"Regulatory Federalism: A Comparative Study of Safe Drinking Water Policy Implementation in Vancouver, Canada, and Seattle, USA"
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The role of national standards in federal states has been a longstanding question of federalism scholars. In particular, with respect to environmental policy, the question of jurisdiction has been a prominent issue. In terms of public health, in both Canada and the United States, debates have asked whether there should be national systems and national standards. In Canada, the issue of health falls largely within provincial jurisdiction, but the federal government provides policy principles through the Canada Health Act. This paper examines drinking water protection policy, a topic that intersects both environmental and health policy. In terms of policy outcomes, the paper focuses on public health, but it raises important questions about environmental protection and the incentives and disincentives surrounding it.

This paper examines what happens when governments regulate governments as is the case with public drinking water systems. In Canada, the subnational governments are to ensure the municipalities provide potable water for their residents. In the United States, the federal government via the Environmental Protection Agency oversees the implementation of the Safe Drinking Water Act delegating authority to the states to ensure that municipalities provide adequate drinking water protection. There is an expectation that federal binding standards will provide more drinking water protection than subnational-level standards.

"Who guards the guardians?" is a longstanding political question. Within federal polities, regulatory federalism offers an answer to this question. Since the 1960s, in the United States, and more recently, with the rise of the European Union, 'New Federalism' has created a situation in which governments are regulating governments. The state or subnational governments are the guardians watched by the federal or national government that has oversight. Local governments, too, may be considered to receive oversight from their 'superior' subnational units.

Regulatory Federalism

In the literature, regulatory federalism has two primary definitions. One of these definitions focuses on the institution of federalism explaining the concept as "an institutional arrangement that divides the public authority to establish and implement regulatory policy between one federal and two or more state governments"[1] (Kelemen, 2000). In contrast, when American agencies such as the Advisory Committee on Intergovernmental Relations (ACIR) refer to regulatory federalism they tend to emphasize the regulatory aspect of the relationship being described. Their understanding of regulatory federalism borrows from comprehension of federal

[1] Kelemen's definition includes attributes such as (1) two regulators (2) common market and (3) high court adjudication.

regulation of private corporations. For example, the Domestic Council Review Group on Regulatory Reform (1974) referred to federal regulation as follows:

> Federal regulation may be defined as federal laws and rules imposing government established standards and significant economic responsibilities on individuals or organizations outside the federal establishment. Regulation is carried out by federal agencies through such means as setting or approving prices, rates, or fares, profits, interest rates and wages; awarding licenses, certificates and permits or safety rules or quality levels, public disclosure of financial information or prohibition of price, racial, religious or sexual discrimination.

Thus, regulatory federalism would understand federal laws and rules to impose "standards" and "significant economic responsibilities" not only on individuals or organizations, but also on subnational governments. As Gerber and Teske (2000:852) explain,

> Regulation is a distinct policy arena because it involves the use of governmental authority to constrain the behaviour of private actors. Unlike distributive, redistributive and other policies, regulation does not involve large amounts of direct governmental expenditure; instead, governments direct private actors to expend considerable resources in certain prescribed ways.

Regulation is most often conceived of as governments regulating private actors, but, in the case of drinking water, we have a situation where governments are regulating governments. In particular, in the United States, the federal government's Safe Drinking Water Act requires that municipalities provide potable water but offers no funds for them to carry out the actions required by the law. Unlike regulation of private actors, there is considerable expenditure of public funds, but it is not the regulating government who sets the standards that pays; it is the lower level of government. While the first definition of regulatory federalism describes an institutional arrangement, the second underscores the regulatory nature of the relationship. In Canada, the concept of regulatory federalism is not acknowledged in the literature. This is perhaps due to its less obvious manifestations with the Canada Health Act being the primary example.[2]

This paper looks at implementation and federalism drawing on a regulatory federalism framework to examine one of the most 'burdensome'[3] policy areas: drinking water protection. The primary research question is: What happens when governments regulate governments? A second and important question is whether more governments being involved in regulation produces a better policy outcome, and might be understood colloquially as 'How many governments does it take to make the water

[2] Kelemen's definition would include court adjudication and the imposition of federal values on provinces such as the Vriend case or more recent decision of the Supreme Court on the definition of marriage, for example but does not follow with the second definition where the federal government is itself imposing ongoing costs.

[3] The US Congressional Budget Office has called the SDWA one of the "most burdensome" of policies. This is primarily because it is an unfunded mandate, and it imposes significant regulatory demands that states and municipalities must carry out.

safe to drink?' This study involves a comparison of policy implementation and concomitant policy outcome with regards to drinking water protection in two federal states: Canada and the United States of America.

Policy Implementation Literature and Federalism

In terms of public policy, the concept of regulatory federalism, and especially its imposition, may be seen to fall within the implementation literature. Implementation theory has recently undergone a revival in the United States (Lester and Goggin, 1998; Scherberle, 1997; Stoker, 1991). In Canada, in contrast, the study of public policy implementation has largely been ignored.[4]

Policy implementation became part of the public policy and broader political science literature in 1973 with Pressman and Wildavsky's seminal work, *Implementation*. They noted difficulties with implementing policy in a federal system, but federalism was not the focus of their work. One year earlier, the first work that dealt with both federalism and issues of implementation appeared. Martha Derthick's *New Towns In-Town* examined how the federal government carried out its plan to construct surplus housing on federal lands. Her study was indicative of early implementation work and detailed how a single decision was carried out, concluding that government-sponsored programs seldom achieved their objectives (Derthick, 1972; Lester et al, 1987).

The implementation literature in the late 1970s through the 1980s tended not to focus on issues of federalism. These studies were concerned with explaining implementation success or failure and involved four distinct stages over the two decades: (1) generation of case studies (2) development of policy implementation frameworks (3) application of frameworks as well as (4) synthesis and revision (Lester et al, 1987). The framework of Sabatier and Mazmanian provided the most comprehensive list of factors (seventeen) divided into three categories including the tractability of the problem, the ability of the statute to structure implementation, and the nonstatutory variables affecting implementation. Bottom-up frameworks (Elmore 1978; Berman 1978; Lipsky 1971) arose out of the criticism that top-down approaches ignored other sources of policy initiatives such as those from the public sector, for example. When frameworks were applied, implementation researchers found that time periods were very important, some programs were successfully implemented, and that "even modest programs can fail" (Lester et al 1987).

In the 1990s, interest in both implementation and federalism resurfaced within American political science. One of the reasons implementation became important to study was that several programs first introduced in the 1970s were now more fully implemented, including the Safe Drinking Water Act (1974). Intergovernmental relations also took on greater significance as "New Federalism" was concerned with devolution of powers from the federal government to the states (Lester and Goggin 1998).

Three major works appeared in the 1990s that addressed both federalism and implementation. Robert Stoker authored *Reluctant Partners: Implementing Federal*

[4] Important exceptions include Lowry, 1999; Gunderson and Rabe, 1999; Lum, 1995; Howlett, 1991, and Ratner, 1980. It is worth noting that only half of these authors are Canadians while the others are Americans studying Canada.

Policy (1991). This work placed implementation of national policies within the context of concepts of liberalism and federalism. Stoker (1991: 4) explained,

> Federal policy may challenge the perspectives, interests, or priorities of others who, nonetheless, serve as key implementation participants. In this context, the challenge of national governance is to gain the cooperation of reluctant partners: implementation participants who enjoy substantial autonomy and whose cooperation is uncertain and may be difficult to achieve.

In addition to discussing the relationship between federalism and policy implementation, Stoker developed an "implementation regime framework." This framework emphasized cooperation between levels of government and went beyond top-down or bottom-up approaches.

Another scholar, William Lowry (1992) examined the effect of two aspects of federalism on state leadership in the area of pollution control policies: vertical involvement of the federal government in state behaviour and horizontal potential for state competition. His findings suggest that vertical involvement and state competition matter. When the federal government was less involved, and states were highly competitive, state behaviour was more dissimilar. He also found that "the lower the level of interstate competition in a policy area, the more likely the leading state programs superseded federal guidelines." In contrast, the more federal involvement in a policy area, the greater the "dissemination and coordination of leading state efforts" (Ibid).

In addition to the work of Stoker and Lowry, Denise Scheberle (1997) examined five environmental programs to better understand the nature of federal-state working relationships as well as the factors that facilitate or hinder progress in implementing environmental policies. One of the environmental programs she studied was the Safe Drinking Water Act, prior to the 1996 amendments. Scheberle found that the relationship between the federal government and the states could be characterized as "coming apart and contentious". Tensions were related to inadequate resources/funding for states to fulfill their mandates. Two main challenges she identified included the high costs of the monitoring program, and the equal treatment of contaminants in terms of danger/harm.

The work done by Scheberle (1997), Lowry (1992) and Stoker (1991) was followed in the literature by a discussion of the state of the subfield. James Lester and Malcolm Goggin (1998) were concerned with the "lack of conceptual clarity and consensual theory" within implementation studies. They rejected a dichotomous conceptualization involving success and failure, and suggested the need to identify implementers and their roles within the larger system. Finally, they called for research that accounts for variation in "the behaviour of implementers across time, policies, and units of government" (Ibid.). Anne Schneider (1999) went further in her critique stating that the field was "atheoretical" and had generated few important propositions. Moreover, the field had been of little value to policymakers or agency officials. She (1999: 3) noted that some researchers emphasis on compliance failed to "take into account the creative ways that agency officials may try to adapt the statute to fit into the local value context." Soren Winter (1999) also contributed to the debate by suggesting that the dependent variable be redefined from goal achievement to

implementation behaviour and that more attention should be paid to explaining variation in policy outcome.

In contrast to American or international political science, the Canadian political science literature has only rarely addressed the issue of policy implementation and did not undergo a similar debate about the status of the subfield. While the implementation literature has attempted to address the issue of federalism as a variable affecting implementation, it is important to examine the federalism literature and what answers it may offer to what happens when governments regulate governments. Regulatory federalism gives rise to the question which government is a better regulator in a given case. In the federalism literature, most often the question may not be about the regulatory relationship between governments but which government ought to have jurisdiction (empirical versus normative dichotomy).

Governments as Regulators

Questions of who should be responsible have been at the heart of federalism debates, historically. Within Canada, jurisdiction over education in 1867, and natural resources in 1982 were at the centre of the constitutional compromise. In the United States, a considerable portion of the federalist and anti-federalist debates were about who would be responsible for what, and why. More recently, for example, there is controversy over the issue of marriage and constitutional jurisdiction.

Classical political theory suggests that "local mores helped to sustain national patriotism" in the United States (Derthick 1999: 126; Diamond in Schambra 1992). Alexis de Tocqueville's famous discussion of federalism noted the need for a local level of government. As he explained,

> The first difficulty which the Americans had to face was how to divide sovereignty so that the various states of the Union continued to govern themselves in everything to do with internal prosperity but so that the whole nation, represented by the Union, should still be a unit and should provide for all general needs. That was a complicated question and hard to resolve (2000: 114).

There are several theoretical perspectives that shed light on the level of government that is the optimal regulator. Many scholars suggest that who benefits should be in line with who pays (Nelson, 1995). Similarly, K.C.Wheare in his seminal work prefers that general matters be federal and local matters be at the provincial or state level (1963: 80). Furthermore, the public choice literature draws on the work of Tiebout (1956) in arguing that the local level can be more responsive to citizens who can 'vote with their feet' by relocating to a jurisdiction that provides the preferred services and levels of taxation. In a similar vein, others argue that it is more reasonable to have local citizens solving problems that directly affect them rather than distant officials (Koontz, 2002; Ostrom, 1987).

The race-to-the-bottom literature also falls within the public choice rubric. It argues that competition in environmental regulation may be unhealthy as states 'race to the bottom' in order to attract capital through lax environmental standards. The race to

the bottom literature is challenged conceptually by Vogel's California effect (1995). He suggests that one state that is sufficiently populous, innovative, and tied to other markets, can lead the way in regulations that are of a higher environmental standard: a race to the top. Moreover, too much variation in environmental regulations would make it difficult for manufacturers to comply and provide acceptable products in each jurisdiction (Portney, 1990). Further, those scholars who have examined the impact of local jurisdiction explain that some state standards exceed those of federal standards (Kritz 1989; Vogel, 1995). Portney (1990) explains that environmental policy need not be made at the federal level. He explains that individual states including New York, Wisconsin, Massachusetts, Minnesota, New Hampshire, Michigan, and California were active in passing their own environmental laws.

In contrast, the blame avoidance theoretical perspective suggests there is no race-to-the-top as there are no incentives to have one (Weaver, 1986). Blame avoidance suggests that the costs and benefits of environmental policy lead governments to 'pass the buck', declining to act, unless certain incentives are in place (Harrison, 1996). The need to impose costs on citizens for long-term gains, "is generally an exercise in blame avoidance rather than credit claiming" for reasons of concentrated costs and diffuse benefits as well as the 'negativity bias' (electorates punish losses more readily than they reward gains, see Lau, 1982: Lau, 1985: Weaver, 1986: Pierson, 1994, Ross, 2000). The blame avoidance literature falls within the race-to-the-bottom theoretical perspective.

Another theory, the 'functional theory of federalism', perhaps fits best within a regulatory federalism framework as the rationale for regulation tends to differ from that of immediate economic benefits. The functional theory of federalism predicts that lower and higher levels of government tend to produce different outputs" (Koontz, 2002; Peterson, 1995). Thus, officials at higher levels of government are more likely to introduce redistributive policies because it is more difficult to move to another country than to a different state or province within a federation. Moreover, governments at local levels favour developmental policies that "enhance the economic position of the government by generating business and employee taxes" (Koontz, 2002:8; see also Peterson, Rabe and Wong, 1986).

The recent work of Tomas Koontz (2002) in forestry policy provides useful arguments for and against national standards and falls within the functional framework. Koontz asks if devolution matters from a policy perspective. He is concerned if there are systematic differences between higher and lower levels of government in terms of policy performance (Ibid: 5). His work compares and contrasts public forests in the jurisdiction of the federal government with public forests in the jurisdiction of state governments. He finds that there are systematic differences. State public forests have higher levels of management for timber outputs, economic profitability, and revenue sharing with local governments. In contrast, national forests have higher levels of management for environmental protection. In terms of citizen participation, federal officials are more apt to encourage participation than state officials. "Moreover, citizens who favour timber uses more actively participate in the state forest policy, whereas citizens who favour environmental protection more actively participate in federal forest policy" (Ibid: 17). These findings appear to be in line with a redistributive versus developmental dichotomy. Citizen participation, as might be expected, occurs at both levels but usually mobilizes different actors.

Regulatory federalism makes certain assumptions about the actions of the levels of government. First, regulation is occurring; there is some form of power relationship. This relationship can be referred to as 'principal-agent' (Moe, 1984; Chubb, 1985).Examination of the behaviour of the recipients of regulation may shed light on the effectiveness of the relationship. Second, the purpose of the relationship is, in part, a goal of regulation such as safety rather than responsiveness, participation or other democratic goals.

Principal-agent theory is premised on the principal hiring an agent to carry out some task the principal either cannot do or chooses not to do (Gerber and Teske, 2000). It is in the agent's self-interest to pursue the delegated task only to the extent it is beneficial. Moreover, the agent often has more information than the principal, and "monitoring is costly" (Moe, 1984). While public choice theory would assume that the government or institution charged with the responsibility for taxation is the same as the one that provides the service, the cases discussed in this paper do not follow that premise. The goal of the principal, in this paper, either the federal government (United States) or the subnational government (Canada), can be surmised to be to limit or avoid shirking on the part of the agent(s), the state and municipality (United States), or solely the municipality (Canada).

Methodology

This paper uses a case study approach involving document review and qualitative interviews. The cases have been paired so that they are as similar as possible on every other variable except the variable of interest, in this case, country of origin as a proxy for national standards or their absence.[5] The two subnational units are both located on the west coast, and both have similar geography, demography, and economic situations. The paper looks at one of a set of three paired case studies.

The case studies are used to elucidate the effect of regulatory federalism on policy outcome.

In a comparison of Canadian and American models, one might expect that the American example in which one government regulates another, in which the federal government regulates the state and municipal levels and in which the state also acts as regulator may offer better protection for public health. This follows from the functional theory of federalism, but also draws on public choice notions of incentives. Which government has more incentive to regulate? Which government has more incentive to react positively when it is being regulated? The paired comparative case studies presented in this paper allow for a testing of the hypothesis in two ways: (1) over time and (2) across cases.

[5] In particular, the study has controlled for population (community capacity), water source, and country of origin (level of government with lead jurisdiction; in Canada – provincial; in the US – Federal).

National Regulation: The United States and Canada

Drinking Water Protection in the United States of America

The history of drinking water protection in the United States began early in the nineteenth century when public health experts pointed to the drinking water as the cause for widespread typhoid and cholera. The first drinking water guidelines were issued for coliforms in 1914, with others following, later. These guidelines were issued by the US Treasury Department and the US Public Health Service. Standards were binding on "interstate carrier conveyances" but states could decide whether or not to adopt the standards, themselves (Levin et al, 2002). By 1974, most states had neglected to adopt or enforce the standards (Ibid.) These guidelines were non-binding, but formed the beginning of a regulatory framework in the United States. Early on, the American Public Health Service identified the need to protect the public from waterborne diseases.

The most significant legislative changes in terms of drinking water protection in the US took place in 1974 with the introduction of the Safe Drinking Water Act (SDWA). Protection of the public was the primary reason for the Act. As the EPA (1999b:3) explains, "Public health is the primary goal of the SDWA, achieved by ensuring that public water supplies meet strong, enforceable standards." The impetus for this Act was several studies done by the EPA that showed that water quality was poor. Moreover, in June 1969, the Cuyahoga River caught fire due to the wide array of flammables in the water and on its surface (Levin et al, 2002). This sent a major warning message to the public and the federal government about the quality and contamination of drinking water. Even today, virtually none of the surface water in the US is drinkable without treatment (Ibid.).

The original act authorized the Environmental Protection Agency to develop health-based drinking water standards. In 1974, the focus was on water treatment; by 1996 the existing law had been enhanced by recognition of source water protection, operator training, funding for water system improvements and public information as important components.

The SDWA applies to every public water system (PWS) in the United States. A public water system is defined as a water system that has at least 15 service connections and serves over 25 people for at least 60 days per year. There are more than 170,000 public water systems in the US. The SDWA distinguishes between community water systems which it defines as serving Americans year-round and non-community water systems that can be transient or intransient which provide water on less than an annual basis.[6] Responsibility is "divided among the USEPA, states, tribes, water systems and the public" (EPA, 1999). The Act states that tap water must meet National Primary Drinking Water Regulations including the maximum contaminant levels (MCLs) for physical, chemical, biological and radiological substances in drinking water. The National Primary Drinking Water Regulations "set enforceable MCLs for particular contaminants in drinking water or required ways to treat water to remove contaminants" (EPA, 1999). "USEPA, states and water systems work together to ensure these standards are met" (EPA, 1999:1).

[6] An example of a non-transient non-community water system is a school with its own water supply. It does not serve the same people year-round. An example of a transient non-community water system is a rest area or a campground that provides water to visitors. See EPA, 1999.

Amendments were made to the SDWA in 1986. Experts generally agree that the EPA was moving too slowly. For example, the EPA had only determined 23 MCLs and no treatment techniques by 1986 (Gostin, 2000). Moreover, the majority of public water systems (PWS) did not meet minimal national standards (Gostin, 2000). After 12 years, the EPA had only served to adopt most of the older US Public Health Service guidelines and adopted only one new standard : for trihalomethanes in 1979 (Levin et al, 2002).

Following direction from the SDWA amendments of 1986, the EPA instituted the Surface Water Treatment Rule in 1989. This rule limited water turbidity. It also outlined filtration criteria, and disinfection requirements as well as new maximum contaminant level goals (MCLGs). The 1986 amendments also gave rise to the Total Coliform Rule (TCR) which sets MCLs for coliforms. The ability of coliforms to indicate water contamination is well-documented.

A significant change in 1986 was the addition of regulations pertaining to groundwater. Other significant amendments in 1986 include changes to the compliance provisions of the SDWA. Prior to 1986, the EPA had to obtain a court order before being authorized to compel states to comply with MCLs. After the amendments, the EPA could issue administrative orders and fines on its own (Lewis, 1989:905).

Prior to the 1986 amendments, the EPA did not focus on enforcement actions. After 1986, EPA civil enforcement accelerated. For example, between 1990 and 1994 the states undertook an average of 1555 enforcement actions per year, while the EPA undertook about 2626 enforcement actions per year (Tarlock, 1997).

The most recent amendments to the SDWA took place in 1996, and are still being implemented. The rationale for these amendments is four-fold (Tarlock, 1997:1): In part, these amendments repealed the 1986 changes that required the EPA to identify 25 new contaminants and issue MCLs every 3 years. The rationale for this change was, “because it did not permit scientific judgement to separate real from perceived risks” (Gostin, 2000:848). The requirement for 25 contaminants was changed to require the EPA to consult with the scientific community, periodically publish a list of hazardous contaminants and create a contaminant occurrence database. Every five years, the “EPA must select no fewer than five contaminants and after giving notice and receiving public comment, decide whether to regulate them” (Ibid.; Levin et al, 2002). Along these lines, cost-benefit analysis was to be “thorough for every new standard” (EPA, 1999a). In 1996, the EPA agreed to adopt rules to address risks posed by distribution systems such as cross connections, backflows, and other risks from pipes that deliver treated water to consumer’s taps. One of these amendments was the Lead and Copper Rule. This rule addressed the lead and copper in much of the pipes that serve as the distribution system for water. (Former) EPA Administrator Christie Whitman drew attention to this issue, noting that New York and other major cities are distributing water through pipes that are more than a century old (Kilian, 2002).

A second rule resulting from the 1996 amendments was the Information Collection Rule (ICR). This rule required collection of data on water quality with specific attention to “microbiological contaminants, and disinfection byproducts” (Gostin,

2000). In addition, this rule required the testing of source water, and, in some circumstances, finished water, for cryptosporidium.

Another rule, the Disinfectants and Disinfection Byproducts Rule, was also added. This provision established MCLGs and maximum residual disinfectant levels goals (MRDLGs) for several common disinfectants and disinfection byproducts. Similarly, an additional rule strengthened protection for MCLs including for cryptosporidium parvum. Others will follow in line with the 1996 amendments (EPA, 1999a).

The Surface Water Treatment Rule (SWTR) was also enhanced by the 1996 amendments so that by February, 1999, there were more stringent standards for filtration, and record-keeping requirements were increased. In addition, groundwater under the direct influence of surface water had to be surveyed (Gostin, 2000:849).

Recognition that those who ensure the water is safe to drink need to be properly educated about the health risks, and requirements under the SDWA led to an operator certification amendment in 1996. By 1999, guidelines had been issued of minimum standards for certification and recertification of drinking water treatment system operators.

In addition, an amendment addressed the public's right-to-know and responsibility for ensuring the safety of public water systems. "Water systems across the nation rely on citizen advisory committees, rate boards, volunteers and civic leaders to actively protect this resource in every community in America" (USEPA, 1999:3) This involved the requirement of annual reports for PWS which include the detected contaminants, possible health effects and identify the drinking water source.

In 1996, amendments included the Drinking Water State Revolving Fund which provides grants to implement the SDWA, and for the costs of improvements to drinking water treatment systems. Smaller systems receive special consideration for this fund (EPA, 1999:3). This amendment set aside 1 billion per year for system improvements, and was developed in conjunction with the Lead and Copper Rule that banned the use of any pipe or plumbing fixtures that are not lead free in facilities providing water for human consumption (Blabolil et al, 1997).

Drinking Water Protection in Canada

In contrast to the United States, Canada has Guidelines for Drinking Water Quality rather than a Safe Drinking Water Act. It has non-binding objectives rather than a legally enforceable law at the federal level. Drinking water has long been considered the responsibility of the provinces. According to Bora Laskin (1961:215), former Chief Justice of the Supreme Court, "It is a safe generalization that the regulation and distribution of water resources in a province for domestic consumption…purposes are within exclusive provincial competence."

Canadian drinking water guidelines have been in place since 1968, and the process for determining them has remained largely the same. The guidelines are currently prepared by the Federal-Provincial-Territorial Committee on Drinking Water; the Committee is made up of representatives from each province and territory, as well as from Health Canada. In 1968, the guidelines were established by a joint committee made up of the Canadian Public Health Association Drinking Water Standards Committee and an Advisory Committee (Mouldey, 1994: 184). In 1978, a joint working group critically reviewed the 1968 guidelines. Once this task was completed, the group disbanded and the Federal-Provincial Territorial Subcommittee on Drinking Water was not struck until 1986. The Federal-Provincial-Territorial Advisory Committee on Environmental and Occupational Health established the permanent Federal-Provincial-Territorial Subcommittee on Drinking Water that year.

The drinking water guidelines follow the public health approach of other regulatory policies that are protective in nature, and address the lines of defense. Health Canada (2002) recommends a 'multi-barrier approach' to safe drinking water. Other relevant policies include the Canada Water Act, the Canadian Environmental Protection Act, and the Fisheries Act, as well as various Acts at the provincial levels. The Canada Water Act outlines federal-provincial arrangements regarding water resources management. The Canadian Environmental Protection Act (1999) primarily addresses the control of toxic substances as well as pollution control. It requires that companies who use highly toxic substances provide pollution prevention plans. The Fisheries Act addresses source water protection and provides regulations limiting effluents.

In the mid- 1980s, the federal government introduced a Drinking Water Materials Safety Bill but this Bill died on the order paper and was never passed into law (Concerned Citizens and CELA). In 1990, the federal government promised a Drinking Water Safety Act as part of Canada's Green plan (Mouldey, 1994). This act was never passed but would have been limited to drinking water within federal jurisdiction (e.g. military bases, territories, reservations and airlines, airports).

Only two provinces, Alberta and Quebec, have adopted the Canadian Drinking Water Guidelines. In terms of compliance across provinces, this is a considerably low indicator.[7] There is no federal enforcement of drinking water as it is primarily a provincial responsibility, and the Guidelines are non-binding. The extent to which drinking water laws are enforced at the subnational level appears to be largely unknown. As the Canadian Environmental Defence Fund notes, "It is difficult to establish the level of enforcement ... No province specifically reports prosecutions or convictions related to drinking water" (2001: 15). Moreover, provinces do not tend to discuss the enforcement or compliance measures of the acts, directly[8]. Evidence appears to point to non-binding regulations at the provincial levels. Lindgren (2003:18) explains, "Provinces have generally adopted or expressed the federal MACs and IMACs through guidelines, objectives and standards. In Ontario, for example, drinking water quality, historically was addressed through non-enforceable Ontario Drinking Water Objectives." The Walkerton tragedy has given rise to changes and the Ontario Water Resources Act has binding and enforceable standards, for example.

[7] The recent Ontario Water Resources Act does not specifically adopt the guidelines, though it has many of the same parameters for radiological and chemical testing.

[8] Certainly Alberta and Quebec do not. Water management is the focus. BC's recent changes have introduced a fine and/or imprisonment.

Subnational Regulation: Washington and British Columbia

What do provincial governments do? British Columbia

Provinces have generally accepted primary responsibility for drinking water in Canada. This includes enacting laws, implementing treatment programs, and monitoring and testing. They are also responsible for compliance and enforcement. Within the provinces, municipal acts empower municipalities to protect the drinking water through infrastructure, for example, while public health acts address the local health issues and risks associated with water. Other relevant provincial acts include environmental protection and assessment acts that regulate pollution discharges into water, and water treatment and sewage systems (see CELA, 2001: 12).

Ensuring water is safe to drink is a considerable challenge. A multi-barrier approach to drinking water protection policy is recommended by both governments and organizations concerned with public and environmental health. The United States and Canada take significantly different approaches to regulating water for human consumption. The United States model involves federal policy and enforcement coupled with state primacy if standards are met. In contrast, the Canadian model involves no significant federal role. Guidelines are non-binding, and no laws have been made that directly address drinking water at the federal level. The American model represents significant effort on the part of a federal agency and the national government through Congress to protect citizens' health. The Canadian Guidelines leave the responsibility to the provinces. The extent to which this difference impacts water quality and consequently, the health of the public is of concern for policymaking.

In British Columbia, the primary drinking water legislation is the Drinking Water Protection Act. This new legislation came into effect on May 16, 2003 and replaced the Safe Drinking Water Regulation under the Health Act. The Act and Drinking Water Protection Regulation requires testing for fecal and total coliforms, only. At least 90 percent of the sample must have no detectable total coliform and no sample can have more than 10 total coliform bacteria. Most large cities test for significantly more contaminants, and the Greater Vancouver Regional District even takes into account the Canadian Guidelines and Environmental Protection Agency requirements. The Health Minister explained that the Act has an "outcome-based focus" and is not meant to be prescriptive, however drinking water officers can establish different sampling requirements and public notification, for example. The drinking water officers are health officers employed by the regional health authorities with the mandate to ensure the water is safe. The Act also increased expectations around assessment of water systems, certification of operators and suppliers as well as monitoring and reporting on water quality.

What do the state governments do? Washington

Some would argue that state governments act similarly to the provinces, but this is within the context of binding federal standards rather than optional ones. State drinking water programs such as Washington State's Department of Health (DOH) can apply to USEPA for 'primacy', the authority to implement SDWA within their

jurisdictions, "if they can show they will adopt standards at least as stringent as USEPAs and make sure water systems meet these standards" (1999:2). All states have primacy except Wyoming and the District of Columbia whose water is overseen by the EPA. While no Indian tribe has applied for primacy, in 2000 the Navajo tribe was granted primacy and "treatment as a state."

With primacy, state laws grant one or more state agencies the authority to implement and administer drinking water protection laws. States direct either the state health department or environmental protection department, or both to implement and administer laws pertaining to water quality (Gostin et al, 2000). States are not required to have watershed protection plans, although it is one means by which to avoid the filtration requirements under the SWTR. Nine states including Washington have watershed protection plans. Seattle Public Utilities was also instrumental with respect to the 1996 amendments which allowed for limited filtration when watersheds were significantly protected.

In terms of oversight, states are expected to perform the following tasks:

- ensure water systems test for contaminants
- review plans for water system improvement
- conduct on-site inspections and sanitary surveys
- provide training and technical assistance
- take action against water systems not meeting standards (USEPA, 1999)

A major challenge and of much controversy for the EPA in relation to the SDWA has been the high costs of ensuring drinking water safety. The SDWA is perhaps the most famous[9] of 'unfunded mandates' meaning its standards are legally binding and enforceable by, in this case, a federal agency, but the funding to implement it is inadequate.

Even though the EPA has delegated much of the responsibility to state agencies, it reserves the right to involve itself in order to ensure the water is safe to drink. For example, Seattle pursued an exemption to the filtration requirement and it had to work with the regional EPA office. When a violation occurs a range of actions can take place from fining the purveyor, requiring notification, putting you under consent decree which is a court order or compliance order, for example. The EPA and state department may also work out an 'agreed order' with the purveyor. The EPA and the state have the authority to fine and the authority to force the water purveyor to comply.

Under the National Primary Drinking Water Regulations which can be found in Title 42, Section 6a, Section 300-g, the EPA can take enforcement action, if, thirty days after notification a system has failed to comply. Enforcement actions include issuing an order and, seeking a judicial determination in federal court for penalties not to exceed $25000 per day. The Administrator can also hold a portion of state revolving fund grants, if states do not demonstrate increased capacity. Ultimately, a state could lose the authority to implement the SDWA.

[9] The Congressional Budget Office gave as one of its reasons for choosing the SDWA for a case study of unfunded mandates as "it has often been cited as a particularly onerous mandate." See CBO, 1995:1).

Local Regulation: Seattle and Vancouver

Vancouver, British Columbia, Canada

Thus far, this paper has addressed national and subnational regulation. The case studies within this paper are at the local level as this is the level at which drinking water protection policies are largely implemented. The Greater Vancouver Regional District in British Columbia is a large municipality of 1.35 million people situated on the west coast of Canada. The area in which it is located is often referred to as the 'lower mainland'. The lower mainland includes several industries such as forestry, shipping, tourism, recreation and some agriculture. Vancouver's water comes from mountains, rivers, creeks and streams in three watersheds, Capilano, Seymour, and Coquitlam.

Drinking water has long been as issue of interest for Vancouver's citizens. A brief examination of this history provides important insight into intergovernmental relations with respect to drinking water in Canada, and more specifically, British Columbia.

Emergence of the Water System

Historian James Morton notes that the decision of the Vice-President of the Canadian Pacific Railway to settle in Vancouver was not made with a water source in mind (1970:39). The nearest and most abundant source was across the First Narrows (across the ocean's inlet) being the Capilano River on the North Shore. There was another plentiful source some twenty miles from Vancouver, the Coquitlam Lake and River. On the same day in 1886, two companies (the Vancouver Water Works Company and the Coquitlam Water Works Company) corresponding to these two main water sources were incorporated and began to compete to be the purveyors of the city's primary water source. A year later, citizens of Vancouver would be asked to vote in a referendum on these two companies, one of them to be financed by the city and the other to provide a water system at no cost, now, with an option to purchase, later. The Vancouver Water Works no cost option won, and construction began across the First Narrows. Building the water system was a considerable engineering feat, so much so that the American expert fled the scene before the system was finished. Nevertheless, Vancouver achieved a water system, and by 1891, the system was owned by the municipality. While intergovernmental relations did not come into play during these early days, these challenges exemplify the city's concern with its water supply, and the public's involvement.

Protecting the Source Water

In 1871, British Columbia became a province, but it was not until 1905 that this fact became important with respect to its drinking water. On April 3, 1905, City Solictor Arthur McEvoy and Alderman George Halse went to the provincial capital of Victoria to secure a 999 year lease on the Capilano watershed. They assumed it was a formality (Morton, 1970:78). The provincial government refused the lease but placed the land in reserve noting that the calculated monetary value of the land with respect to its timber resources was $100,000 in twenty years (Province, 1905). It was not until 1927 that the municipality of Vancouver succeeded in leasing the Capilano watershed for 999 years. In the 22 years between its first official request and the granting of said request, the city launched considerable efforts to buy parcels of land throughout the watershed focusing on the pieces closest to the water source. This move was without

doubt, innovative. Only very recently has the US EPA encouraged source water protection of this magnitude. How did these local legislators know that watershed protection was important? It is unclear, but they did speak of the "pristine purity" of the water supply and the need to protect it (Ibid.). Perhaps the struggle to deliver water at all meant a greater focus on ensuring its potability.

Efforts at the local level to protect the source water were stymied by the provincial government's emphasis on the need to keep the land open for resource extraction. Nevertheless, eventually, the province agreed to a 999 year lease on 82000 acres of land in the Capilano and Seymour watersheds. The role of E.A. Cleveland, Chief Commissioner of the Greater Vancouver Water District, in securing the lease has been emphasized by researchers, bureaucrats, and environmentalists. He was formerly the Comptroller of Water Rights for the Province. In 1910, the BC Electric Railway Company purchased the Coquitlam WaterWorks Company and was successful in having federal legislation passed to protect the watershed. The watershed was later given to the city of Vancouver.[10]

Chlorination

Even though drinking water protection falls within provincial jurisdiction, the federal government played a major role in Vancouver's drinking water story. It forced the city to chlorinate the water during World War II. In 1937, Dr. C.E. Dolman of the Provincial Board of Health refused to certify the city's water to foreign shipping on account of its refusal to chlorinate the water (Morton, 1970). E.A. Cleveland held that Vancouver's protected watershed meant that chlorination was unnecessary.

In 1942, the federal government's Department of Pensions and Health which had taken on new powers as a result of the war, ordered Vancouver to chlorinate its drinking water. Dr. Ian Mackenzie, Minister of Pensions and Health and a Vancouverite explained, "We would chlorinate the water if it came from heaven" (Vancouver Sun, Oct 6 1942). In response to the opposition in Vancouver which included community meetings, months of letters to the editor and editorials supporting the stand of the water board, the federal government moved to refer the question to the Supreme Court as a reference case. However, by November, it determined it could not wait for the courts and ordered the water chlorinated, immediately, with the threat that any refusal to do so would mean it would come in, and take full control of the care and administration of Vancouver's water system. At this, the city of Vancouver, and E.A. Cleveland agreed to accept the chlorination order. As the Minister noted, Vancouver would not have to continue to chlorinate the water after the war: "The only authority we have is under the War Measures Act which expires with the end of the war" (Vancouver Sun, Nov 26, 1942). The federal government paid for the chlorinating machinery which the city eventually bought at a considerably reduced price. When the war ended, the city stubbornly reverted back to its unchlorinated status. Within a few years, though, the chlorinators were turned back on, and chlorination became less controversial, because, as Morton (1970) explains, milk became pasteurized and people became more aware of the water and food-borne instances of disease.

It would seem that the federal government's interest in Vancouver's water supply should have waned when the war ended, but Vancouver's decision to build a dam in

[10] It may have been sold to them– need to check.

the 1950s piqued the interest of the federal Fisheries department, and once, again, E.A. Cleveland was at odds with the federal government. What is now known as the Cleveland Dam was threatened with a federal injunction if measures were not taken to protect the several species of salmon and trout living in the Capilano River. The federal government and city finally agreed on ladders for the fish, but the efforts were largely unsuccessful as the fishery was reduced by thousands as a result of the dam-building (Morton, 1970).

The federal government's intervention during the war was highly contentious yet ultimately successful and public health experts would agree, improved the safety of Vancouver's drinking water. The efforts to protect fish ultimately failed, but were taken seriously by the local authorities, after considerable contention. While protection of fish is not directly related to ensuring safe drinking water, the costs of the protection are assumed by the city.

A Highway through the Watershed?

The 1950s also marked another intergovernmental event, this time between the province and the municipality. In 1952, the provincial government recommended that a highway be built through the watershed. The road was to go from North Vancouver to Squamish. At the time, residents had to take the ferry from Squamish as no roads connected it with the lower mainland. In a brief to the water board, E.A. Cleveland stated that "there was no advantage in a road through the Capilano watershed and that a public highway would greatly increase the possibilities of pollution to the water supply and add to the forest fire danger" (Vancouver Province, Sept 6, 1942). This road never materialized and today Squamish residents have access to the lower mainland along a coastal highway rather than one through the still-protected watershed. Even though the highway was never built, it was promised for years, and represents another example of provincial stymieing of local attempts to protect the water supply. In this case, larger provincial interests came up against those of the city of Vancouver.

A significant departure from the municipality's position on protection of the watersheds occurred in the late 1950s after the death of E.A. Cleveland. T.V. Berry was appointed Water Commissioner and under his leadership a timber harvesting program was begun in the watersheds. This program continued until 1995 when the city's review of its Drinking Water Improvement Plan determined that citizens were opposed to watershed logging.

Several environmental groups were involved in placing pressure on the local authorities to end the logging including the Western Canada Wilderness Committee, the BC Tapwater Alliance, and SPEC. These groups argued and continue to argue that the logging contributes to increased turbidity in the water supply. Other groups such as the BC Medical Association also suggested that logging leads to increased turbidity.

While some local legislators agreed, they noted that slides can be forces of nature contributing to increased turbidity. In addition, some of the byproducts of logging actually helped to protect the water supply, they argued. These included road-building which enables access to fight fires as well as access to fight pest infestations which can contribute to fires and be problematic for the watershed. This issue is obviously highly contentious, as road-building also contributes to increased turbidity,

especially as the roads age, and erosion occurs. Some environmentalists point to the provincial government's intervention leading to increased logging in the watershed but there is no direct evidence for this.

The most recent intergovernmental event for Vancouver's water supply has been the decision to institute filtration. Vancouver's water is not currently filtered, though it is run through a screening process. The new plant will be cost-shared with the federal ($50 million contribution) and provincial ($50 million) governments while the city of Vancouver will pay the bulk of the bill ($500 million). The filtration plant is to be online by 2007. Water rates will increase from $87 per year to $98 per year in order to pay for the plant.

In the case of Vancouver, a historical analysis of events in which the different levels of government interacted with respect to Vancouver's water supply has demonstrated that federal intervention tended to improve water quality, provincial intervention tended to de-emphasize water quality as the primary issue placing other concerns, first, or the province has not appeared to be successful as a sole regulator. The municipality, overall, has been a protector, but its role has been mixed. Certainly, in terms of watershed protection, it has been an innovator. Its delay in implementing both chlorination and filtration suggest it has to contend with interests other than public health, at times.

Seattle, Washington, USA

The Seattle Water District serves 1.2 million people in the Greater Seattle area. Seattle's water source is the mountains, rivers and streams of the Cascade mountains. It has two watersheds, the Cedar and the Tolt. The history of drinking water protection in Seattle is similar to Vancouver in some ways, but it is a unique story. Seattle's settlers ensured there was a water supply near their settlement so that in the early years, residents who could afford to paid to receive their water from the Spring Hill Water System or the Union Water Company. Both of these systems were eventually sold to the city. The impetus for building a public water system was the need for fire hydrants. In 1888, one of the legislators wrote,

> We ought not to be dependent in the matter of water supply which may be called the life-blood of a city on the caprize or rapacity of any corporation…Should the public own its own water system, there might rapidly be extended over the whole city a complete system of fire hydrants which it is impossible to do by our present system at present rates, as such rates would almost lead the city to the verge of bankruptcy (Lamb, 1914:20).

A referendum on having a public water system with the Cedar River watershed as its source was held on July 8, just less than one month after the great fire of 1889. The votes in favour of the public water system were almost unanimous (Ibid.). Similar to the Vancouver case study, the emergence of the water system had nothing to do with other levels of government. However, it demonstrates that the concern for the water

supply was connected to a need for fire-fighting infrastructure, and that the public participated in a referendum.

Watershed Protection Too Costly
Seattle's efforts to protect its watersheds soon came up against other interests. In 1901, the city applied to the Commissioner at the General Land Office for a temporary withdrawal from entry, sale or settlement of all lands still owned by the United States. In 1899, the Registrar and Receiver of the US Land Office had withdrawn from disposal all lands then presumed to be in the Cedar River watershed. The government required the city to pay a deposit to the Secretary of the Interior for the costs of the survey and appraisement of timber. This cost was $8000. At that time, the city had not yet decided to buy the lands. In 1911, a bill (5432) was introduced in the Senate which would have established a forest reserve on these lands. Section 4 of the bill stated that the city of Seattle could secure patent to these lands upon payment of the appraised value of the timber plus $1.27 per acre. This amounted to $400000 plus annual interest of $20000; too high for Seattle's Water department. On June 15, 1922, the city released and waived claims to the land and was returned $5217 as the survey of the lands had cost $2783.

As early as 1891, six companies were logging in the Cedar River watershed and removing 100 million board feet, annually. Seattle was not able to close its watershed to private interests, and logging continued. In 1930, the city of Seattle brought a lawsuit against the Pacific States Lumber Company in an effort to cancel a contract made in 1917. The case was voided because there had not been a question brought to the electors to cancel the contract. It was not until 1943 that Seattle pursued an active policy to gain control of the lands. This policy was, however, pursued via logging interests. Several logging companies including Weyerhaeuser, North Pacific Rail and Cascade Timber Company entered into an agreement that would allow for land exchange. As then Superintendent of the Water Board wrote, "It is the finest deal the department ever made. Complete final ownership of the entire watershed in 40 years without cost is now assumed to the City of Seattle with a revenue of $1 million from use of city owned roads in logging operations" (McWilliams, 1955: 175). This agreement was between the municipality and private owners. There do not appear to be any means by which the state or federal government could have been involved as the United States Forest Service is not permitted to give land away; it can only trade or sell it.[11]

In terms of relations with the state, these were most often between the health department and the water department. In 1906, the Washington State Board of Health would become involved as the Chicago Milwaukee and Puget Sound Railway Company applied to operate a railway line through the watershed for 11 miles. Consultants were hired to investigate and concluded that the logging and sawmill camps already presented a threat to the water supply, and that the valley would "not be as much endangered by the coming of the railroad as it was already by existing nuisances" (Lamb, 1914:140). In order for the train to pass through the watershed it had to agree there would be no station, that the city could employ an inspector and that the closets would be locked so that sanitation would not enter the watersystem. A fence was also required to be built along the railway.

[11] Public officials stated this in interviews – need to confirm

Chlorination
Chlorination was installed in Seattle as early as 1911 to avoid pollution when there was a break in two pipelines. Between 1914 and 1915 chlorination was improved. The state Department of Health (DOH) monitored the chlorine use and wrote in 1928 that it was "grieved that the old chlorinators were still in use, after they had approved the new ones in February of 1927" (McWilliams, 1955: 148). These were installed in 1929.

USPHS Issues Potable Water Standards
In 1944, the United States Public Health Service issued new non-binding potable water standards and regulations for interstate commerce. Superintendent Morse wrote the following in response to the new regulations in his annual report:

> These regulations go, in my judgment, far beyond the authority of the United States Public Health Service. They are quite difficult to comply with but we are complying at the present time almost completely, and will soon be fully complying. The number of samples to be tested was greatly increased to 250 per month. We were formerly testing approximately 50 per month. In January 1945, 240 samples were tested, not one positive.

Even though the Superintendent felt the standards were unacceptable, he still complied with them. There were no efforts to disregard the standards of the federal level of government, even if these were seen to be especially burdensome.

A Highway Through the Watershed?
In 1951, the state proposed to build a highway through the watershed. As described above, logging had been allowed in the watershed since its inception, but this was monitored and the watershed was largely closed to the general public. It was felt that opening a highway through the watershed may lead to people stopping and contribute to debris and other problems. The proposed highway was to secure a shorter route to Snoqualmie Pass and Eastern Washington. In 1953, Dr. Wolman of Johns Hopkins noted that the hazards were likely to be significant. The state backed down, and proposed an alternate route, the existing Echo Lake Road.

Safe Drinking Water Act
In 1974, the federal government passed the Safe Drinking Water Act and a new relationship ensued between the state Department of Health and the municipality. Local bureaucrats currently view this relationship as a "partnership." Just ten years earlier, the Tolt watershed was added to the Seattle water system with the South Fork Tolt River supplementing the Cedar River Watershed.

In 1989, an ordinance was passed directing the Water Department to maintain closed, unsupervised public access to the watershed. In 1992, the Cedar River Watershed Act directed the United States Forest Service to exchange critical Cedar River Watershed lands with the Seattle Public Utilities, and placed deed restrictions on the property, prohibiting the City from reselling or harvesting timber from or developing the parcels in question. The deed restrictions devalued the land to $8 million from $100 million

enabling the City to purchase it. Logging in the Cedar River watersheds continued until 1997.

In terms of intergovernmental relations with respect to the history of Seattle's water system, there are some patterns. When the federal government demanded compliance, Seattle moved to comply, even if its bureaucrats disagreed. When the state Department of Health moved to protect the water system, Seattle also complied and accepted the directives. In contrast, when other state interests attempted to thwart water supply protection, the municipality resisted. With respect to watershed protection, it appears that the incentives are not aligned as the laws do not allow for protection of the watershed until such time as it can be bought. Land use becomes problematic for watershed protection. Even when the watershed is fully owned, the incentives to sell the timber, especially when the costs of supplying potable water are constantly increasing, are high.

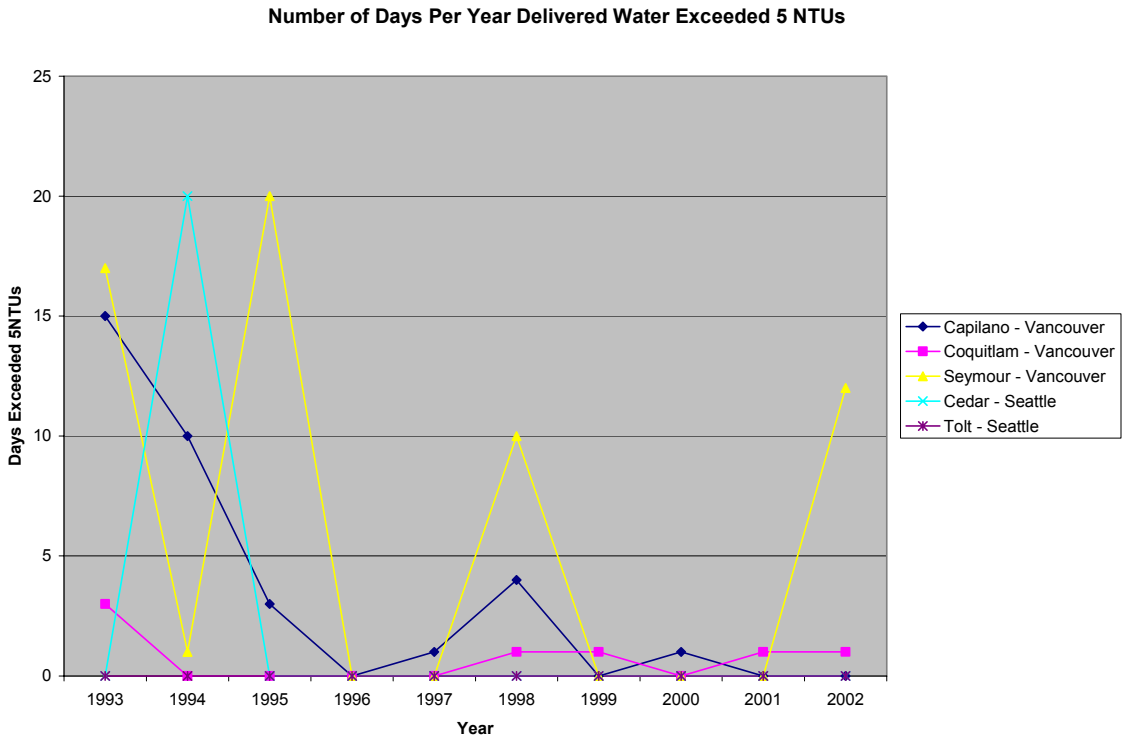
Comparing Vancouver and Seattle

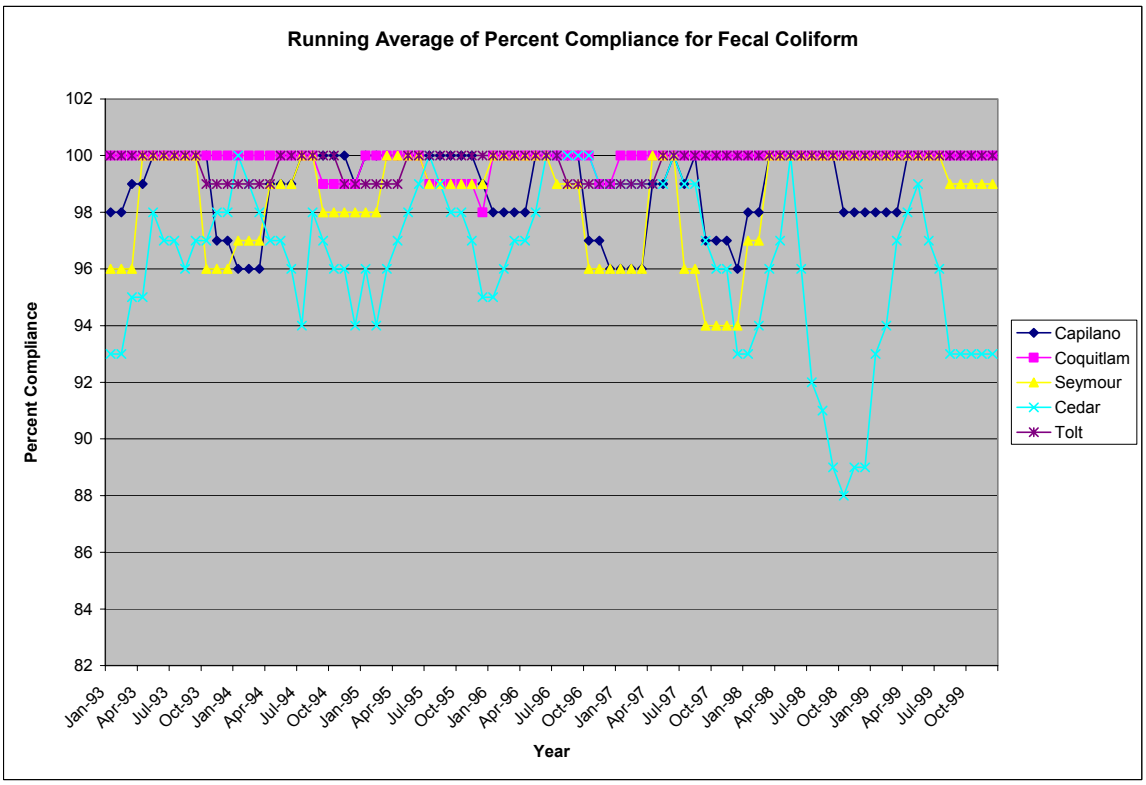
In order to better understand the impacts of regulatory federalism and which level of government provides the best protection for drinking water, this paper compares the two municipalities of Vancouver and Seattle. The criteria for comparison include: (1) water quality (2) effort and (3) citizen participation.

Water Quality

Water quality is determined using the two main indicator measures: turbidity and fecal coliforms. Turbidity can be defined as suspended particles in the water causing cloudiness. Turbidity is measured in nephelometric turbidity units (NTUs). Coliforms are a group of bacteria that act as indicators of water contamination. Fecal coliforms are bacteria that may indicate the presence of human or animal fecal matter in the water.

Both Vancouver and Seattle have good water quality, particularly at the source, as their water comes from mountain rivers and streams. However, examination of data suggests that Seattle's quality surpasses that of Vancouver for turbidity while overall they have similar levels for fecal coliforms. In 1992, the Cedar fell below the 90 percent compliance for fecal coliforms which usually requires a filtration order for unfiltered supplies. It was a drought year and there were lower flows. The city worked with the state Department of Health and the EPA and came to an "agreed order" in which it would study the alternatives and implement limited filtration. For the 1996 amendments, Seattle worked with New York, Boston, and San Francisco and took the lead in creating a new category called "limited alternative to filtration" rather than "filtration avoidance" or "filtration".


Number of Days Per Year Delivered Water Exceeded 5 NTUs
Days Exceeded 5NTUs
25
20
15
10
5
0
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Year
Capilano - Vancouver
Coquitlam - Vancouver
Seymour - Vancouver
Cedar - Seattle
Tolt - Seattle


Running Average of Percent Compliance for Fecal Coliform
Percent Compliance
102
100
98
96
94
92
90
88
86
84
82
Jan-93
Apr-93
Jul-93
Oct-93
Jan-94
Apr-94
Jul-94
Oct-94
Jan-95
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Year
Capilano
Coquitlam
Seymour
Cedar
Tolt

Effort

Effort can be defined as the attempt to improve the quality of the drinking water, ensuring it is more likely to be potable, that events are less likely to occur and that it is a reliable source of safe drinking water. Risk is inherent as no one can ensure that water is completely safe to drink at all times, and random events can occur that make the water unsafe to drink such as the heavy rains in Milwaukee that produced excessive turbidity leading to the hospitalizations of 4000 and the death of as many as 100 persons in 1993. The concept of effort means that the local level takes actions as a result of directives from the subnational or national levels in the case of a regulatory federalism framework or on its own in the case that incentives are in line. The aspects of effort discussed here are based on the multi-barrier approach to drinking water protection.

	Vancouver	**Seattle**
Watershed Protection	Significant efforts Begin 1905; success by 1927 Reversal in 1950s with logging Re-establish significant protection 1990s Own the watersheds Watersheds are closed to the public	Effort is high but challenges significant Begin 1901; stop 1922 Establish logging agreement 1940s Own most of the Cedar River watershed 1990s; no longer attempting to buy Tolt Portions of watersheds that are owned are closed to the public

In terms of watershed protection, Vancouver has made more effort for a sustained period of time. Seattle is no longer attempting to protect the Tolt watershed by buying up the land. The land use policies of the United States government make it difficult to protect the water source. Vancouver's 999 year lease is unique and significant.

	Vancouver	**Seattle**
Disinfection	Did not chlorinate until 1944 when ordered to by federal government Stopped chlorination Began 1950s	Began chlorination in 1914 (USPHS directive) Tried chloramination in 1930s Various modifications and improvements since 1914.

Seattle is clearly ahead in terms of efforts to disinfect the water supply. Vancouver's ownership of the watershed was the rationale for E.A.Cleveland not to want the water supply chlorinated during the Second World War. However, the use of chlorine is widely acknowledged worldwide as an inexpensive and effective form of disinfection. It took the federal government to order Vancouver to chlorinate its water.

	Vancouver	Seattle
Filtration	Westerly transfer system (1999) Filtration online by 2007	Transfer system (1997) Filtration in 2000

The issue of filtration of the water has been an ongoing concern for both municipalities. The water departments of Vancouver and Seattle have tried to avoid filtration as it is very costly, and there is a sense that the protected watersheds offer additional protection for public health making filtration less necessary. Both cities used a screening process to get rid of larger particles in the water. As early as 1927, Seattle's sanitary engineer H.W. Nightingale recommended a filtration plant established to cost $2 million at that time. Over 15 years later in 1944, the city created the Cedar River Water Commission headed by Dr. Abel Wolman. Among his recommendations: "The hazards are operative with or without logging. Water supply protection would not be improved by insistence upon a closed watershed or virgin forest evolution. Logging practices in the past have had no discernible effect on the quality of water," and a filtration plant at a capital expenditure of $3 600 000 with annual costs of $50 000. Seattle did not agree to filtration until 2003.

In contrast, while the health authorities and associations in Vancouver claim they have been asking for filtration for many years, it has only appeared as a discussion in the 1990s. Many suggest this is a result of a highly publicized Health Canada study showing that increased turbidity in the water could be linked to gastrointestinal illness in the population, and hospitalizations.[12] Environmental groups appear to have used this study to lobby for an end to logging in the watersheds. Others, however, have noted that a filtration plant removes the need to reduce turbidity from logging operations. Experts in Seattle also agreed that filtration threatens the protected watershed because it removes the immediate argument not to interfere with nature.

Seattle is leading the way with filtration, and records indicate it has been more aware of the requirements for filtration over time. Filtration is a complex measure, however, as it is not deemed necessary if the watershed is sufficiently protected and compliance with fecal coliforms does not fall below 90 percent according to the US EPA's surface water treatment rule. Prior to the 1996 amendments, the EPA had a category entitled 'filtration avoidance' which, as one bureaucrat explained, made it sound like you would get there eventually. Seattle's input lead to changes in 1996 so that it is possible to fall within the category of "limited alternative to filtration".

Vancouver agreed to filtration after a lengthy public consultation process in the late 1990s. Its filtration plant will be built on the Seymour watershed and will cost $600 million. $500 million of this will be provided by Vancouver residents through taxes and increased water rates with $50 million coming from the federal government's

[12] This study is controversial from a scientific standpoint. It has not been formally published except by Health Canada. Moreover, the relationship is statistically significant but weak.

infrastructure funds and $50 million from the provincial government. In contrast, Seattle's Tolt Treatment Plant cost $101 million.

	Vancouver	Seattle
Distribution System	2000 – Annual flushing and cleaning instituted	Adds calcium oxide and sodium carbonate Did 1997 study and found lead in water of 53 of 390 homes or 14%

Distribution systems are becoming problematic for cities all over North America. Many of the pipes are old and corroding. Pipe corrosion can lead to copper and other minerals seeping into the water supply. In Vancouver, this creates green stains on the bathtubs and sinks. Seattle has a similar problem but it is less acute. In 1992, the EPA agreed to adopt rules to address risks posed by distribution systems such as cross connections, backflows, and other risks from pipes that deliver treated water to consumer's taps. One of these amendments was the Lead and Copper Rule. This rule addressed the lead and copper in much of the pipes that serve as the distribution system for water. Former EPA Administrator Christie Whitman drew attention to this issue, noting that New York and other major cities are distributing water through pipes that are more than a century old (Kilian, 2002). In response to this, in 1997, Seattle conducted a study of homes and found lead in 53 of 390 homes or 14%; copper was found in zero of the homes studied. Seattle adds calcium oxide and sodium carbonate to reduce corrosion of building plumbing with the goal a pH of 8.2. In contrast, Vancouver began annual flushing and cleaning in 2000.

Citizen Participation

Citizen participation is included within this discussion as federalism scholars debate about the extent to which particular levels of government encourage participation, or at which level citizens prefer to participate. This case study suggests two things. First, citizens participate at the local level, especially with an issue such as water quality that is very germane. Second, federal laws may discourage public input because the regulations are viewed as created through a scientific process and there is little need for citizen responsiveness. Over the last two decades, Vancouver has been involved in a considerable public consultation and education process. It continues today with information and tours of the watershed by GVRD employees who work in the water quality sector. In Seattle, residents can visit the Cedar River watershed and there is an interpretive centre set up by a non-profit organization, Friends of the Cedar River, but public officials tended to agree that citizen participation is minimal. Citizens provide feedback when the water is turbid and there are information lines they can call in both locales. At the national level, citizens sit on the decisionmaking committees, but from a local perspective there is little public input. In terms of effort, The Greater Vancouver Regional District (GVRD) and its Water District have gone to exceptional lengths to consult citizens and provide information about the options for improving Vancouver's drinking water. The larger case study demonstrates that it is important citizens are knowledgeable about drinking water safety, but citizens may not make informed decisions about public health. The chlorination debate in Vancouver in the

1940s is evidence of this. As one citizen explained in a letter to the editor of the Vancouver Sun in the midst of the controversy: “Does it not seem that our so-called medical health boards are dominated by a handful of bateriologists arrogating to themselves an attitude of omniscience with regard to matters of public health…The attitude of the water board, the city council and the Sun is admirable” (Oct 7, 1942). Another asked what is the “the necessity of doping our water” (Oct 8, 1942)? These letters appeared on an ongoing basis along with rallies in opposition to the authority. Eventually, however, the city gave way to the public health – and war – directive of the federal government.

Findings

The hypothesis presented in this paper was that a model of regulatory federalism where one level of government regulates another offers better protection for public health. Following the functional model of federalism, some levels of government would be better regulators than others. Public choice suggests that different levels of government may have different incentives to regulate or not, and to comply with regulation or not. The paired comparative case studies presented in this paper allow for a testing of the hypothesis in two ways: (1) over time and (2) across cases.

The Safe Drinking Water Act was not implemented in the United States until 1974. Prior to that act, guidelines issued by the Public Health Service were non-binding. This allows a testing of the American case study using a timeframe before and after federal regulations. In contrast, the Canadian case study does not offer federal regulation, as such, but its narrative provides an opportunity for federal regulation because of the regulation of fisheries and the changes in federal powers during wartime. The SDWA was created because of state failure so this also provides further rationale for the function of federal regulations. Do federal binding regulations make a difference?

The case studies seem to suggest they do. Seattle has what may be seen as better overall quality, and certainly has put more effort into ensuring the water is safe to drink. This effort has been driven by an awareness that the state department and EPA have real power to force compliance, though bureaucrats do describe the relationship as a ‘partnership’. The Vancouver case study also demonstrates that when the federal government regulates, the local government responds. Even prior to 1974, when the USPHS issued new guidelines for testing, the Seattle Water Department moved to comply, if grudgingly.

In contrast, the provincial government’s incentives were often not in line with water protection, preferring to keep the watershed open to resource extraction, and vying to build a highway. While the state Department of Health in Seattle has taken its role as implementer of the federal SDWA seriously, the state itself has not always provided incentives to encourage or foster safer drinking water.

Conclusion

From both a comparative perspective and across time, this paper demonstrates that the federal level provides for more consistent protection of drinking water. In a regulatory federalism framework, the federal government can encourage the state to act through withholding funds and issuing fines. It can encourage the municipality to act, similarly. The most obvious way it encourages action, though, is simply by issuing regulations. At least for the case of drinking water in Vancouver and Seattle, when

governments regulate governments in a federal polity, they comply. In fact, when the subnational level of government does not act to protect the drinking water, it is the municipalities that may act as regulators in the sense that they demand actions or decisions be reversed.

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Appendix A: A Comparison of Drinking Water Protection Policies - Overview

	Canada	Year	United States	Year
Legal means by which Drinking Water is Regulated	- Guidelines (non-binding)	1968	- Guidelines (non-binding on the states; laws regulating interstate carriers binding on federal government) - SDWA (binding and enforceable)	1914 1974
Regulatory Development	- Guidelines for Canadian Drinking Water Established - Review of Guidelines takes place by Working Group - Subcommittee is established and begins to meet regularly (twice yearly) - Drinking Water Safety Act (limited to federal locations) promised in Green Plan but never passed	1968 1978 1986 1990	- PHS and Treasury Board regulated drinking water on interstate carriers and other federal grounds - SDWA - SDWA amended - SDWA amended	1914 1974 1986 1996
Guidelines/ Standards Development	- 2 stage process with input from technical secretariat = Federal-Provincial-Territorial Subcommittee (15 members,one from each prov/territory and 2 from federal government) has consensus objective with 2/3 of 75 percent of participants rule to report to Federal-Provincial-Territorial Committee on Environmental and Occupational Health (15 members) in which each member has a veto (consensus rule) - Subcommittee and Committee each meet twice a year - guidelines are set for microbial, chemical, physical		- Standards (part of National Primary Drinking Water Regulations) are set by EPA on an ongoing basis; 1986 amendments required at least 25 new contaminants every 5 years; changed to at least 5 to be considered in 1996 - In setting standards EPA relies on recommendations from the National Drinking Water Advisory Council (15 members, 5 general public, 5 states, and 5 other agencies) which has several working groups each composed of about 20 members and operates on consensus; also input from the public meetings and comments - standards are set for microbial, chemical, physical and radiological characteristics	

	and radiological characteristics - use ADI and NOAEL (preferred) -assume 1.5 L/day water intake and average weight of 70 kg - for carcinogenic contaminants use 1 in 100 000 to 1 in 1 000 000 based on daily exposure - sensitive populations (elderly, children or immuno-compromised may or may not be considered)		- use a risk assessment approach - assume 2 L/day water intake - for carcinogenic contaminants use 1 in 100 000 to 1 in 1 000 000 based on daily exposure - sensitive populations must be considered in standard-setting under the Boxer amendment	
Source Water Protection	Does not address but falls under other statutes		Surface Water Treatment Rule	1986
Groundwater Protection	Not addressed – more research is needed**		Underground Injection Control program	1986?
Treatment System	No guidelines at federal level – confirm - recommend a multi-barrier approach		Lead and Copper Rule	1996
Monitoring and Comprehensive Testing	- Health Canada recommends a multi-barrier approach		Required since 1974; enforced after 1986; an annual report with respect to compliance is issued	
Operator Certification	- Health Canada recommends a multi-barrier approach		Required in 1996 amendments; certification and recertification	
Public Involvement	- members of public can comment on guidelines during 'proposed' year		- 5 members of NDWAC are from general public - public can participate in public meetings and/or provide written comments when guidelines are placed in the Federal Register	
Public Notification	- none required		- PWS are required to report annually on contaminants found in the drinking water, and the water systems and source	
Enforcement and Compliance	- two provinces (AB and PQ) have fully adopted the guidelines - no enforcement at federal level	??	- enforcement can be at the state level both civil and criminal penalties - EPA retains enforcement authority and can revoke it from states - Drinking Water Revolving State Funds can be withheld for non-	1974 1974 1996

			compliance	