinking water.

Foster, C.D. 1992. *Privatization, Public Ownership and the Regulation of Natural Monopoly.* Oxford, UK: Blackwell.
The author uses an economic perspective to analyze British and American experiences of regulating natural monopolies.

France. Agences de l'Eau. 1996. *Impact de la nouvelle directive européenne relative à la qualité des eaux destinées à la consommation humaine* [online]. [Cited June 18, 2001.] <www.eaufrance.com/francais/etudes/modele.asp?fiche_id=50>.
This document anticipates the reforms in water services in France that need to take place in order to pave the way for the adoption of the European directive on water quality.

———. 2001. *La qualité de l'eau du robinet* [online]. [Cited June 18, 2001.] <www.eaufrance.com/francais.qualite/criteres.asp?lien=1>.
This document discusses the criteria used for determining water quality and identifies the State departments that are responsible for protecting water quality.

France. La Cour des comptes. 1997. *La gestion des services publics locaux d'eau et d'assainissement.* Janvier [online]. [Cited May 18, 2001.] <www.ccomptes.fr/Cour-des-comptes/publications/rapports/eau/cdc72.htm>.
This document compares water charges to consumers under different management regimes and discusses initiatives to make water services management more accountable to the public.

France. Direction Départementale des Affaires Sanitation Sociales (DDASS). 1999. *Drinking water in Brittany – 1999 edition* [online]. [Cited June 18, 2001.] <www.rnde.tm.fr/anglais/sy/sante/sysa0006.htm>.
This document describes the levels of nitrates and pesticides in untreated surface water and drinking water in Brittany.

France. Ministère de l'Aménagement du Territoire et de l'Environnement. 1997. *La politique communautaire de l'eau.* Prepared by Bernard Kaczmarek. Previously published as "L'Europe de l'environnement," *Aménagement et nature.* March [online]. [Cited June 19, 2001.] <www.environnement.gouv.fr/ministere/polcommu.htm>.
This article considers the challenges of formulating and implementing an integrated water policy for Europe.

———. 1998a. *Gestion de l'eau dans l'habitat collectif.* Paris: Association des Responsables de Copropriété [online]. [Cited June 19, 2001.] <www.environnement.gouv.fr/INFOPRAT/Publications/depublic.htm#s>.
This document identifies initiatives that the government is adopting to make water services management more transparent and accountable.

———. 1998b. *L'eau. L'expérience française* [online]. [Cited June 19, 2001.] <www.environnement.gouv.fr/INFOPRAT/Publications/depublic.htm#s>.
This document discusses the need for water management that benefits public and private actors alike.

———. 1998c. *Réforme des instruments d'intervention publique dans le domaine de l'eau* [online]. [Cited June 19, 2001.] <www.environnement.gouv.fr/INFOPRAT/Publications/depublic.htm#s>.
This document discusses the propositions of the new water politics (e.g., transparency, public input, and parliamentary control of the water agencies, and the more stringent enforcement of the polluter-pays principle).

———. 1998d. *Water management in France: A well-known initiative.* Paris: Ministère de l'Aménagement du Territoire et de l'Environnement, Direction de l'Eau [online]. [Cited January 16, 2002.] <www.waterlink.net/gb/ageau2gb.htm>.
This document describes water policy principles and state participants in water management in France.

———. 1999. *Réforme de la Politique de l'eau.* 27 octobre [online]. [Cited June 19, 2001.] <www.environnement.gouv.fr/dossiers/eau/reforme/HCSPEA.htm>.
This document outlines a plan to make water politics more transparent, democratic, and accountable, and to more strictly enforce the polluter-pays principle.

Franceys, Richard. 1997. *Private Sector Participation in the Water and Sanitation Sector.* Water Resources occasional papers No. 3. July [online]. [Cited May 11, 2001.] <info.lut.ac.uk/well/occpaps/no3.htm>.
This paper discusses the options and benefits of public-private partnerships.

Freedland, Mark R. 1994. "Government by contract and public law." *Public Law.* Spring, pp. 86–104.
Using the British experience as an example, the author argues that it is difficult for individual citizens to seek legal remedies when government services are privatized.

Frilet, Marc. 1996. "Underlying contractual and legal conditions for a successful private public partnership in the water sector. (France)" *The International Construction Law Review*. Vol.13, no. 3, July, pp. 281–90.
Using the French example, this article examines some of the factors that contribute to the success of public-private partnerships in the water sector.

Frind, E.O. and D.L. Rudolph. 2001. *The Case for Groundwater Protection in Ontario.* Submission to the Walkerton Inquiry, Phase II. March [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com>.
This paper argues that Ontario should follow the example of Germany, Switzerland, Denmark, and other European countries in adopting an effective groundwater protection strategy.

Gabor, T., Shane, April Kiers North, Lisette Ross, Henry Murkin, James Anderson, and Matthew Turner. 2001. *"Beyond the Pipe" – The Importance of Wetlands and Upland Conservation Practices in Watershed Management: Functions and Values for Water Quality and Quantity.* Submission to the Walkerton Inquiry. Ducks Unlimited Canada. March [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com/>.
This document discusses the importance of wetlands and upland conservation practices in watershed management, particularly in the Ontario context.

Gelt, Joe. 1995. "Voters influence water policy with initiatives, referenda." *Arroyo.* Vol. 8, no. 4. Tucson: Water Resources Research Center, University of Arizona, December.
This report discusses the use of initiatives and referenda to create water policy in Arizona.

Gershberg, Alec Ian. 1998. "Decentralisation, recentralisation and performance accountability: building an operationally useful framework for analysis." *Development Policy Review*. Vol. 16, pp. 405–31.
This paper provides a framework for analyzing accountability in "decentralising" social service delivery systems. It does not use the water sector as an example.

Gilbertson, Michael. 1999. "Water quality objectives: yardsticks of the Great Lakes Water Quality Agreement." *Environmental Health Perspectives.* Vol. 107, no. 3, March.
This article considers the public health and ecosystem implications of contaminants in the Great Lakes.

Glouberman, S. 2001. *Towards a New Perspective on Health and Health Policy.* Chapter 5, pp. 65–70, public submission to the Walkerton Inquiry [online]. [Cited May 2001.] <www.walkertoninquiry.com/part2info/publicsubmissions/index.html>.

Glouberman uses the case of the Walkerton water crisis to show the complexity and "non-linear interactions among factors" that should be considered when trying to unravel the problems of "adaptive systems." p. 69.

Goldstein, Susan, Dennis Juranek, Otto Ravenholt, Allen Hightower, Debra Martin, June Mesnik, Sean Griffiths, Angela Bryant, Rick Reich, and Barbara Herwaldt. 1996. "Cryptosporidiosis: an outbreak associated with drinking water despite state-of-the-art water." *Annals of Internal Medicine*. March [online]. [Cited May 9, 2001.] <www.acponline.org/shell-cgi/prin…pl/journals/annals/01mar96/cryptosp.htm>.

The authors note that the water quality exceeded federal standards at the time of the outbreaks in Milwaukee and Las Vegas. They conclude that it is important to monitor for cryptosporidiosis and to introduce guidelines for the prevention of this water-borne infection among HIV-positive persons.

Gopinath, Deepak. 2000. "Blue gold." *Institutional Investor.* Vol. 34, no. 2, February, pp. 35–38.

Gopinath discusses increasing market competition among the big water companies.

Gostin, Lawrence, Zita Lazzarini, Verla Neslund, and Michael Osterholm. 2000. "Water quality laws and waterborne diseases: *Cryptosporidium* and other emerging pathogens." *American Journal of Public Health.* Vol. 90, no. 6, June, pp. 847–53.

The authors identify problems with drinking water regulations and make recommendations to build and maintain safe water infrastructure in the future.

Goudriaan, Jan-Willem and David Hall. 1997. "The problems with privatizing water: private companies rife with corruption, incompetence." *CCPA Monitor*. April [online]. [Cited May 11, 2001.] <mai.flora.org/forum/1997>.

The authors try to discourage Canadians from privatizing water by citing problems with that strategy in other parts of the world.

Gow, David. 2000. "Privatisation goes one step further: water could be next as British service providers step up the pace of restructuring," *The Guardian.* October 25, p. 1 and p. 31.

The author speculates that the United Kingdom might be on the verge of restructuring or consolidating its water companies.

GreenOntario Provincial Strategy. 2001. *Clean Water for Ontario* [online]. [Cited April 17, 2001.] <www.greenontario.com/strategy/water.html>.
This Web site presents information about the current Ontario strategy regarding drinking water quality and considers alternatives. It identifies key players and makes recommendations for further reading.

Gresham, Zane O. and Katherine E. Slaudeman. 2000. "Lessons from the field: private sector involvement in water projects." *Water Engineering and Management*. Vol. 147, no. 2, February, pp. 26–29.
The authors discuss the unique characteristics of the water industry, the need and options for private sector involvement in water projects, the range of service and management contracts, the methods of financing, and the legal and regulatory considerations.

Grigg, Neil S. 1996. *Water Resources Management: Principles, Regulations, and Cases.* New York: McGraw-Hill.
Grigg briefly discusses the benefits and challenges of water privatization in industrialized countries. pp. 186–89. He discusses the relative merits of regulatory-based and market-based approaches and the evolution of water quality management in the United States in chapter 14.

Guerrant, Richard L. 1997. "Cryptosporidiosis: an emerging, highly infectious threat." *Emerging Infectious Diseases*. Vol. 3, no. 1, January-March [online]. [Cited May 17, 2001.] <www.cdc.gov/ncidod/eid/vol3no1/guerrant.htm>.
This article discusses the magnitude of cryptosporidiosis and methods to detect it.

The H_2O Coalition. 2001a. *Water Infrastructure: Side-by-Side Comparison of Recommendations of the WIN and the H_2O Coalition*. Washington, D.C.: National Association of Water Companies [online]. [Cited May 5, 2001.] <www.waterindustry.org/Water-Facts/h2ocosbs.pdf>.
The Coalition that produced this chart includes National Association of Water Companies, National Council for Public Private Partnerships, Water and Wastewater Equipment Manufacturers Association, and the Association of State Drinking Water Administrators. This chart compares the policy position taken by Water Infrastructure Now (WIN) and the H_2O Coalition on general issues related to financing water infrastructure needs. WIN takes the position that the federal government should take a more active role in providing funds for clean and safe water. The H_2O Coalition states that customers should be expected to pay as much of the full cost of water services as they can reasonably afford.

———. 2001b. *What Is the Infrastructure Problem and What Are the Solutions?* Issue paper. Washington, D.C.: National Association of Water Companies [online]. [Cited May 5, 2001.] <www.waterindustry.org>.
This report argues that consumers should pay the full cost of service rates for water. Subsidized rates should only be available for the poor. Then the public will be aware of the true cost of water and will be more likely to conserve it. The water utilities will be more likely to become self-sustaining rather than dependent on government funds.

Haarmeyer, David. 1992. *Privatizing Infrastructure: Options for Municipal Water-Supply Systems*. Policy paper No. 151. Los Angeles: The Reason Foundation. October [online]. [Cited March 30, 2001.] <www.rppi.org/water.html>.
The author examines the water privatization experiences of Britain and France in order to find solutions for some of the problems of public water utilities in the United States. He asserts that privatization "would expand a municipality's tax base, encourage full-cost pricing, and lead to less reliance on all levels of the government to finance the cost of upgrading facilities and meeting state and federal drinking water regulations."

Haarmeyer, David and Ashoka Mody. 1997. "Private capital in water and sanitation." *Finance and Development*. March, pp. 34–37.
The authors discuss the various models for privatizing water and sanitation services and include a useful typology relating to the allocation of responsibilities in alternative approaches.

Hairston, Julie. 1998. "Atlanta water contract signed today." *The Atlanta Constitution*. November 10, p. C6.
The author outlines some of the background details related to the contract between Atlanta and United Water Services.

Hall, David. 1999a. "Trends in the water industry in the EU, 1999." Presented at EPSU/PSI Conference Brussels, February 22, 1999. London: Public Services International Research Unit. February [online]. [Cited May 2001.] <www.psiru.org>.
This article critically examines water privatization in the European Union.

———. 1999b. *Water and Privatisation in Latin America, 1999*. Report No. 9909-W-Latam.doc. Presented at PSI Water Conference, Santiago de Chile, September. London: Public Services International Research Unit [online]. [Cited May 2001.] <www.psiru.org>.
The author describes trends and issues related to privatization in Latin America, including performance problems. He provides many cross-country case studies and information about multinationals active in water in South America.

———. 2001. *The Public Sector Water Undertaking – A Necessary Option.* Prepared for the Water Utility Partnership Regional Conference on The Reform of the Water Supply and Sanitation Sector in Africa, February 26–28, 2001, Kampala, Uganda. London: Public Services International Research Unit. February [online]. [Cited May 2001.] <www.psiru.org>.

David Hall examines the problems with private concessions and the potential benefits of public sector water undertakings, using international examples.

Hamilton, City of. 2002. Waterworks New Program. Transportation, Operations and Environment 2000 – 2009 Capital Budget. April 25.

This document describes Hamilton's anticipated capital expenditures on water, wastewater, and storm sewers.

Hamilton, City of. 2001. 100 Year Report – Infrastructure Asset Management Strategy. TOE1014.

This document describes Hamilton's significant infrastructure requirements.

Hamlin, Christopher. 2001. "Overcoming the myths of the north." *Forum for Applied Research and Public Policy*. Vol. 16, no. 1, spring, pp. 109–14.

Hamlin outlines the political skills that engineers and scientists need to develop in order to help them improve water quality and sanitation in developing countries.

Hardie, Ann. 1999. "Backlog damming water company's tries at timeliness." *The Atlanta Constitution*. August 30, p. B1.

The author reports that United Water is struggling to deal with the backlog of service requests inherited from the Atlanta's water department. She notes that the company is instituting computer innovations to improve the tracking of service requests.

Hassan, John, Paul Nunn, Judith Tomkins, and Iain Fraser. 1996. *The European Water Environment in a Period of Transformation*. Manchester: Manchester University Press.

Judith Tomkins discusses the various policy instruments that can be used for water quality management in chapter 3. She argues that there are opportunities to use market-based instruments alongside command and control policy instruments. John Hassan reviews the three models of ownership that have existed in England and Wales in the recent past in chapter 5. In chapter 6, he traces the historical development of the French water companies and draws lessons for Central and Eastern Europe (CEE). Based on their study of water management in Western Europe, the four authors recommend that Central and Eastern Europe should gradually adopt a mixture of instruments, while taking into account the political, social, and financial constraints of

operating in ex-communist countries. They argue that the CEE needs "to recruit private-sector investment and expertise in the water sector, while retaining overall public control." p. 135.

G. Haughton. 1998. "Private profits – public drought: The creation of a crisis in water management for West Yorkshire." *Transactions of the Institute of British Geographers.* Vol. 23, no. 4, pp. 419–33.
This article discusses the influence of water privatization on the management of the drought in West Yorkshire in 1995.

Healy, Michael P. 1997. "Still dirty after twenty-five years: water quality standard enforcement and the availability of citizen suits." *Ecology Law Quarterly.* Vol. 24, no. 3, pp. 393–460.
This article describes the basic structure of the Clean Water Act *and the challenges of achieving water quality standard compliance. It considers the role that direct citizen enforcement might play in enforcing compliance.*

Health Stream. 1999. No. 16, December [online]. [Cited May 17, 2001.] <www.med.monash.edu.au/epidemiology/crc/hs/hs16web.htm>.
This newsletter describes the National Workshop on Drinking Water Management in Adelaide, Australia, which focused on risk management principles and the development of national guidelines.

Hearne, Robert R., and K. William Easter. 1995. *Water Allocation and Water Markets: An Analysis of Gains-from-Trade in Chile.* World Bank technical paper number 315. Washington, D.C.: World Bank.
The authors note that most of the literature on water markets is concerned with the western United States. They discuss the importance of institutions that specify the quantity, quality, and timing of water delivery if the transfer of water-use rights is to operate smoothly.

Helm, Dieter, and Tim Jenkinson, eds. 1998. *Competition in Regulated Industries.* Oxford: Oxford University Press.
This book discusses the issues that tend to arise when utility industries are exposed to competition. It examines the UK experience of competition in electricity, gas, telecommunications, water, and rail sectors. It devotes a section to the regulators' perspectives.

Hissom, Doug. 2000. "Don't go near the water." *Shepherd Express Metro.* Vol. 21, no. 36, August 31 [online]. [May 13, 2001.] <www.shepherd-express.com/shepherd/21/36/cover_story.html>.
The author discusses the problem of water pollution at Milwaukee's beaches.

Holas, J., and M. Konvicková. 1996. "Legislative tools in the Czech watershed management policy." *Water Science and Technology.* Vol. 33, no. 4–5, pp. 38–44.

The authors review the legislative tools related to watershed management policy that are used to improve agricultural practices in the Czech Republic. They conclude that a new water act is needed that will take into consideration historical conditions in the Czech Republic and conform to the legal norms established in the neighbouring European countries.

House, Margaret A. 1999. "Citizen participation in water management." *Water Science and Technology*. Vol. 40, no. 10, pp. 125–30.

This article describes the importance of citizen participation in water management in England and Wales, whether it is in the form of formal consultation, public involvement, or actual direct participation by the public. Personal experience promotes the greatest level of environmental awareness and understanding by the public.

Hoxie, Neil, Jeffrey Davis, James Vergeront, Raymond Nashold, and Kathleen Blair. 1997. "Cryptosporidiosis-associated mortality following a massive waterborne outbreak in Milwaukee, Wisconsin." *American Journal of Public Health.* Vol. 87, no. 12, December, pp. 2032–35.

This study estimated the number of deaths associated with Cryptosporidium *in the Milwaukee vicinity around the time of the massive water-borne outbreak in 1993. It found that there is likely a causal connection between outbreaks of the infection and significant mortality, especially among immunocompromised populations.*

Huby, Meg. 1995. "Water poverty and social policy: A review of issues for research." *Journal of Social Policy*. Vol. 24, no. 2, pp. 219–36.

The author examines the evidence and impact of water poverty in England and Wales. She argues that equity and social justice considerations should not be subsumed by efficiency concerns in water utility provision.

Hydes, O. 2000a. "National Report: UK." *Water Supply*, Vol. 18, no. 1–2, pp. 120–22.

The author describes the aspects of government structure and regulations in the UK that relate to drinking and waste water.

Hydes, O. 2000b. "Regulation of drinking water and waste water." *Water Supply.* Vol. 18, no. 1–2, pp. 79–84.

The author reviews the regulation of drinking water and wastewater in 17 countries.

Hyman, Leonard S., Andrew Hyman, Robert Hyman, Edward Meehan, James Hempstead, and Jose Kochen. 1998. *The Water Business: Understanding the Water Supply and Wastewater Industry*. Vienna, Virginia: Public Utilities Reports, Inc.

The authors examine the history of private water companies in the United States and ownership patterns in the worldwide water utility industry. They expect that market-based instruments will prevail over command and control policy instruments in the future.

Hynes, Michael, Sheila Nataraj Kirby, and Jennifer Sloan. 2000. *Casebook of Alternative Governance Structures and Organizational Forms.* Santa Monica, CA: The RAND Corp.

The authors examine alternative governance structures and organizational forms.

Institut français de l'environnement. 2001. "Eau potable: diversité des services … grand écart des prix." *Les données de l'environnement.* Numéro 65, avril [online]. [Cited June 19, 2001.] <www.ifen.fr>.

This paper summarizes the results of a survey by the french institute for the environment and the ministry of agriculture's department of statistics that found that there are significant variations in the price of water throughout France. It traces the variations to "different methods used for organizing and managing drinking water distribution, variable natural conditions, the extent of water distribution equipment and whether users are in a densely populated area or are scattered in rural areas." p.4.

Institut français de l'environnement. 2000. "La préoccupation des Français pour la qualité de l'eau." *Les données de l'environnement.* Numéro 57, août [online]. [Cited June 19, 2001.] <www.ifen.fr>.

In 2000, a survey revealed that many French citizens were concerned about the quality of their drinking water and did not believe that the government was providing them with adequate access to accurate information about their regional water quality.

International Office for Water. 2001. *The Organization of Water Management in France* [online]. [Cited June 18, 2001.] <www.oieau.fr/anglais/gest_eau/intro.htm>.

This online document is divided into the following sections: (1) the organization of public authorities (2) knowledge of water resources and hydro-systems (3) the integrated development of watercourses (4) municipal services for potable water supply and (5) French water acts.

Iskander, Samer, David Owen, and Andrew Taylor. 1999. "Making a big splash: with more than a century in the private sector, French water companies are showing the rest of the world how to manage their utilities." *Financial Times*, August 24, p. 17.

The author describes the history of the French multi-utilities.

Johns, Carolyn M. 2002. *Policy Instruments to Manage Non-Point Source Water Pollution: Comparing the United States and Ontario.* Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 11. Walkerton Inquiry CD-ROM. [Online.] [Cited January 5, 2002.] <www.walkertoninquiry.com>.

"This report summarizes intergovernmental institutional arrangements and policy instrument strategies being implemented in Ontario and three U.S. states (Wisconsin, Michigan, and New York) to address non-point source water pollution." p. 2. It concludes that these jurisdictions in the United States "have higher levels of institutional capacity to manage these complex water pollution problems than jurisdictions in Ontario." p. 24. The author's unpublished dissertation is also a useful reference: Johns, Carolyn M. 2000. Non-Point Source Water Pollution Management in Canada and the United States: A Comparative Analysis of Institutional Arrangements and Policy Instruments. Ph.D. diss., McMaster University.

Johnson, Michael, and Stephen Rix, eds. 1993. *Water in Australia: Managing Economic, Environmental and Community Reform.* Leichhardt, NSW: Pluto Press Australia.

Chapters 8 and 9 are useful for a study of the quality implications of water privatization. Chapter 8 draws lessons for Australia from the British privatization initiative. The authors conclude that "the slower approach in Australia has had great environmental costs but may assist this country in avoiding the costly mistakes of countries like Britain." p. 162. Chapter 9 describes the political context of the public sector reform debate in Australia. The authors caution that the commercialization of the water sector may cause serious equity problems and may not resolve the problems that it was intended to correct.

Johnson, Robin A., and Norman Walzer, eds. 2000. *Local Government Innovation: Issues and Trends in Privatization and Managed Competition.* London: Quorum Books.

This book explores the issues and trends related to privatization of municipal services in the United States. It examines the operational aspects and future prospects of privatization. In chapter 12, Bill Campbell, the mayor of Atlanta, describes water privatization in that city and lists the lessons learned by public officials.

Johnstone, Nick, and Libby Wood, eds. 2001. *Private Firms and Public Water: Realising Social and Environmental Objectives in Developing Countries.* Cheltenham, UK and Northhampton, Mass.: Edward Elgar.

This book examines the increase in private sector participation in the provision of water and sanitation. It draws lessons from the experiences of five cities: Manila (Philippines), Buenos Aires and Córdoba (Argentina), Abidjan (Côte d'Ivoire), and Mexico City (Mexico). It emphasizes that, even in a privatized context, government plays a key regulatory role in ensuring that social and environmental goals are realized.

Jordan, Andrew. 1999. "European Community water policy standards: locked in or watered down." *Journal of Common Market Studies.* Vol. 37, no. 1, March, pp. 13–37.

Jordan uses a historical institutionalist approach to explain the rigidity of current European Community water standards. He particularly emphasizes the case of drinking water in the United Kingdom to show "how institutions have gradually hemmed in decision-makers, locking states into a policy trajectory that most now regard as sub-optimal in key respects." p. 13.

Jordan, Andrew, and John Greenaway. 1998. "Shifting agendas, changing regulatory structures and the 'new' politics of environmental pollution: British coastal water policy, 1955–1995." *Public Administration.* Vol. 76, winter, pp. 669–94.

This article uses policy network and social learning theory to explain the discontinuity in British coastal water policy.

Jordan, Charles G. 1998. "Water quality reports boost consumer confidence." *Journal of the American Water Works Association.* Vol. 90, no. 1, January, pp. 40–43 [online]. [Cited April 13, 2001.] <www.awwa.org/journal/j198es1.htm>.

This article discusses techniques for creating user-friendly consumer confidence reports that comply with the Safe Drinking Water Act.

Kaiser, Ronald, Bruce Lesikar, C. Scott Shafer, and Jan Gerston. *Water Management Strategies.* Texas A&M University System [online]. [Cited March 30, 2001.] <tx-water-ed.tamu.edu/strategies.html>.

The authors identify the water management strategies that are preferred by officials in 16 Texan water-planning groups.

Kerf, Michel. *Do State Holding Companies Facilitate Private Participation in the Water Sector? Evidence from Côte d'Ivoire, the Gambia, Guinea, and Senegal.* Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This paper reviews the cases of four African countries to determine whether or not state holding companies (SHCs) promote the success of private

participation schemes in the water sector. It concludes that in most cases it is preferable to transfer investment opportunities to the private operator or leave them with the government. A state holding company is only the preferred option when "investment responsibility cannot be transferred to the private operator; tariffs are insufficient, at least for a time, to cover investment needs, so that access by a public entity to other sources of finance is crucial; and the financial strength and accountability of the SHC, or the SHC's incentives and ability to promote the gradual adoption of cost-covering tariffs, are superior to those of a ministerial department." p. 1.

Kerin, J.C. *Involving the Community in Water Management.* [Author's files.]
This paper reviews two community involvement initiatives underway in New South Wales that are intended to improve water management: the Water Advisory Council and the local river, groundwater, or water management committees.

Kingdom, Bill, and Sharon Slade. 2000. "Special Contribution." *Water Supply*, Vol. 18, no. 1–2, pp. 7–13.
This article reviews the issues surrounding the use of service contracts in the water sector.

Klein, Michael. 1996. *Economic Regulation of Water Companies.* International Bank for Reconstruction and Development, Private Sector Development Dept. Washingon, D.C.
This paper emphasizes that the regulation of water systems is necessary to ensure water quality. Some of the charts provide useful outlines of quality issues and ownership structures, pp. 32–33. Figure 2, p. 9, shows the relevant quality dimensions, and table 8, p. 25, shows the design objectives for regulatory institutions. The paper reviews the spectrum of institutional options for carrying out regulatory options. Appendix II, p. 34, identifies the main regulatory agencies in the water sector in selected countries.

Klein, Michael, and Timothy Irwin. 1996. "Regulating water companies." *Public Policy for the Private Sector.* World Bank. Note No. 77. May [online]. [Cited May 2001.] <www.worldbank.org/>.
This paper discusses the importance and challenges of regulating public and private water companies. It suggests that auctioning the right to deliver water to the highest bidder can reduce the price, but acknowledges that "auctions are no panacea." p. 4.

Komives, Kristin. *Designing Pro-Poor Water and Sewer Concessions: Early Lessons from Bolivia.* Washington, D.C.: World Bank [online]. [Cited May 2001.] <www.worldbank.org/>.
This paper discusses the need for developing countries to offer utilities the right incentives to encourage them to provide clean water to poor households.

Kotze, Roelf, Andrew Ferguson, and James Leigland. 2000. "Government facilitation of public-private infrastructure projects: Lessons from South Africa." *Journal of Project Finance.* Vol. 6, no. 1, spring, p. 61.

The authors discuss the challenges of introducing public-private partnership water and sanitation agreements in the town of Dolphin Coast and the City of Nelspruit, South Africa.

Kraemer, R. Andreas. 1998. "Public and private water management in Europe." *Selected Issues in Water Resources Management in Europe.* Vol. 2. Edited by Francisco Nones Correia. Rotterdam: A.A. Balkema. Chapter 10, pp. 319–52.

This chapter, which is based on a Eurowater report, describes the functions associated with urban water services as they relate to the operation of water supply, and compares the various models of privatization. Kraemer concludes that urban services have often been treated as a technical problem. It is time to examine them instead from a social science perspective and explore the management issues.

Krewski, Daniel, John Balbus, David Butler-Jones, Charles Haas, Judith Isaac-Renton, Ken Roberts, and Martha Sinclair. 2002. *Managing Health Risks from Drinking Water.* Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 7. Walkerton Inquiry CD-ROM. [Online.] [Cited January 5, 2002.] <www.walkertoninquiry.com>.

This background paper reviews approaches for managing potential health risks in drinking water. It observes that Ontario's drinking water risk management system is comparable with the United States, Australia, and the World Health Organization. In conclusion, it identifies opportunities for Ontario to improve risk assessment.

Kross, Burton C., George Hallberg, Roger Bruner, Keith Cherryholmes, and J. Kent Johnson. 1993. "The nitrate contamination of private well water in Iowa." *American Journal of Public Health*. Vol. 83, no. 2, February, p. 270.

This article reports the first statistically valid statewide estimates of the extent of groundwater contamination in rural private wells in Iowa.

Lack, Tim. 1999. "Water and health in Europe: an overview." *British Medical Journal*. Vol. 318, no. 7199, June 19, p. 1678.

The author identifies persistent European water quality problems (such as nitrate contamination) and their impact on public health.

Lauzon, Léo-Paul, Michel Bernard, François Patenaude, and Martin Poirier. 1998. *Privitisations: L'autre point de vue*. les Éditions du Renouveau québécois et la Chaire d'études socio-économiques de l'UQÀM.
This article critically examines the issue of water privatization in Quebec. It portrays the British and French experiences of privatized water in a negative light.

Leadlay, H.J., and R.D. Kreutzwiser. 1999. "Rural water supply allocation in Ontario: an evaluation of current policy and practice." *Canadian Water Resources Journal*. Vol. 24, no. 1.
The authors identify problems with the Ministry of Environment's Permit to Take Water program. They develop an evaluation framework and recommend changes in current water allocation policy and practice. For example, they suggest that the public should be educated about the program to ensure that those who require a permit take the necessary steps to acquire one. Permit holders should be charged administration fees. Management jurisdictions should be clarified and the water permits should be used to promote water conservation goals.

Leban, Raymond. 1999. "Eau, gaz, transports … où en est-on? Les services public de réseaux: une comparaison européenne." *Problèmes économiques.* numéro 2640, 17 novembre [online]. [Cited May 5, 2001.] <www.ladocfrancaise.gouv.fr/>.
The author discusses France's approach to public services in the European context.

Lee, G. Fred, and Anne Jones-Lee. 1993. *Public Health Significance of Waterborne Pathogens*. Report to State of California Environmental Protection Agency Comparative Risk Project. Berkeley, Calif., December.
This article describes the significance of water-borne pathogens in water supplies and concludes that the California government does not adequately regulate the control of water-borne pathogens in domestic water supplies.

Legg, Wilfrid and Michel Potier. 1998. "Reconciling agriculture and the environment." *The OECD Observer*. No. 210, February/March, pp. 32–36.
The authors discuss reforms in agricultural policy that have resulted in gradual improvements in water quality in OECD countries.

Libby, Lawrence W. 1996. "Groundwater quality: a public policy perspective." *Water Quality and Water Management*. North Carolina Cooperative Extension Service. AG-441-3 [online]. [Cited March 27, 2001.] <www.bae.ncsu.edu/bae/programs/extension/publicat/wqwm/ag441_3.html>.
Libby argues that changes in the rights and obligations of users or in the economic and social costs of water use options need to be made in the

interest of reducing groundwater pollution. He suggests that change can be instigated in several ways: "(1) by adjusting the anticipated cost of an alternative (including non-monetary effects); (2) by adjusting the anticipated benefit of an alternative (again including non-monetary effects); and (3) by eliminating certain options through regulation." p. 4.

Liner, Barry, and Robert Gibson. 1996. "Public or private? Making the right decisions." *American City and County.* Vol. 111, p. 42.

This article reviews the decision-making process that officials in Camden, New Jersey, used when they chose between operational alternatives for their water service delivery.

Lobina, Emanuele, and David Hall. 1999. *Public Sector Alternatives to Water Supply And Sewerage Privatisation: Case Studies*. Report No. 9908-W-U-Pubalt.doc. Presented at IX Stockholm Water Symposium, 9–12 August 1999. London: Public Services International Research Unit [online]. [Cited May 2001.] <www.psiru.org>.

The authors critically discuss private sector participation in water supply and sewerage, using many international cases. They examine examples of public sector alternatives in water supply and sewerage in developed and developing countries. They conclude that public companies are just as efficient as private companies and are more sensitive to the public interests.

———. 2001. *UK Water privatisation – a briefing*. London: Public Services International Research Unit. February [online]. [Cited May 2001.] <www.psiru.org>.

This report, which was partly financed by the Canadian Union of Public Employees, documents issues related to the Thatcher water privatization: economic performance, social exclusion, service delivery, and restructuring of the industry.

Lorrain, Dominique and Gerry Stoker, eds. 1997. *The Privatization of Urban Services in Europe*. London: Pinter.

Dominique Lorrain suggests that, in the French case, privatization of urban services has been less politically driven than in the British case. pp. 117–32.

M2 PressWIRE. 2001. *BC Ministry of Environment, Lands & Parks: Public wants actions to protect drinking water.* March 23.

This article describes the consultation process in British Columbia, as members of the public rally to demand more protections for drinking water.

MacDonnell, Lawrence J. 1998. "Marketing water rights." *Forum for Applied Research and Public Policy*. Vol. 13, pp. 52–55.

This article examines issues related to expanding water markets in the western United States.

MacKenzie, William R., Neil Hoxie, Mary Proctor, Stephen Gradus, Kathleen Blair, Dan Peterson, James Kazmierczak, David Addiss, Kim Fox, Jan Rose, and Jeffrey Davis. 1994. "A massive outbreak in Milwaukee of *Cryptosporidium* infection transmitted through the public water supply." *The New England Journal of Medicine.* Vol. 33, no. 3, July 21, pp. 161–67.
The authors investigated the outbreak of diarrhea among residents of Milwaukee in 1993 that affected more than 400,000 people. They concluded that the outbreak was caused by Cryptosporidium *oocysts that had passed through the filtration system of one of the city's water treatment plants. They found that "water-quality standards and the testing of patients for* Cryptosporidium *were not adequate to detect this outbreak." p.162. The authors suggest that testing for* Cryptosporidium *infection is important even though there is no effective treatment, because it allows the education of patients, facilitates the recognition of an outbreak, and may lead to the institution of measures to prevent the spread of infection.*

Maclean, Mairi. 1991. *French Enterprise and the Challenge of the British Water Industry.* Aldershot: Avebury.
This book explores the French penetration of the British water business. It tries to determine the potential advantages and disadvantages of the French presence for Britain.

Maitland, Alison. 1997. "680,000 told to boil water." *Financial Times.* May 4, p. 9.
Three Valleys Water warned 680,000 people in north London and Hertfordshire to boil their water, following an outbreak of Cryptosporidium.

Malec, H.J. 2001. Correspondence with Justice Dennis O'Connor, Re: Part II of the Inquiry: Designing a Safe Water System for Ontario, January 8 [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com/>.
A water official in the District Municipality of Muskoka makes recommendations to improve the design and construction of water supply systems based on his experience over a ten-year period.

Maloney, William A., and Jeremy Richardson. 1995. *Managing Policy Change in Britain: The Politics of Water.* Edingurgh: Edinburgh University Press.
The authors use a policy community/policy network approach to analyze changes in water policy in Britain over a 50-year period. However, they conclude that exogenous shocks were probably more important for explaining policy change than policy network characteristics. p. 174.

Manikcutty, S. 1998. "Community participation: lessons from experiences in five water and sanitation projects in India." *Development Policy Review.* Vol. 16, pp. 373–404.

This article provides lessons on encouraging community participation in water projects, drawn from the author's experiences in India.

Mann, Patrick C. 1993. *Water-Utility Regulation: Rates and Cost Recovery*. Policy paper No. 155. Los Angeles: The Reason Foundation. March [online]. [Cited March 30, 2001.] <www.rppi.org/water.html>.

The author asserts that price regulation has constrained the ability of water utilities to upgrade infrastructure and meet stringent quality regulations. It recommends costing, financing, and rate incentives that regulatory officials should introduce so that public and privately owned water utilities will be more likely to adopt efficient water supply practices.

Martin, L. 1996. "Private sector participation in water projects." *Water Policy: Allocation and Management in Practice.* Proceedings of International Conference on Water Policy, held at Cranfield University, September 23–24, 1996. Edited by Peter Howsam and Richard Carter. London: E. & F.N. Spon. pp. 293–301.

This paper uses a series of case studies of privatized water projects in developing countries to highlight some of the common problems and lessons that can be learned.

Martinson, Jane. 1996. "Drinking water inspectors deny accusations from EU." *Financial Times.* July 4, p. 31.

The author reports that the European Community is suing two British water companies for failing to comply with EU law.

Marvin, Simon, and Nina Laurie. 1999. "An emerging logic of urban water management, Cochabamba, Bolivia." *Urban Studies.* Vol. 36, No. 2, pp. 341–57.

The authors examine water privatization in Cochabamba, Boliva, and make recommendations for "a more socially inclusionary and environmentally sensitive style of water management." p. 341.

Mason, Joanne. 1993. "Europe's water bill." *International Management.* Vol. 48, no. 6, July/August, p. 16.

The author notes that French and UK water companies will be the main beneficiaries of the European Community's stringent water standards.

Mazounie, P., F. Bernazeau, and P. Alla. 2000. "Removal of *Cryptosporidium* by high rate contact filtration: the performance of the Prospect Water Filtration Plant during the Sydney water crisis." *Water Science and Technology.* Vol. 41, no. 7, pp. 93–101.

The authors review the performance of the Prospect Plant during the Sydney water crisis.

Mazzucchelli, S.A. 2000. "Private sector participation in water supply and sanitation in Argentina: balancing economic, social and environmental goals." *Water Supply*. Vol. 18, no. 1–2, p. 697.
This article describes the water system in Argentina before and after privatization. It pays particular attention to such issues as access, tariff structure and incentives, quality of service, health and environmental externalities, and community participation.

McClellan, Peter. 1998a. *First Interim Report: Possible Causes of Contamination.* Sydney Water Inquiry, New South Wales, Premier's Department. Sydney: August.
This report considers the possible causes of contamination in Sydney's water supply in 1998 without providing a definitive conclusion. It recommends the establishment of a common national standard for acceptable levels of Cryptosporidium *and* Giardia.

———. 1998b. *Second Interim Report: Management of the Events.* Sydney Water Inquiry, New South Wales, Premier's Department. Sydney: September.
This report indicates that Sydney Water failed to implement an adequate testing regime. It finds that there were communication problems between New South Wales Health and Sydney Water during the perceived crisis and concludes that accurate information was not effectively conveyed to the public.

———. 1998c. *Third Report: Assessment of the Contamination Events and Future Directions for the Management of the Catchment.* Sydney Water Inquiry, New South Wales, Premier's Department. Sydney: October.
This report finds fault with Sydney Water's laboratory – Australian Water Technologies. It suggests that independent monitoring and testing of the water supply should be undertaken for health purposes. As a result of the first three Interim Reports, Parliament passed legislation to create a new body to manage the catchment, the Sydney Catchment Authority.

———. 1998d. *Fourth Report: Prospect Water Filtration Plant, Tender Process and Contract Arrangements.* Sydney Water Inquiry, New South Wales, Premier's Department. December [online]. [Cited November 20, 2001.] <water.sesep.drexel.edu/outbreaks/Sydney4thRpt/>.
This report addresses the suitability of the water treatment arrangements in Sydney. It concludes that the Water Board's Environmental Management Unit (EMU) should have been given the Hutton Report, reviewing the information on Cryptosporidium *and* Giardia*, at an earlier date. The Hutton Report was published in October 1992, but the EMU did not receive it until March 1993.*

———. 1998e. *Final Report.* Volumes 1 and 2. Sydney Water Inquiry, New South Wales, Premier's Department. Sydney: December.

This report notes that, unlike most cases of contamination internationally, this outbreak was identified as part of a routine monitoring program and without an outbreak of illness within the community. It concludes that there is a need for greater public disclosure about the quality of Sydney's water and the terms of any contractual arrangements designed to protect it.

McCulloch, Paul, and Paul Muldoon. 1999. *A Sustainable Water Strategy for Ontario*. Prepared for the Environmental Agenda for Ontario Project. Toronto: Canadian Environmental Law Association. March [online]. [Cited May 5, 2001] <www.cela.ca/water.htm>.

The authors argue that Ontario should make it a priority to protect its water. They describe the problem of contamination in Ontario's water and recommend specific actions that can be taken to utilize water resources wisely.

McIntosh, A.C. and C.E. Yñiguez. *Privatization of Water Supplies in Ten Asian Cities.* [Author's files.]

The authors conclude that it is too early to tell whether privatization in the ten cities under consideration has been successful. They draw a number of lessons and discuss some alternatives to privatization.

McKay, Jennifer, and Anthony Moeller. 2000. "Is it time for a new model of water quality laws?" *Environmental and Planning Law Journal.* Vol. 17, no. 3, June, p. 165.

The authors argue that it is time for Australia to adopt mandatory standards for drinking water quality.

Mehta, Lyla. 2000. *Water for the Twenty-First Century: Challenges and Misconceptions*. IDS Working Paper 111. Brighton: Institute of Development Studies, University of Sussex [online]. [Cited May 5, 2001.] <server.ntd.co.uk/ids/bookshop/details.asp?id=554>.

The author critically reviews the narratives concerning water scarcity, water "crises," and water resources management. She notes her concerns that equity and justice issues are obscured by some of the rhetoric in the current privatization debates.

Ménard, Claude and George Clarke. 2000a. *Reforming Water Supply in Abidjan, Côte d'Ivoire: A Mild Reform in a Turbulent Environment*. Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

The authors examine the public-private partnership in the water sector in Abidjan and try to explain its strong performance relative to other cities in developing countries.

———. 2000b. *A Transitory Regime: Water Supply in Conakry, Guinea.* Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This article examines the impetus for private sector reforms in the water supply in Guinea and makes recommendations for improving performance in the water sector.

Ménard, Claude, George Clarke, and Ana Maria Zuluaga. 2000. *The Welfare Effects of Private Sector Participation in Urban Water Supply in Guinea.* Washington, D.C.: World Bank [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

This article evaluates the success of the institutional arrangements in the water sector in Guinea. It presumes that there were large gains made in water quality, and conducts a cost-benefit analysis of the welfare impact of reform. pp. 34–35.

Miljan, Lydia. 2000. *I'll Drink the Privatized Water.* Fraser Forum. Vancouver: The Fraser Institute, July [online]. [Cited March 23, 2001.] <www.fraserinstitute.ca/publications/forum/2000/07/section_07.html>.

Miljan discusses the E. coli *outbreak in Walkerton. She blames the Ontario government for failing to enforce regulations and government employees who made errors in judgment. She contends Ontario water should be fully privatized as a way of reducing errors in the future.*

Milwaukee Water Works. 2001a. *Major Plant Improvements* [online]. [Cited May 13, 2001.] <www.mpw.net/Pages/wwimpr.htm>.

The city outlines the new improvements to Milwaukee's drinking water facilities.

———. 2001b. *Water Quality Exceeds Mark!* [online]. [Cited May 13, 2001.] <www.mpw.net/wqreport98/Pages/mainreport.html>.

This article discusses accomplishments of the Milwaukee Water Works in the area of testing and monitoring drinking water. It reviews the findings of the 1998 Water Quality Report. The chief of the Public Water Systems boasts that Milwaukee's water "is among the best in the nation."

Mitchell, Bruce, and Dan Shrubsole. 1994. *Canadian Water Management: Visions for Sustainability.* Cambridge, Ontario: Canadian Water Resources Association.

This book was based on presentations made at a workshop hosted by the Canadian Water Resources Association in Hull, Quebec, in 1994. It identifies recent management reforms in each of the provinces and territories. It discusses some of the main trends in water management, such as partnerships. It identifies opportunities for privatization initiatives in the water sector.

Moeller, Anthony, and Jennifer McKay. 2000. "Is there power in the Australian constitution to make federal laws for water." *Environmental and Planning Law Journal*. Vol. 17, no. 4, August, p. 294.

The authors argue that the powers listed in the Australian Constitution permit the commonwealth to impose legislation on national water quality.

Mogno, Y. 2000. "National Report: France." *Water Supply*. Vol. 18, no. 1–2, pp. 18–19.

The author describes the use of public-private partnerships in the water sector in France.

Moore, Howard. 1999. "Opening the floodgates." *Global Finance*. Vol. 13, no. 5, pp. 61–65.

Participants at a roundtable discussion examine international opportunities for private sector investment in water utilities.

Moran, Sharon Diane. 2000. Fluid Categories: Water System Management in Post-Communist Poland. Ph.D. diss., Clark University.

This thesis describes the changes that have taken place in the management of water utilities in the first five years after communism, using eight cities as case studies. The author concludes that "privatization and democratization are not necessarily as mutually reinforcing as is sometimes assumed."

Moraru-De Loe, Liana. 1997. "Privatising water supply and sewage treatment services in Ontario." *Water News*. Canadian Water Resources Association. Vol. 16, no. 1, March 1.

This article discusses the prospect of water privatization in Ontario.

Morris, John C. 1994. Privatization and Environmental Policy: An Examination of the Distributive Consequences of Private Sector Activity in State Revolving Funds (Water Quality Policy). Ph.D. diss., Auburn University.

The author finds that there are significant differences in the patterns of resource distribution when the State Revolving Fund program is administered with private sector personnel rather than public sector. He concludes that "formal privatization can enhance the distribution of SRF loans to small communities, financially at-risk communities, and communities with facilities in significant non-compliance, while informal privatization (including privatization of the provision function) leads to distributional patterns based on financial solvency."

Morris, Robert, Elena Naumova, Ronnie Levin, and Rajika Munasinghe. 1996. "Temporal variation in drinking water turbidity and diagnosed gastroenteritis in Milwaukee." *American Journal of Public Health*. Vol. 86, no. 2, February, pp. 237–39.

This article found that turbidity in both Milwaukee drinking water treatment plants "was associated with an increased number of gastrointestinal events even after exclusion of a major documented outbreak of cryptosporidiosis." p. 237.

Multinational Monitor. 2000. "The fight for water and democracy: An interview with Oscar Olivera." Vol. 21, no. k6, p. 15.

Oscar Olivera, a spokesperson for the Coordinator for the Defense of Water and Life, discusses the struggle against water privatization in Bolivia.

Nashville. The Metropolitan Government of Nashville and Davidson County Task Force. 1998. *The Future of Metro Water Services: Privatization of Water and Wastewater Utilities.* September 21 [online]. [Cited April 15, 2001.] <www.waterindustry.org/Metro-water.htm>.

This report lists the problems facing city owned utilities, the reasons for privatizing water services, alternative forms of ownership and operations, and examples of recent projects.

The National Association of Water Companies. (NAWC). 1999. *The NAWC Privatization Study: A Survey of the Use of Public-Private Partnerships in the Drinking Water Utility Sector.* Conducted by The Hudson Institute. Washington D.C.: NAWC. June. A summary of the findings is online at <www.nawc.org/study_main.html>.

The NAWC study reports that the 29 public-private partnerships across the United States that it closely examined have been successful in ensuring compliance with the Safe Drinking Water Act*, upgrading infrastructure, reducing costs, stabilizing rates, and improving customer service. It concludes that the investor-owned utilities were able to bring all the systems into compliance within one year of privatization by upgrading the aging infrastructure, identifying system improvements and applying advanced operating techniques.*

———. 2001. *About the Private Water Utility Industry* [online] [Cited April 15, 2001] <www.nawc.org/invest_main.html>.

NAWC defines a private water system, answers questions about the benefits of privatization, and identifies common public-private partnership options.

National Round Table on the Environment and the Economy. 1996. *State of the Debate: Water and Wastewater Services in Canada*. Ottawa: National Round Table on the Environment and the Economy.

The report anticipates the extent of the need for new water infrastructure in the future, and examines the alternative modes of financing and

delivering water and wastewater through public-private partnerships. The round table does not reach a consensus on whether public or private management of the water industry is preferable.

Neal, Kathy, Patrick Maloney, Jonas Marson, and Tamer Francis. 1996. *Restructuring America's Water Industry: Comparing Investor-Owned and Government Water Systems.* Policy study No. 200. Los Angeles: The Reason Foundation [online]. [Cited March 25, 2001.] <www.rppi.org/ps200.html>.

This report makes the case for restructuring by comparing the performance of investor-owned and government-owned water companies in California. It concludes that investor-owned companies can provide the same services at the same cost as government companies without subsidies or tax-exemptions.

Neto, Frederico. 1998. "Water privatization and regulation in England and France: a tale of two models." *Natural Resources Forum.* Vol. 22, no. 2, pp. 107–17.

This article examines the regulations that were introduced in England and France subsequent to water privatization. The author compares the regulation of the water industry in England and France with a view to determining the usefulness of these two models for other countries.

New Brunswick. Office of the Auditor General. 2000. "Departments of the Environment and Local Government and Health and Wellness: Domestic Well Water Quality." *2000 Auditor General's Report.* Chapter 4 [online]. [Cited May 5, 2001.] <www.gov.nb.ca/OAG-BVG/2000agr.htm>.

The auditor general found that government is not enforcing the regulations for dug wells, and notification of water test results is often delayed beyond the three-working-day limit. There is only one trained inspector in the Department of the Environment and Local Government to monitor the Domestic Well Water Program. The auditor general made many recommendations. Trained staff should work for the department. Well diggers should be licensed. A groundwater management information system should be set up. The department should establish performance indicators.

Noble, Dan W. 1999. *U.S. Water Industry Crosses Threshold: Privatization, Pricing and Parlez-Vous Francais?* [online]. [Cited May 5, 2001.] <www.waterinvestments.com/discuss/WaterindustryOverviewFinalPrint.asp>.

This article discusses the effects of consolidation, globalization, and privatization on the water industry in the United States.

Novotny, Vladimir. 1996. "Integrated water quality management." *Water Science and Technology.* Vol. 33, no. 4–5, pp. 1–7.

The author examines the components of the integrated water quality management and planning process in the United States.

O'Connor, Jeremiah, and Bharat Patel. 1994. "The water industry needs reform: states should make preventive measures their priority." *Fortnightly: the North American Utilities Business Magazine.* Vol. 132, April 1, pp. 24–27.

The authors identify some of the problems with restructuring the water industry. They note that many of the small utilities lack the resources to meet water quality standards. They argue that government should promote the consolidation of the water industry to make it more financially viable.

Ogden, Stuart, and Robert Watson. 1999. "Corporate performance and stakeholder management: balancing shareholder and customer interests in the U.K. privatized water industry." *Academy of Management Journal.* Vol. 42, no. 5, pp. 526–38.

The authors found that shareholders of private water firms often responded positively to the suggestion that customer service performance should be improved, even though it could be costly for the firms.

Okun, Daniel A. 1977. *Regionalization of Water Management: A Revolution in England and Wales.* Essex: Applied Science Publishers Ltd.

The author provides a historical comparison of water quality management in the United States and in England and Wales. pp. 310–21.

O'Leary, Rosemary. 1993. "Five trends in government liability under environmental laws: implications for public administration." *Public Administration Review.* Vol. 53, No. 6, November/December, pp. 542–49.

The author examines the implications of changing environmental laws for U.S. public administration.

Oliver, Charles. 1997. "When the government gets in the way." *Investor's Business Daily.* February 27. Reprinted in *NCPA Privatization Issues – Feds Hamper Local Privatization.* Idea House, National Center for Policy Analysis, 2001 [online]. [Cited April 14, 2001.] <www.ncpa.org/pd/private/pdpriv/pdpriv9.html>.

The author suggests that the federal government should remove some of the roadblocks to privatization such as grant limitations, labour provisions and environmental laws. Then private firms will have the opportunity to show that they can provide a higher quality of service than local governments.

d'Ombrain, Nicholas. 2002. *Machinery of Government for Safe Drinking Water* . Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 4. Walkerton Inquiry CD-ROM. [Online.] [Cited January 5, 2002.] <www.walkertoninquiry.com>.

This paper discusses the evolution of water policy in Ontario and describes the roles of federal, provincial, and municipal agencies. It evaluates the strengths and weaknesses of the government's policies, institutions, and

processes related to the provision of safe drinking water, and suggests a framework for assessing possible future arrangements.

Ontario Clean Water Agency. 1998. "Emergency preparedness: OCWA's got the situation under control." *Waterline: The Ontario Clean Water Agency Newsletter.* Vol. 2, no. 111, spring 1998 [online]. [Cited May 5, 2001.] <www.ocwa.com/frpub.htm>.

This article explains OCWA's uninterrupted provision of services during the Ice Storm of 1998.

Ontario. Environmental Commissioner. 2001. *Ontario's Permit to Take Water Program and the Protection of Ontario's Water Resources.* Submission to the Walkerton Inquiry. January [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com>.

The Environmental Commissioner concluded that inconsistencies and deficiencies were so pervasive in the Permit to Take Water program that the information it generated could not be considered reliable. The ECO suggested the need for more public accountability and transparency in the PTTW process and the consistent application of an ecosystem approach. The ECO highlighted regulatory and administrative problems associated with the PTTW program.

Ontario. Ministry of the Environment. 2000a. *Operation Clean Water: A Progress Report.* Toronto: Ministry of the Environment, September [online]. [Cited May 5, 2001.] <www.ene.gov.on.ca/opclean.pdf>.

This report identifies steps that have been taken to restore the public's confidence in the municipal water system since the Walkerton disaster. For instance, since July the Ministry of the Environment has posted Adverse Water Quality Incident Reports on its Web site.

———. 2000b. *Protecting Drinking Water for Small Waterworks in Ontario.* Discussion paper. Toronto: Ministry of the Environment. August 9.

As part of the Ontario government's Operation Clean Water, this report provides an action plan for ensuring that Ontario's drinking water is safe.

Ontario. Office of Privatization.1998a. *Government's Role in Operation of Water and Sewage Treatment Systems to be Reviewed.* News release. March [online]. [Cited April 7, 2001.] <www.ene.gov.on.ca/envision/news/privnr.htm>.

This news release announces the provincial government's review of the Ontario Clean Water Agency's role in the operation of water and sewage treatment plants for municipalities.

———.1998b. *The Ontario Clean Water Agency.* Fact sheet. March [online]. [Cited April 7, 2001.] <www.ene.gov.on.ca/envision/news/fact.htm>.

The fact sheet outlines the mandate of the Ontario Clean Water Agency. It

provides a chart showing the number of operators of water distribution and sewage treatment facilities in Ontario and their respective roles and responsibilities.

Ontario. Office of the Auditor General. 1994. "Reports on value for money audits: water and sewage treatment facilities." Queen's Printer for Ontario. Toronto: Office of the Auditor General. pp. 78–90.
The auditor general observed that, in Ontario, water generally meets the quality standards. However, inadequate monitoring was noted of plants not covered by the Drinking Water Surveillance program and a lack of timely follow-up action on problems.

Ontario. Office of the Premier. 2000. *Harris Government Action Plan to Improve Water Quality Includes Tough New Regulation.* News Release. August 8.
This release announces the Ontario government's strategy for improving water quality. It is the first time that water quality standards and testing requirements have been enforced by law.

Ontario Sewer and Watermain Construction Association. 2001a. *Conservation, Preservation, Restoration: A Nine Step CPR Plan for Ontario's Water and Sewage Systems.* Submission to the Walkerton Inquiry. January [online]. [Cited May 2001.] <www.walkertoninquiry.com>.
This document outlines nine steps for improving water infrastructure in Ontario.

———. 2001b. *Drinking Water Management in Ontario: A Brief History.* Submission to the Walkerton Inquiry. January [online]. [Cited May 2001.] <www.walkertoninquiry.com>.
This paper describes the complexities that have historically been associated with managing and financing water infrastructure in Ontario.

Ontario Society of Professional Engineers. 2001. *Safe Drinking Water & the Role of Professional Engineers.* Submission to the Walkerton Inquiry – Part II. OSPE Task Group on the Production and Distribution of Safe Drinking Water in Ontario. March [online]. [Cited May 2001.] <www.walkertoninquiry.com/>.
This paper focuses primarily on the role of engineers in ensuring the delivery of safe drinking water. It discusses the evolution of the ownership of water systems in Ontario. pp. 8–9.

Ontario. Treasury Board Secretariat. 1996. *Alternative Service Delivery Framework.*Toronto: Queen's Printer.
This framework defines strategies for delivering innovative, client-based, financially viable services without promoting a particular model of alternative service delivery.

Orwin, Alexander. 1999. *The Privatization of Water and Wastewater Utilities: An International Survey*. EV524. Toronto: Environment Probe, August.
This survey examines water privatization in developed and developing countries. Canada and the United States are excluded on the grounds that the degree of privatization in these countries is minimal. The author concluded that privatization is "a pragmatic solution to previously intractable problems."

Ostrom, Elinor. 1996. "Crossing the great divide: coproduction, synergy, and development." *World Development*. Vol. 24, no. 6, pp. 1073–87.
This article explores the activation of local citizens to participate in the formulation and implementation of water policies in Brazil. It argues that the Brazilian case provides a model of co-production that may be an improvement over the traditional methods of constructing and operating urban infrastructures.

Pacific Research Institute for Public Policy. 1999. *Ending California's Water Crisis: A Market Solution to the Politics of Water*. San Francisco: Pacific Research Institute for Public Policy. July 7 [online]. [Cited March 26, 2001.] <www.pacificresearch.org/issues/enviro/watermkts/main.html>.
This report suggests that CALFED, the federal-state task force created by the 1994 Bay Delta Accord, should look to water markets to sustain California's water supply rather than focusing on dams, canals, and bureaucratic rules.

Parker, Shafer. 2000. "How to think clearly about clean water: Why is Canada among the slowest countries in the developed world to privatize delivery?" *Report Newsmagazine (BC Edition).* Vol. 27, no. 5, July 3, pp. 15–17.
Parker identifies cases of successful privatization – England, Milwaukee, Moncton and Strathmore, which has a contract with Epcor Water Services Inc., a profit-oriented subsidiary of Edmonton's city-owned water and power utility.

Parto, Saeed. 1997. "ISO 14000 – Who needs it?" *Water News.* Vol. 16, no. 3, September.
The author considers the benefits and limitations of adopting an environmental management system based on the ISO 14001 model.

Patte, David E.M., and Leon E. Danielson. 1996. "Groundwater policy in North Carolina." *Water Quality and Waste Management.* North Carolina Cooperative Extension Service. RE-9 [online]. [Cited March 27, 2001.] <www.bae.ncsu.edu/bae/programs/extension/publicat/wqwm/re9.html>.
This fact sheet describes North Carolina's groundwater protection policies

and the actors involved in the policymaking process. It anticipates that local governments will play increasingly significant roles in protecting the groundwater.

Pearse, Peter H. 1998. *Water Management in Canada: The Continuing Search for the Federal Role*. Keynote Address at the 51st Annual Conference of the Canadian Water Resources Association. Victoria, B.C., June 10–12 [online]. [Cited March 27, 2001.] <www.cwra.org/news/arts/pearse.html>.

Pearse describes the role of the federal government in water management in Canada. He regrets the deep cuts in funding and staffing in Environment Canada and the lack of a centre of water expertise in the federal government.

Peel, Regional Municipality. 1999. Water and Wastewater Servicing Master Plan for the Lake Based System. May.

This plan describes the proposed future development for water and wastewater infrastructure for the region's lake-based system.

Pineda Pablos, Nicolas. 1999. Urban Water Policy in Mexico: Municipalization and Privatization of Water Services. Ph.D. diss., University of Texas, Austin.

This thesis examines changes in the management of water services in Mexico in the past two decades. It emphasizes the importance of community participation, local political conditions and a stable economic context for ensuring the success of restructured water services.

Pint, Ellen Marie. 1989. Government Control of Natural Monopoly: Regulation or Nationalization. Ph.D. diss., Stanford University.

This thesis seeks to explain theoretically the effects of ownership on the production decisions of firms, including U.S. water utilities.

Platt, Anne. 1996. "Water-borne killers." *World Watch*. Vol. 9, no. 2, March, p. 28.

This article describes the devastation caused by water-borne infections throughout the world and the strategies that are used to improve water quality.

Plunkett, T.J., and G.M. Betts. 1978. *The Management of Canadian Urban Government*. Kingston: Institute of Local Government, Queen's University.

This is a classic political science textbook that stresses the importance of keeping politics out of administration.

Pollution Probe. 2001. *The Management and Financing of Drinking Water Systems: Sustainable Asset Management*. Submission to the Walkerton Inquiry. Toronto: Pollution Probe. April 2 [online]. [Cited May 2001.] <www.walkertoninquiry.com>.

This document examines the management and financing of Ontario's drinking water system.

Pollution Probe. 1998. *The Water We Drink: A Report on Pollution Probe's Conference "The Water We Drink: Examining the Quality of Ontario's Drinking Water, November 16–17"* [online]. [Cited May 2001.] <www.walkertoninquiry.com>.

The conference proceedings concern the quality of Ontario's drinking water.

"Public-private partnering reshaptes *[sic]* water and sewer industry." 1997. Empire State Report Supplement, *A Time of Choice/ A Time of Change*. March [online]. [Cited April 15, 2001.] <www.waterindustry.org/indust-1.htm>.

Public-private partnerships are becoming more popular in the United States, partly as a result of the Internal Revenue Service's recent decision to allow government agencies to negotiate longer-duration contracts with private design-build-operate consortiums. This article identifies some of the international contract maintenance firms that are courting city councils to outsource their water.

Public Services International. 2000a. *It cannot be business as usual: Problems with the private models for water*. PSI Briefing – World Water Forum, The Hague, March 17–22. London: Public Services International Research Unit [online]. [Cited May 5, 2001.] <www.world-psi.org>.

This briefing note records the problems of the French model that were identified in the auditor's 1997 report.

———. 2000b. *Private water inefficiencies*. PSI Briefing – World Water Forum, The Hague, March 17–22. London: Public Services International Research Unit [online]. [Cited May 2001.] <www.world-psi.org>.

A direct water cost comparison is made between Swedish and English cities in 1995. The results show that, "In every case the publicly-owned Swedish company had lower production costs than the privately-owned UK counterparts."

———. 2000c. *Undermining Democracy and the Environment*. PSI Briefing – World Water Forum, The Hague, March 17–22. London: Public Services International Research Unit [online]. [Cited May 5, 2001.] <www.world-psi.org>.

This briefing note advances the argument that private water concessions undermine democratic accountability.

Québec. Ministère de l'Environnement. 1999. *La gestion de l'eau au Québec: Document de consultation publique* [online]. [Cited April 7, 2001.] <www.menv.gouv.qc.ca/eau/consultation/themes3.htm>.

This report describes the state of drinking water systems in Quebec and the need to invest in upgrading the water infrastructure.

Rapinat, Michel. 2000. "National Report: France." *Water Supply*. Vol. 18, no. 1–2, p. 97.

The author describes standards for drinking water and wastewater in France.

Reason Public Policy Institute. 2001. *Privatizing Water Utilities or Water Works: Trends, Cost Savings Potential, Best Practices, How To Tips*. Los Angeles: The Reason Foundation [online]. [Cited March 30, 2001.] <www.privatization.com/Collection/SpecificServiceAreas/Water-local.html>.

This article traces the current interest in investor-owned water companies in the United States to the lack of public resources to upgrade the aging infrastructure, "the unfunded congressional mandates related to requirements of the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA), and the cost savings associated with outsourcing water-delivery services." It identifies cases of successful privatization: Jersey City, New Jersey; Hawthorne, California; and North Brunswick, New Jersey.

Reed, Lawrence W. 1997. "Privatization and American business," *Imprimis*. Vol. 26, October, pp. 1–6.

This paper outlines different forms of privatization globally and in the United States. It gives examples of privatization initiatives in different sectors.

Renner, Don. 2000. "Privatize without a contract." *Water Engineering and Management News*. February, pp. 34–37.

This article, by a former plant operator, makes recommendations for upgrading water plant operations in the absence of a privatization contract.

Renzetti, Steven. 1999. "Municipal water supply and sewage treatment: costs, prices, and distortions." *Canadian Journal of Economics*. Vol. 32, no. 3, May, pp. 688–704.

Renzetti discusses the operations of municipal water utilities in Ontario. He determines that prices charged to customers for water are only one-third of the estimated marginal cost for treatment in 1991.

Reuss, Martin, ed. 1993. *Water Resources Administration in the United States: Policy, Practice, and Emerging Issues*. East Lansing: American Water Resources Association.

William Goldfarb's chapter, "The trend toward judicial integration of water management," deals most directly with water quality management. Goldfarb examines cases where "a court was forced to integrate water quantity and quality concerns because a state or local government was unwilling or unable to perform this synthesis in a comprehensive manner." p. 84.

Rivera, Daniel. 1996. *Private Sector Participation in the Water Supply and Wastewater Sector: Lessons from Six Developing Countries*. World Bank Publication. September [online]. [Cited May 2001.] <www.worldbank.org/>.

The author draws lessons from partnerships in the water supply and wastewater sectors in Argentina, Mexico, Columbia, Poland, Guinea, and Chile. He suggests that "private sector participation did lead to improvement in the quantity and quality of service delivery," p. 21, particularly in Argentina and Chile. For the author, more surprising than the fact that there was an improvement in service quality was the speed with which the improvement took place as the private sector instituted relatively inexpensive, innovative management and operating procedures.

Robinson, Lee. 1999. "Scorekeepers to business partners: repositioning the finance function." *Total Quality Management*. Vol. 10, no. 4/5, July, pp. S690–S696.

The author examines the organizational culture of North West Water, which was a water/wastewater company formed in 1989 when the government privatized the regional water authorities in England and Wales. He discusses how the company evolved into the UK's first multi-utility organization and became a major international business.

Rogers, Peter. 1993. *America's Water: Federal Roles and Responsibilities*. Cambridge, Mass.: The MIT Press.

Rogers discusses some of the issues related to setting water quality standards. pp. 38–43. Appendix 1 identifies the landmark events in water policy at the federal level in the United States from 1776 to the present.

Rose, Joan B. et al. 2000. "Climate and waterborne disease outbreaks." Executive Summary. *Journal of the American Water Works Association.* Vol. 92, no. 9, pp. 77–87 [online]. [Cited April 13, 2001.] <www.awwa.org/journal/j900es2.htm>.

The authors examined water-borne disease outbreak data since 1971 and found that "outbreaks in the United States associated with microorganisms from fecal contamination are clustered in time with heavy rainfall and geographically with key watersheds." p. 77.

Saal, David S., and David Parker. 2000. *Productivity and price performance in the privatized water and sewage companies of England and Wales.* RP0029. November [online]. [Cited May 17, 2001.] <http://research.abs.aston.ac.uk/wpaper/0029.pdf>.

This report suggests that water privatization with economic regulation has not improved total factor productivity growth in Britain.

Saleth, R. Maria, and Ariel Dinar. 1999. *Water Challenge and Institutional Response: A Cross-Country Perspective*. Washington, D.C.: World Bank, February 5 [online]. [Cited May 5, 2001.] <www.worldbank.org/>.
This study examines patterns of change in water institutions in 11 countries. It delineates best practices and concludes by suggesting the implications of the study for the World Bank's policy and operation for encouraging market-oriented changes in water management.

Salman, M.A., ed. 1999. *Groundwater Legal and Policy Perspectives: Proceedings of a World Bank Seminar*. World Bank technical paper No. 456. November 24. [online]. [Cited May 5, 2001.] <www.worldbank.org/>.
This report describes the experience of different countries that use water markets. It argues that the regulation of groundwater markets must be based on "an interdisciplinary approach coordinating legal, economic, and social analysis and tools." p. 88.

San Francisco Chronicle. 1991. "Shortage of clean water is a big problem in Poland." April 22, p. C6.
The author discusses the need for new technologies and money to protect the Polish environment after decades of destruction by heavy industry.

Sancton, Andrew, and Teresa Janik. 2002. *Provincial-Local Relations and Drinking Water in Ontario*. Toronto: Ontario Ministry of the Attorney General. Walkerton Inquiry Commissioned Paper 3. Walkerton Inquiry CD-ROM. [Online.] [Cited January 5, 2002.] <www.walkertoninquiry.com>.
This paper identifies the historical and institutional reasons that the province has played a central role in providing a public good that might more logically be considered a local concern.

Sanders, Barry, Peter Engler, and Kathryn Heaton. 2000. "National Report: Australia." *Water Supply*. Vol. 18, no. 1–2, p. 88.
This report describes the government structure for water management and Australia's drinking water guidelines.

Santa Clara Valley Water District. 2000. *Silicon Valley's Water Supply and Water Quality Challenges*. January 27.
This report explains the need for improved water quality in the Santa Clara Valley Water District. It outlines the steps that are being taken to ensure that the water quality meets public health standards now and in the future.

Saunders, Peter. 1995. "Consumers and privatization: the case of the water industry." *Privatization and the Welfare State: Implications for Consumers and the Workforce*. Edited by Philip Morgan. Aldershot, UK: Dartmouth.
The author examines the impact of water privatization in England and Wales upon consumers, in the areas of price levels, quality of provision,

and corporate accountability. He concludes that consumers benefited on prices but the effect on quality and accountability was mixed. He notes that there are incentives for price-capped companies to try to raise profit margins by taking the easy route on quality standards. Nevertheless, the government has taken steps to make its regulations more stringent and monitoring has improved.

Schaefer, Karl, Sonya Meek, and Sally Leppard. 2000. "Innovative funding for watershed management." *Water News.* September.

This report summarizes the case studies presented at the 1999 CWRA – Ontario Branch conference on Innovative Funding for Watershed Management. The cases examined include (1) the Rural Water Quality Program – "The City Pays" – Regional Municipality of Waterloo, which may be the only program in Canada where the urban municipality has shared the costs of improving water quality at the source with the agricultural community, (2) Water Quality Reserve Fund – Peel, (3) Stormwater User Fees – Regina, (4) Water Licence Fees – Nova Scotia, (5) Revolving Loan Fund – Toronto Atmospheric Fund, which assists the city in reducing local greenhouse gas emissions, and (6) State Lottery – Nebraska.

Schundler, Bret. 1997. "City chooses private manager for its water utility." *The American City and County.* Vol. 112, no. 3, March, pp. 45–46.

This article describes the public-private partnership involving Jersey City, New Jersey, and United Water Resources. It speculates that competitive contracting for a water utility's management may better serve the public's interest than selling the utility.

Scott, Colin. 2000. "Accountability in the regulatory state." *Journal of Law and Society.* Vol. 27, no. 1, March, pp. 38–60.

This article discusses the traditional accountability mechanisms. It describes administrative changes that have accompanied the new public management revolution and develops two extended accountability models: interdependence and redundancy.

Scottish Executive. 2001a. *Drinking Water Quality in Scotland 1998* [online]. [Cited May 17, 2001.] <www.scotland.gov.uk/library2/doc06/dwq-00.htm>.

This report shows that water quality in Scotland was better in 1998 than in 1997.

———. 2001b. *Managing Change in the Water Industry: A Consultation Paper* [online]. [Cited May 17, 2001.] <www.scotland.gov.uk/consultations/industry/mcwi-02.asp>.

This consultation paper considers the development of competition in the Scottish water sector subsequent to the Competition Act 1998. *It observes that the current statutory framework will need to be changed.*

———. 2001c. *The Water Services Bill – The Executive's Proposals* [online]. [Cited May 18, 2001.] <www.scotland.gov.uk/consultations/government/wsbep-01.asp>.
This report discusses the new licensing regime and the post of Drinking Water Quality Regulator that is being established to take into account the increasing competition in the water industry.

Seabrook, Charles. 1998. "Georgians to pool ideas on solving water woes." *The Atlanta Journal*. April 6, p. E1.
The author describes Atlanta's water quantity and quality problems.

Seidle, F. Leslie. 1995. *Rethinking the Delivery of Public Services to Citizens.* Montreal: Institute for Research on Public Policy.
This book reviews recent innovations in service delivery in Canada, the United Kingdom, New Zealand, and Australia. Chapter 7 focuses specifically on partnerships, service provisions, and public sector responsiveness. It discusses the rationale and potential of social partnerships, and includes a case study of the Ontario Ministry of Natural Resources partnership "successes."

Senia, Al. 1999. "A new era of water competition." *Utility Business.* December 24.
This article describes the activity of private firms in the water market in California.

Shaoul, Jean. 1997. "A critical financial analysis of the performance of privatized industries: the case of the water industry in England and Wales." *Critical Perspectives on Accounting*. Vol. 8, no. 5, October, pp. 479–505.
This article argues that the British water industry did not become more efficient subsequent to privatization, and shareholders were the primary beneficiaries of the policy change.

Shapard, Rob. 1997a. "How safe is your water?" *The American City and County*. Vol. 112, no. 6, June, pp. 30–42.
This article describes the water quality reporting experience in: California; Milwaukee, Wisconsin; and Denver, Colorado.

———. 1997b. "Safeguarding municipal water supplies at the source." *The American City and County*. Vol. 112, no. 3, March, pp. 34–42.
This article recommends steps that should be taken to involve all stakeholders in protecting watersheds.

Shultz, Jim. 2000. "Bolivia's water war victory." *Earth Island Journal*. Autumn, pp. 28–29.
Jim Shultz, the Executive Director of the Democracy Center, San Francisco, documented the events surrounding the Cochabamba protest over rate hikes subsequent to the Bechtel-led water privatization.

Sirat, Michael. 2000. "Sponsor Talk." *Project Finance*. June, pp. 30–31.
Michael Sirat, the Vice President International Finance of Suez Lyonnaise des Eaux, discusses the role of his company in the privatization process in Argentina.

Smith, David Ingle. 1999. *Water in Australia: Resources and Management*. Melbourne: Oxford University Press.
This book begins with a scientific account of water quality and supply issues and ends with a discussion of the advantages and disadvantages of corporatization and privatization. The author expresses his concerns about the deficiencies in regulation related to corporatization in Australia. He concludes that "the rapid adoption of new styles of ownership is the most significant change in the management of Australia's water resources in this century. Because information about the impacts of this change has, to date, been scarce, the judgement as to whether or not it has the potential to solve water quality problems is still largely a matter of opinion." p. 304.

Smith, Velma. 1994. "Disaster in Milwaukee: complacency was the root cause." *EPA Journal*, summer [online]. [Cited May 13, 2001.] <www.epa.gov/docs/epajrnal/summer94/06.txt.html>.
The author discusses the cause and implications of the 1993 water disaster in Milwaukee.

Smout, Ian, and Sarah Parry-Jones. 1999. *Lessons Learned From NGO Experiences in the Water and Sanitation Sector*. Prepared by the WELL Resource Centre, Water, Engineering and Development Centre, Loughborough University.
The authors discuss the lessons learned from the experiences of non-government organizations in developing countries.

Soden, Dennis L., and Janet S. Conary. 1997. "Unforeseen problems and the need for corrective public works projects." *Public Works Administration: Current Public Policy Perspectives*. Edited by Lucy Brewer. Chapter 10, pp. 163–79.
This article discusses the need to build a desalination plant to correct the problem of the overutilization of water from the Colorado River so that water quality standards can be met for water flowing from the United States into Mexico.

Solo-Gabriele, Helena and S. Neumeister. 1996. "U.S. outbreaks of cryptosporidiosis." *Journal of the American Water Works Association*. Vol. 88, no. 9, pp. 76–86.
This study determined that the Cryptosporidium *outbreak in Milwaukee was responsible for the deaths of at least 69 individuals.*

Spellman, Frank R., and Joanne Drinan. 2000. *The Drinking Water Handbook.* Lancaster, Penn.: Technomic Pub. Co.

The authors identify different types and sources of contaminants in water. pp. 162–64.

Spulber, Nicolas, and Asghar Sabbaghi. 1998. *Economics of Water Resources: From Regulation to Privatization.* 2nd edition. Boston: Kluwer Academic Publishers.

The most relevant chapters discuss the benefits of various types of administrative controls (chapter 8) and the impetus for water privatization, particularly in the United States. The authors argue that privatized water services are likely to be more efficient. However, in their view, "effective protection of both consumer and industry interests will require that privatized industry be subject to quality controls and pipeline-channel network specifications, as well as to price constraints." p. 218.

Standards Council of Canada – Canadian Association for Environmental Analytical Laboratories (SCC-CAEAL) Accreditation Program Information. 2001. *Accreditation of Laboratories in Canada with a Focus on Drinking Water Testing Laboratories.* Submission to the Walkerton Inquiry, Standards Council of Canada – Canadian Association for Environmental Analytical Laboratories. March 3 [online]. [Cited May 5, 2001.] <www.walkertoninquiry.com>.

This paper provides information concerning accreditation of water testing laboratories in Canada.

Starkey, Deb, and Larry Morandi. 1998. "State capacity development legislation under the *Safe Drinking Water Act.*" *State Legislative Report.* Vol. 23, no. 10, April.

This report suggests ways that states develop their capacity to help small drinking water systems to meet public health standards.

Starr, Paul. 1988. "The meaning of privatization." *Yale Law and Policy Review.* Vol. 6, pp. 6–41 [online]. [Cited April 14, 2001.] <www.princeton.edu:80/~starr/meaning.html>.

The author discusses the significance of privatization as an idea, theory, and rhetoric, and as a political practice. He explains why he is generally opposed to privatization.

———. 1990. "The new life of the liberal state: privatization and the restructuring of state-society relations." *Public Enterprise and Privatization*, Edited by John Waterbury and Ezra Suleiman. Boulder, CO: Westview Press, pp. 22–54 [online]. [Cited April 14, 2001.] <www.princeton.edu:80/~starr/newstate.html>.

The author seeks an explanation of the current turn toward privatization and liberalization throughout the world. He notes that it would be short-sighted to consider privatization irreversible.

Steinway, Daniel M. 2000. "Recent ruling compels EPA to consider best available science." *Corporate Counsel*. Vol. 7, no. 7, July, p. A8.

The U.S. Court of Appeals for the District of Columbia Circuit rules in the case Chlorine Chemistry Council v. EPA *that the EPA "must base its regulatory proposals on the best available scientific evidence, rather than on unsubstantiated scientific theories." p. A8.*

Stiefel, Holly June. 1994. *Municipal Wastewater Treatment: Privatization and Compliance*. Policy study No. 175. Los Angeles: The Reason Foundation. February [online]. [March 30, 2001.] <www.rppi.org/water.html>.

The author opposes federal funding programs, which she believes discourage communities from discovering innovative ways for complying with water treatment standards. She notes that EPA identifies the benefits of public-private partnerships in the wastewater industry as "(1) access to more sophisticated technology; (2) cost-effective design, construction, and/or operation; (3) flexible financing; (4) clear delegation of responsibility and risk; and (5) guaranteed costs."

Stiglitz, Joseph E. 1994. *Whither Socialism?* Cambridge, Mass.: The MIT Press.

The author argues that ownership (i.e., property rights) is less important than institutional aspects of water management (e.g., work incentives) for explaining the efficiency of firms and economies.

Swan, Norman. 2000. "Quality of drinking water." *Radio National: The Health Report*. July 3 [online]. [Cited May 9, 2001.] <www.abc.net.au/rn/talks/8.30/helthrpt/stories/s148021.htm>.

Norman Swan hosted a radio discussion regarding water quality problems such as carcinogens and Cryptosporidium.

Swomley, John M. 2000. "When blue becomes gold." *The Humanist.* Vol. 60, no. 5, September/October, pp. 5–7.

The author discusses the globalization of the water industry.

Sydney Water. 2001. *Annual Environment & Public Health Report 2000* [online]. [Cited May 11, 2001.] <www.sydneywater.com.au/html/AER2000/html/qual_coastal/coastal_01.htm>.
This report documents Sydney Water's efforts to ensure high-quality drinking water.

Tate, Donald. Forthcoming. "Water system privatization." *The African Water Page* [online]. [Cited May 5, 2001.] <www.thewaterpage.com/ppp_debate.htm>.
This excerpt from a soon-to-be-released book examines privatization as a major sociopolitical issue in water demand management.

Taylor, Andrew. 1998. "Regulators in row over water improvements." *Financial Times*. June 19, p. 12.
This article by Andrew Taylor notes that Ian Byatt, Director-General of OFWAT, rejected the Environment Agency's plan to improve water quality on the grounds that the plan would cost consumers too much.

———. 1999. "Drinking water quality 'among highest in world.'" *Financial Times*. July 8, p. 9.
Taylor observes that the latest annual report by the Drinking Water Inspectorate reveals that the UK has high quality water.

Tenenbaum, David J. 1998. "Tackling the big three." *Environmental Health Perspectives*. Vol. 106, no. 5, May [online]. [Cited March 23, 2001.] <http://ehpnet1.niehs.nih.gov/docs/1998/106-5/spheres.html>.
This article bemoans the prevalence of contaminated drinking water, untreated human excrement, and air pollution. It describes how international agencies – the World Bank, the United Nations, and the World Health Organization – have tackled these problems.

Thuss, Michael F. 1998. *Federal Involvement in Resolving Local Water Resource Issues*. 25th Water for Texas Conference: Water Planning Strategies for Senate Bill 1, Austin, Texas, December 1–2, 1998 [online]. [Cited March 30, 2001.] <http://twri.tamu.edu/twriconf/w4tx98/papers/thuss.html>.
Thuss bemoans administrative fragmentation in water resource management. He asserts that local communities need to play a more substantive role in formulating water policy and managing associated budgets.

Thomson, Ken.1994. "Groundwater protection and management in Canada." *Water News*. Vol.13, no. 4, December.
This article reviews the mechanisms for groundwater protection in different regions of Canada and concludes that the lack of a national policy statement on groundwater management is unfortunate.

Trebilcock, Michael J. 1994. *Can Government Be Reinvented?* WPS#25-1994. Faculty of Law, University of Toronto.
Trebilcock provides a theoretical discussion of public sector organizational arrangements. He discusses the strengths and weaknesses of each option. He takes into account distributional considerations and political theories of choice of governing instrument.

Trebilcock, Michael J., and Ronald Daniels. 1996. "Private provision of public infrastructure: an organizational analysis of the next privatization frontier." *University of Toronto Law Journal*. Vol. 46, pp. 375–426.
The authors discuss privatization issues, but do not focus specifically on the water sector.

Trudgill, Stephen, Des Walling, and Bruce Webb. 1999. *Water Quality: Processes and Policy*. Chichester: John Wiley & Sons, Ltd.
This book uses a global perspective to address the relationship between science and policy-making with respect to water resources.

Tully, Shawn. 2000. "Water, water everywhere." *Fortune.* Vol. 141, no. 10, May 15, pp. 342–54.
Tully writes glowingly about the investment opportunities in the water sector of developing countries and the United States. He focuses on the success of Suez in expanding its water business in developing nations.

United Kingdom. Department of the Environment, Transport and the Regions. 1998a. *Investigation of Drinking Water Quality Enforcement Procedures in Member States of the European Union.* DWI0800. June [online]. [Cited May 5, 2001.] <www.fwr.org/waterq/dwi0800.htm>.
This paper discusses the implementation of the EU Drinking Water Directive 80/778/EEC in Denmark, France, Germany, Italy, The Netherlands, and Spain.

———. 1998b. *Raising the Quality* [online]. [Cited May 18, 2001.] <www.environment.detr.gov.uk/wqd/waterquality/rtq08.htm>.
This report provides guidance on quality obligations for 2000–2005.

———. 2000a. *Drinking Water Inspectorate: New EC Directive will make drinking water quality even better*. Press Notice 0079. February 4 [online]. [May 14, 2001.] <www.press.detr.gov.uk/0002/0079.htm>.
This press notice discusses new regulations in the United Kingdom to enshrine into law the EC Directive regarding Cryptosporidium.

———. 2000b. *Drinking Water Inspectorate: water guardian marks first ten years.* Press notice 0011. January 11 [online]. [Cited May 14, 2001.] <www.press.detr.gov.uk/0001/0011.htm>.
This press notice tracks the Drinking Water Inspectorate's success at meeting standards over the past decade.

———. 2000c. *First Consultation Paper on the Implementation of the EC Water Framework Directive. (2000/60/EC)* [online]. [Cited May 18, 2001.] <www.environment.detr.gov.uk/consult/waterframe/04.htm>.
This paper examines the key issues surrounding the implementation of the EC Water Framework Directive in England and Wales.

———. *Water Charging in England and Wales – A New Approach Consultation Paper* [online]. [Cited May 18, 2001.] <www.environment.detr.gov.uk/consult/watercharge/water02.htm>.
This paper describes the government's approach to water charging and its proposal to rule out universal compulsory metering, disconnections, and budget payment units, which cut off the flow of water.

United Kingdom. House of Commons. 2001. *Select Committee on Environmental Audit – Seventh Report* [online]. [Cited May 14, 2001.] <www.parliament.the-stationery-office.co.uk/cgi-bin/htm_hl?DB=ukparl&STEMMER=e…>.
This report summarizes the Environmental Audit Committee's recommendations and conclusions. For example, it states that the committee "is not satisfied that OFWAT's 'no deterioration' approach to the maintenance and renewal of undergoing assets (sewers and water mains) is a logical or acceptable means of assessing the amount of investment which water companies need to meet these requirements." paragraph 208.

United Kingdom. National Audit Office. 1997. *Regulating and Monitoring the Quality of Service Provided to Customers by the Water Industry in England and Wales.* Press Notice on the Report by the Comptroller and Auditor General. December 10 [online]. [Cited April 10, 2001.] <www.nao.gov.uk/pn/9798388.htm>.
This report assesses the quality of service provided by water companies in England and Wales and makes recommendations for improvement. The National Audit Office states that the quality of service provided to customers has improved since privatization. One of its recommendations is that OFWAT should make greater use of target setting in their regulation of the quality of the service provided by companies.

———. 2000. *Office of Water Services: Leakage and Water Efficiency.* Press Notice. December 1 [online]. [Cited April 10, 2001.] <www.nao.gov.uk/pn/9900971.htm>.
The report notes that improvements made by the water industry since the mid-1990s have meant that leakage is not as serious a problem by international standards as it is in most countries. However, there is still a lot of progress that could be made in reducing leaking and improving water efficiency.

United Kingdom. Office of Water Services (OFWAT). 1998. *Provisional Assessment of Customers' Views on the Water Quality Debate*. Letter sent by the Director General of Water Services to the Deputy Prime Minister and the Secretary of State for Wales setting out the Director's provisional assessment, at a national level, of the results of a customer survey. Birmingham: OFWAT. July 7, 1998 [online]. [Cited April 10, 2001.] <www.ofwat.gov.uk/provisio.htm>.

The surveys indicated that OFWAT's customers were as concerned with improvements in services as with higher environmental standards. They would like to see steady environmental progress over a ten-year period, but they would not be willing to pay more for improvements.

———. 1999a. *Informing the Final Decisions on Raising the Quality 2000–2005*. An open letter to the Secretary of State for the Environment, Transport and the Regions and the Secretary of State for Wales. Birmingham: OFWAT [online]. [Cited April 10, 2001.] <www.ofwat.gov.uk/coqopenletter.htm>.

This letter provides an estimate of "the likely costs and implications for customers' bills of achieving the environmental improvement programmes set down in guidance from Ministers in Raising the Quality 2000–2005."

———. 1999b. *Periodic Review Public Consultation*. Executive summary. Birmingham: OFWAT [online]. [Cited April 10, 2001.] <www.ofwat.gov.uk/research.htm>.

The review was designed to determine the customers' views on water charges and environmental and service improvements.

———. 2000a. *The Changing Structure of the Water and Sewerage Industry in England and Wales*. Information note No. 29. Birmingham: OFWAT. August 1994. Revised May 2000.

This briefing note discusses the 1989 change in the structure of the water and sewerage industry. It explains the conditions under which a merger between utilities is referred to the Competition Commission. It lists the changes in ownership since 1993.

———. 2000b. *Comparing the Performance of the Water Companies in England and Wales in 1998–99 with Water Enterprises in Other Industrialised Countries*. Birmingham: OFWAT. September.

This report compares the performance of water companies in England and Wales with those in Australia, the Netherlands, and the United States.

———. 2000c. *Competition Act 1998: Application in the Water and Sewerage Sectors*. Birmingham: OFWAT. January 31.

This report describes the powers and duties of the Competition Act 1998 *with respect to the water and sewerage sectors, the standard approach to*

investigations, the nature of specific applications, and the process and procedures for handling cases.

———. 2000d. *New Ownership Structures in the Water Industry.* A consultation paper by the Director General of Water Services. Birmingham: OFWAT.
This consultation paper raises the issues that need to be considered before adopting new ownership structures, such as mutual trusts.

———. 2000e. "Opting for a meter." Information Note No. 46. (June.) [Online.] [Cited January 15, 2002.] <www.ofwat.gov.uk/pdffiles/in46.pdf>.
This note discusses the installation of meters and the bases for determining the householders' charges.

United States. Centers for Disease Control and Prevention. 1995. "Assessing the public health threat associated with waterborne cryptosporidiosis: report of a workshop." *Morbidity and Mortality Weekly Report* (June 16). Vol. 44, no. 6, pp. 1–19 [online]. [Cited January 15, 2002.] <www.cdc.gov/mmwr/preview/mmwrhtml/00037331.htm>..
This report addresses four key issues: "(1) surveillance and epidemiologic study designs; (2) public health responses when oocysts are detected; (3) cryptosporidiosis in immunocompromised persons; and (4) water sampling methods."

United States. Environmental Protection Agency. 1998a. *Consumer Confidence Reports: Final Rule*. Office of Water, EPA 816-F-98-007 [online]. [Cited May 8, 2001.] <www.epa.gov/safewater/ccr/ccrfact.html>.
This document outlines the information that water suppliers are required to include in their annual drinking water quality reports for consumers.

———. 1998b. *Waterborne Disease Studies and National Estimate of Waterborne Disease Occurrence* [online]. [Cited May 8, 2001.] <www.epa.gov/>.
This federal register informs the public about the epidemiological studies that would be undertaken for the Environmental Protection Agency and the Centers for Disease Control and Prevention two years after the enactment of the Safe Drinking Water Act *Amendments of 1996.*

———. 1999. *Water System Institutional Structures.* Draft annotated outline. United States Environmental Protection Agency, Office of Ground Water and Drinking Water [online]. [Cited March 27, 2001.] <www.epa.gov/safewater/ndwac89/instwa89.html>.
This paper examines how EPA and the states could change internal and external institutional structures and processes in order to improve the quality of drinking water.

———. 2000. *Proposed Ground Water Rule – Regulatory Impact Analysis.* April 5 [online]. [Cited May 8, 2001.] <www.epa.gov/>.
This report discusses water-borne disease outbreaks in the United States since the 1970s. It shows that outbreaks in noncommunity systems are far

more common than in community systems. pp. 2–9. It gives the reasons that the numbers are understated, lists the illnesses caused by the pathogens, and makes recommendations for improved protective practices "(wellhead protection, disinfection, well siting, construction requirements, and distribution safeguards such as cross-connection control)." pp. 2–14.

United States. General Accounting Office. 1997. *Terms Related to Privatization Activities and Processes*. GAO/GGD-97-121. Washington, D.C: July.
This GAO document defines common terms related to privatization.

———. 1998. *Privatization: Questions State and Local Decisionmakers Used When Considering Privatization Options*. GAO/GGD-98-87. Washington, D.C.: April.
This GAO document notes that privatization activities have increased in the sectors of transportation, correction, higher education, and social services since 1988. It identifies critical questions that state and local decision makers have found useful when they have considered whether to privatize a government activity.

———. 1999. *Safe Drinking Water Act: Progress and Future Challenges in Implementing the 1996 Amendments*. Report to the Chairman, Committee on Environment and Public Works, U.S. Senate. GAO/RCED-99-31. Washington, D.C.
This report notes that the Environmental Protection Agency has met the statutory requirements of the Safe Drinking Water Act Amendments of 1996 to develop regulations and guidelines. However, it will be difficult for the EPA, the states, and the nation's public water systems to ensure that the longer-term questions of implementing the new contaminant standards are met.

United Water. 2001. *United Water: Municipal Info* [online]. [Cited May 11, 2001.] <www.unitedwater.com>.
The United Water Web site provides a glossary of water utility regulations terminology and a listing of the contract information related to the company's North American public-private partnerships.

United Water Services Atlanta. 2001. *Atlanta Water System Water Quality Report.*
This consumer confidence report describes recent projects that the company has been involved in to improve drinking water quality and shows that Atlanta water met or surpassed the state and federal drinking water standards in 1999.

Urban Water Council. *A Status Report on Public/Private Partnerships in Municipal Water and Wastewater Systems*. Excerpts and highlights from the US Conference of Mayors [online]. [Cited April 15, 2001.] <www.waterindustry.org/uscm1.htm>.

This U.S. study reports the results of a survey on public-private partnerships for water and wastewater services in 261 cities served by 560 facilities. The chief impediments to developing public-private partnerships were identified as labour issues (57%), intergovernmental relations (30%), procurement restrictions (28%), cost considerations (13%), federal tax code (12%), and loss of control (10%).

Vakil, Nimish, et al. 1996. "Biliary cryptosporidiosis in HIV-infected people after the waterborne outbreak of cryptosporidiosis in Milwaukee." *New England Journal of Medicine*. Vol. 334, no. 1, pp. 19–23.

This article concludes: "When HIV-infected patients are exposed to Cryptosporidium*, those with CD4 counts less/equal 50 per cubic millimeter are at an increased risk for biliary symptoms and for death within one year after the infection." p. 19.*

Van Den Berg, Caroline. 1997. "Water privatization and regulation in England and Wales." *Public Policy for the Private Sector*. Note No. 115. Washington, D.C.: World Bank Group, Private Sector Development Dept. May [online]. [Cited May 5, 2001.] <www.worldbank.org/>.

The author explores issues related to water privatization and regulation in the United Kingdom.

Vandevelde, T. 2000. The protection of water resources in large urban centres in France." *Water Supply*. Vol. 18, no. 1–2. pp. 557–59.

The author reviews the problems with drinking water catchments in France.

Vassilopoulos, James. 1998. *Sydney water crisis due to corporatisation*. [online]. [Cited May 11, 2001.] <http://jinx.sistm.unsw.edu.au/~greenlft/1998/328/328p13.htm>.

The author expresses his reservations about water privatization in Sydney, Australia, and the United Kingdom.

Vickers, John, and George Yarrow. 1988. *Privatization: An Economic Analysis*. Cambridge, Mass.: The MIT Press.

The authors argue that "the ownership of a firm will have significant effects on its behavior and performance, since changes in property rights will alter the structure of incentives faced by decision makers in the firm." p. 2. They provide a detailed analysis of the British privatization program in the telecommunications, energy, transport, and water industries.

Vitale, Bob. 1999. "Water-related projects: catching the wave." *International Financial Law Review*. July, pp. 36–39.
The author identifies forces that have converged to create a hospitable atmosphere for water projects in the United States and worldwide. The factors include: "1. mechanical obsolescence, 2. resource protection, 3. increased environmental regulation, 4. privatization forces, 5. tax law changes, 6. bond covenants, 7. competitive forces, and 8. capital availability." p. 36.

Wahl, Richard. 1993. *Water Marketing in California: Past Experience, Future Prospects*. Policy paper No. 162. Los Angeles: The Reason Foundation. July [online]. [Cited March 30, 2001.] <www.rppi.org/water.html>.
The author describes recent legislative and regulatory actions, which may provide the impetus for more water transfer activity in California.

Walker, David. 2000. "Don't tell Sid: the golden era is over for water companies as the regulator starts to bite into profits." *The Guardian*. June 16, p. 1 and 23.
Walker discusses the post-privatization problems for water executives in England and Wales and the possibility of renationalization.

Walkom, Thomas. 2001. "Is our water seeping into corporate hands? Global trend to privatization heads to Ontario." *The Toronto Star*. January 27, p. 1.
The reporter discusses Premier Harris' privatization record and the implications of greater private sector involvement in the drinking water system.

Walsh, Kieron. 1995. *Public Services and Market Mechanisms: Competition, Contracting and the New Public Management*. New York: St. Martin's Press.
The author discusses the rationale behind a market approach to public sector management and examines the process and impact of marketization. He particularly emphasizes the case of England, which he places in the context of other countries like New Zealand and Australia. Quality and accountability issues are discussed. The water sector receives little direct scrutiny.

Walsh, Nonee. 1998. *Sydney's Cryptic Water Crisis*. Radio National's Weekly Investigative Documentary: Background Briefing. November 22 [online]. [Cited May 11, 2001.] <www.abc.net.au/rn/talks/bbing/stories/s17169.htm>.
Water experts discuss the problem of Sydney's Cryptosporidium *crisis on this radio documentary.*

Ward, Colin. 1997. "Dirty water." *Reflected in Water: A Crisis of Social Responsibility*. London: Cassell. Chapter 10, pp. 115–23.
Ward argues that water should be viewed as a common good, not as an economic commodity. He provides a free-ranging discussion of the

international water crisis in drinking water and makes practical suggestions for improving water quality and access in local communities.

Water Education Foundation. 2000. *A Briefing on California Water Issues.* Sacramento: Water Education Foundation [online]. [Cited March 12, 2001.] <www.water-ed.org/californiaold.asp>.

This briefing note examines key issues relating to California water, such as water supply, marketing, conservation, and quality. It identifies current federal and state initiatives to address these issues.

Water Engineering and Management News. 2000. "Privatization drives municipalities to be more efficient, survey says." April, p. 11.

This article summarizes the results of an opinion survey sponsored by environmental consultants Malcolm Pirnie, Inc. (White Plains, New York) and conducted by Zweig White & Associates, Inc. The telephone respondents, who were water utility leaders, identified efficiency (28%) and cost savings (23%) as two of the most important advantages of privatization.

Water Infrastructure Network. 2001. *Water Infrastructure NOW: Recommendations For Clean and Safe Water in the 21st Century.* Washington, D.C.: Water Infrastructure Network [online]. [Cited May 5, 2001.] <www.win_reports/pub2/pub2.html>.

This second Water Infrastructure Network Report recommends a series of actions that need to be taken by the public and private sector to meet the challenges of water infrastructure funding (estimated at an additional $23 billion a year) over the coming decades. The Water Infrastructure Network suggests that total water and wastewater needs are about $1 trillion over 20 years. The report makes a compelling case for federal investment in infrastructure programs.

Water Sense. 1997. Special issue on privatization. Vol. 3, no. 3, summer.

This theme issue focuses on ways to involve the private sector in providing water services and gives a spectrum of private sector involvement. It reviews new federal regulations and the role of state regulators and gives an example of a successful case of water privatization in New York. The issue reproduces a chart from the U.S. Environmental Protection Agency showing the ownership of community water systems in 1997 and discusses some of the complexities of contract negotiations.

Water Supply. 2000. Vol. 18, no. 1–2.

This international report examines the extent of private sector participation in providing contracted services in 12 industrialized countries. It discusses key issues related to the use and management of service contracts, and the relationship between water quality and public health.

Water UK. 1999. *Report Confirms Best Ever Drinking Water Quality*. July 7 [online]. [Cited April 10, 2001.] <www.water.org.uk/magazine/bulletins/waterpress/WaterUK/28.html>.

The independent drinking water inspector's report for 1998 shows that the water quality in England and Wales is at its highest point.

Watson, Nigel. 1995. "Water privatization and sustainability." *Water News.* December.

The author describes the experience of water privatization in England and Wales in order to draw lessons for Canada about the potential benefits and costs of privatization and the most effective arrangements for ensuring accountability.

Watt, Ed, Mark Van Buren, and David Sellars. 1999. *Hydrological Science Research in Canada: The Practitioners' View*. Part 2. Prepared for the Canadian Water Resources Association and the Canadian Society of Hydrological Sciences [online]. [Cited March 26, 2001.] <www.cwra.org/hydrology/arts/research2/msw.html>.

This report identifies research needs related to the effects of development on water quality.

Weir, Charles M. 2000. "Comparative competition and the regulation of mergers in the water industry of England and Wales." *Antitrust Bulletin.* Vol. 45, no. 3, fall, pp. 811–33.

Weir concludes that comparative competition between private water companies in England and Wales has had benefits for the regulatory process. For example, it improves the information flow between the regulator and the regulated companies and provides a stimulus for companies to improve the quality of their service.

Werner, Andrew J., and Robert Anfuso. 1999. "Competition and regulation: the tug of war molding the U.S. water utility industry" [online]. [Cited May 5, 2001.] <www.waterinvestments.com/discuss/UtilityReportforEBJPrint.asp>.

The authors discuss the differences between the investor-owned utilities, municipal-owned utilities, and operations and maintenance contractors. They examine the drivers behind privatization and consolidation.

Werner, Andrew J., and Robert Anfuso. 1999. *Why do Water Utilities Need Regulation?* [online]. [Cited May 5, 2001.] <www.waterinvestments.com/discuss/WhydoWaterUtilitiesNeedRegulationPrint.asp>.

This paper examines why the model for deregulation in the electricity and natural gas industry is not suitable for the water utility industry. It discusses recent changes in U.S. water utility regulation.

Westerhoff, Garret. 2000a. "National Report: USA." *Water Supply*. Vol. 18, no. 1–2, pp. 33–36.
The author reports on private sector participation in the U.S. water sector.

———. 2000b. "The use and management of service contracts: participation in the private sector." *Water Supply*. Vol. 18, no. 1–2, pp. 1-6.
Westerhoff reviews the status of public-private partnerships in 12 countries and identifies private sector risks.

White, Kristin. 1994. "Can you still drink the water?" *Environmental Health Perspectives*. Vol. 102, no. 3, March [online]. [Cited March 23, 2001.] <http://ehpnet1.niehs.nih.gov/docs/1994/102-3/spheres.html>.
White discusses the need for a coordinated approach by the Clinton administration to ensuring the drinking water is clean. She notes that many water systems are not in compliance with the Safe Drinking Water Act.

World Bank. 1992. *Privatization: Eight Lessons From Experience*. Outreach #3. Policy Views from the Country Economics Department. July [online]. [Cited April 14, 2001.] <www.worldbank.org/html/prddr/outreach/or3.htm>.
This article summarizes some of the policy implications of privatization in many sectors throughout the world.

———. 1995. *Bureaucrats in Business: The Economics and Politics of Privatization.* A World Bank Policy Research Report. Washington, D.C.: International Bank for Reconstruction and Development [online]. [Cited March 23, 2001.] <www.worldbank.org/html/extpb/Bureaucrats/content.htm>.
This report discusses the challenges and political feasibility of reforming state-owned enterprises. It makes suggestions for improving performance, management, and regulatory contracts.

———. 1997. *Toolkits for private participation in water and sanitation.* Washington: World Bank [online]. [Cited June 22, 2001.] <www.worldbank.org/html/fpd/wstoolkits/>.
The first Toolkit contains information about the rationale and options for private sector involvement in water and sanitation, and the regulatory issues that must be considered before choosing a private sector arrangement. The second Toolkit provides advice on "a good process" of designing and implementing an option for private sector participation. The third Toolkit reviews the contractual and regulatory provisions that are necessary for different types of public-private partnerships.

World Health Organization.1997a. *Policy Aspects of Water-Related Issues*. Report on a WHO Consensus Meeting, Yerevan, Armenia, April 9–11, 1997. Copenhagen: World Health Organization [online]. [Cited May 5, 2001.] <http://whqlibdoc.who.int/euro/1994-97/EUR ICP CORD 02 06 01 (A).pdf>.

This document reports on a national policy meeting on water-borne outbreaks of diseases, which involved all the ministries dealing with water in Armenia. The meeting was organized with the assistance of the World Health Organization.

———. 1997b. *WHO Consultation on the Prevention and Control of Enterohaemorrhagic Escherichia coli (EHEC)*. WHO: Geneva. [online]. [Cited May 5, 2001.] <http://whqlibdoc.who.int/hq/1997/WHO FSF FOS 97.6pdf>.

The consultation provided a forum for the discussion of lessons learned from many countries regarding the prevention and control of infections and outbreaks caused by E. coli *O157:H7 and other EHEC. A list of background documents regarding EHEC infections is provided in the Annex, along with a list of worldwide Web sites with information on EHEC.*

———. 2000. *Tools for Assessing the O&M Status of Water Supply and Sanitation in Developing Countries*. Geneva: World Health Organization [online]. [Cited May 5, 2001.] <http://whqlibdoc.who.int/hq/2000/WHO SDE WSH 00.3.pdf>.

This document provides a framework for management and tools for assessing the status of operation and maintenance of water supply and sanitation. It provides guidance on developing and using performance indicators in centrally managed, community-managed, and household-managed systems. The levels of service indicators (table 7.4) p. 34 emphasize the importance of water quality indicators among other factors. It identifies the advantages and disadvantages of various participatory methods (table 9.1) p. 43.

World Health Organization Protection of the Human Environment. 2000. *WHO Guidelines for Drinking Water Quality: Training Pack*. Geneva: World Health Organization. [online]. [Cited May 5, 2001.] <saturn.who.ch/uhtbin/cgisirsi/Fri+Jun++4+14:39:00+MET+DST+1999/0/49>..

This seminar provides information on institutional and legislative frameworks to promote the improvement of water services. It examines the need for national drinking water quality standards. It cautions against a legalistic approach to water quality.

World Water Council. 2000. *Changing Course: Report of the Technical Sessions.* 2nd General Assembly, Marseilles, Paris, October 18-20 [online]. [Cited May 5, 2001.] <www.worldwatercouncil.org/reports.htm>.

This report addresses water quality issues such as the "need" for improved privatization, benchmarking, and participatory approaches. A case study, by a water expert from Severn Trent, describes some of the drinking water quality improvements that have accompanied 10 years of water privatization in Britain.

Wymbs, Clifford Daniel. 1999. *Transnational Investment in the Competitive Transition of Regulated Industries.* Ph.D. diss., Rutgers the State University of New Jersey, Newark.

This dissertation explores the drivers of foreign investment and their implications with respect to U.S. public utilities firms in the telecommunications, electric, gas, and water services industries. It seeks to explain why the public utilities have experienced a few periods of fundamental change that have been followed by long periods of equilibrium, and how firms have coped with a more competitive industry structure and increased international opportunities.

Yaron, Gil. 2000. *The Final Frontier.* A working paper on the big 10 global water corporations and the privatization and corporatization of the world's last public resource. Prepared for Tony Clarke, Polaris Institute, and the Council of Canadians, March 15.

This paper analyzes the activities of the top ten water corporations in the world. It emphasizes the systemic and financial concerns associated with water privatization.

Yates, Larry D. 1997. "A water supply development project in Quiescapa, Bolivia." *Journal of Environmental Health.* Vol. 59, no. 7, p.20.

The author attributes the success of a project by the Andean Rural Health Care and Water for People, a subcommittee of American Water Works Association, to the involvement of residents in the village of Quiescapa, Bolivia.

York Region/Consumers Utilities. 1997. York Region Long Term Water Project: Master Plan. July.

This plan describes the proposed future development for water infrastructure for the region.

Zahariadis, Nikolaos. 1995. *Markets, States and Public Policy: Privatization in Britain and France.* Ann Arbor: University of Michigan Press.

The author modifies John Kingdon's model of agenda-setting to explain the formulation of privatization policies in the oil, telecommunications, and railroads sectors in Thatcher's and Major's Britain and Mitterrand's France.

Zajc, Katarina. 1996. Private Sector Participation Options in the Water Sector in Transition Economies. Ph.D. diss., George Mason University, Arlington, Va.

The thesis compares the efficiency of concession agreements and asset sales for water utilities in developed and transition economies. She finds that asset sales are generally more efficient than concession agreements in transition economies, but in developed economies the differences are minor.