
Decentralised drinking water regulation: risks, benefits and the hunt for equality in the Canadian context

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Abstract: Drinking water management in Canada is based on the intervention of provinces and territories. This contrasts with the American and European approach of uniform, legally enforced regulation at the federal or super-federal level. The Canadian model has been widely criticised for the unequal level of regulation between provinces and territories and the passive role taken by the federal government. This paper: 1) puts calls for greater centralisation in the context of Canada's social and political climate; 2) reviews government, academic and environmental advocacy literature on competing drinking water regulation paradigms; 3) evaluates strengths and weaknesses of centralised and decentralised frameworks for drinking water regulation in the context of risk management theory and practical challenges. Notably, we evaluate drinking water decision-making as one of many competing opportunities for public spending on risk abatement and posit that increasing the uniformity of drinking water quality does not necessarily increase overall equality.

Keywords: decentralisation; drinking water; environmental advocacy; environmental regulation; federalism; risk analysis; Canadian regionalism.

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1 Introduction

A series of outbreaks in Canadian public water systems in the early 2000s has made drinking water quality an important topic in public discourse. Although unsafe drinking water has usually been a topic connected to the developing world, the widely publicised Walkerton, North Battleford and Kashechewan outbreaks alerted the public that even in Canada, clean water cannot be taken for granted. Several prominent environmental groups have been critical of drinking water quality management in Canada (Sierra Legal Defence Fund, 2001, 2006; Boyd, 2006; Ecojustice et al., 2006: hereafter collectively referred to as ‘the drinking water reports’). These leading environmental groups focus on the chronically poor quality of First Nations water supplies, the inequality of drinking water standards among provinces and territories and, notably, the level of regulation of chemical contaminants in Canada versus other countries. They conclude variously that the federal government is not sufficiently involved in drinking water management, that Canada’s decentralised regulatory model is inequitable and jeopardises the health of its citizens and that the level of regulation in Canada is below that of other developed countries.

In this paper, we:

- 1 put calls for greater centralisation in the context of Canada’s unique social and political climate
- 2 review government, academic and environmental advocacy literature on competing drinking water regulation paradigms
- 3 evaluate strengths and weaknesses of centralised and decentralised frameworks for drinking water regulation in the context of risk management theory and practical challenges in the Canadian context.

This paper is the first to examine the division of responsibility for drinking water quality in Canada in the context of total risk abatement including the risk represented by chemical contaminants versus other opportunities for spending. It is also the first academic paper to address the specific claims of environmental groups with respect to greater centralisation. We close with a summary of the advantages and disadvantages of both systems and suggestions to improve the current decentralised framework.

2 Background

The official policy of the federal government with respect to drinking water is known as the ‘multi-barrier approach’ (e.g., Canadian Council of Ministers of the Environment, 2004; Health Canada, 2010) and aims to ensure access to safe drinking water

through a system of regulation, monitoring, treatment and management. The Federal-Provincial-Territorial Committee on Drinking Water operates under Health Canada and publishes non-binding guidelines for drinking water quality, known as ‘maximum allowable concentrations (MAC)’, as well as related technical and toxicological support documents, guidelines for good practice, research reports, and other general information. Also, the federal government is responsible for drinking water quality on federal lands, including First Nations reserves.

Drinking water quality management can be roughly divided into two branches:

- 1 strategies to protect against short-term outbreaks, primarily attributable to spikes in microbiological activity in water supplies
- 2 management of long-term risks, usually associated with chronic trace chemical contamination.

The principles governing the management of short-term risks are relatively few and well understood, and water quality goals vary little among industrialised countries. In contrast, long-term risks are managed by setting maximum allowable levels of contamination by various chemicals. Regulatory agencies determine the level of exposure that is safe by consulting toxicological data and balance these considerations with the cost and potential benefit of regulation. Extensive toxicological research, exposure characterisations and cost-benefit analysis govern the final numerical value that is assigned to these contaminants. Competing opportunities for public investment, frequency of contaminant occurrence and other local factors play important roles in regulatory decision-making that create potentially large differences in regulatory limits. Notably, the intersection of these two branches – balancing short-term risks from microbiological outbreak against long-term risks from disinfection byproducts – is a widely discussed problem with large uncertainties that prevent the generalisation of a best strategy (e.g., Havelaar et al., 2000; Hrudey, 2009).

Almost all known cases of illness and death due to drinking water contamination are attributable to breakdowns in the processes that are supposed to ensure that water is not contaminated by pathogens. Conversely, illness and death due to chemical contamination are extremely hard to trace back to drinking water on an individual level. This is due to the very small numbers of people that typically get sick, the long exposure periods that are typically necessary to cause a health response in exposed populations and the fact that the resulting diseases (notably cancer) cannot be categorised on an individual level according to cause.

3 Literature review

In 2005, the Office of the Auditor General of Canada (OAGC) undertook two audits of federal engagement in drinking water quality, one with respect to First Nations reserves (OAGC, 2005a) and one with respect to all other obligations and functions (OAGC, 2005b). Most opportunities for improvement highlighted by the audits pertained to ensuring competent operation of small systems, adequate testing and sufficient funding, especially in First Nations reserves. One finding criticised the pace at which the federal Drinking Water Guidelines (that primarily pertain to chemical contaminants) are updated and developed. As of its 2009 report, the OAGC considers the federal government to

have ‘made satisfactory progress’ with respect to the 2005 evaluation and noted the implementation of a process to improve the pace with which chemical contaminants are evaluated (OAGC, 2009). A search of the federal government documentation reveals that the vast majority of publications fall into the following categories: outlines of upcoming research needs and identification of priority areas; resources for well-water users; conclusions of environmental assessments; technical information on select contaminants; summaries of international development initiatives; explanatory scientific material for the public; reviews of international commissions and agreements; and resources for agricultural workers.

The environmental geography literature is rich with study and perspectives on overall water governance in Canada (e.g., Bakker, 2002; de Loë et al., 2007). This body of literature focuses on source water management and responsibility with respect to the institutional, legal, geographic, economic, social and environmental challenges that face decision-makers. Academic literature on drinking water safety focuses heavily on control of pathogenic contamination and effective operation of municipal treatment facilities (e.g., Hrudey and Hrudey, 2004; Hrudey et al., 2006; Schuster et al., 2005) and source-water protection (e.g., Davies and Mazumder, 2003) as opposed to risk management of chemical contaminants or the structure of drinking water regulations across jurisdictions. Cohen (2012) has explored (and questioned the basis of) the rescaling of water governance to the watershed level in Canada. Practical policy analyses in the context of drinking water are typically confined to the current context of provincial and territorial responsibility (as in McMullan and Eyles, 1999). One paper however identifies several potential shortcomings in the regulatory mechanisms intended to ensure water quality from the perspective of environmental law (Pardy, 2004). Hill et al. (2008) wrote a paper specifically addressing the lack of literature on Canada’s unique, highly decentralised water regulatory model. While this article was not specific to drinking water regulation, the authors inventoried the drinking water management practices of each province and territory and put Canada in the context of the primary scholarly arguments for and against centralisation of environmental regulation. Bakker and Cook (2011) commented on possible weaknesses of decentralisation in the context of planning for climate change and add to commentary to the effect that decentralisation may exacerbate interregional inequalities.

Environmental advocacy groups have uniformly called for greater centralisation of drinking water management (Sierra Legal Defence Fund, 2001, 2006; Boyd, 2006; Ecojustice et al., 2006). Each of these reports describes the current state of drinking water in Canada as unacceptable and criticises the nature and extent of the involvement of the federal government. They describe the current regulatory framework as a ‘patchwork’ of inequitable rules for drinking water management whereby some Canadians are protected by more stringent rules than others. The US and the European Union, as they point out, have adopted federally (or, in the case of the EU, super-federally) mandated drinking water quality guidelines that ensure consistent standards across their respective territories. Claims of inadequate federal intervention have been based on the numerical value of MAC. One of the drinking water reports points out that Canada’s guidelines are very often less stringent than those of the USA, Australia or even the World Health Organization (WHO) (Boyd, 2006). These reports are interesting because the major part of both the authorship and readership fall outside the limits of mainstream academic and government research on drinking water management. In the following sections we establish and draw on them as examples of the preoccupations of an informed but non-

expert public. This review of the literature highlights that environmental advocacy groups are much more concerned with the management and regulation of chemical contaminants than authors in academia or government. Also, noteworthy is the relatively strong weight put on numerical quality values versus other management strategies (e.g., monitoring, source protection) or even real quality outcomes.

Our literature review did not uncover any analysis that either examines drinking water risk in the context of competing opportunities for spending or questions the policy objective of equalising water quality across regions.

4 Findings

4.1 Perceptions of risk and inequality in decentralised regulation

In the literature review, we established that calls for greater centralisation are much more urgent among commentators in environmental justice than among drinking water researchers. Here, we offer some context for this from the literature on risk perception and Canadian moral valuations.

The resonance that drinking water management failures have had with the public is consistent with research in risk perception. Pilisuk et al. (1987) found that drinking water tops the list of public concern for technological hazards with 79.1% of respondents identifying as ‘very concerned’ and a further 15.1 ‘somewhat concerned’. For comparison, 54.9% of respondents in the Pilisuk study described themselves as ‘very concerned’ about nuclear war. These numbers are likely to be even higher in the wake of widely reported drinking water contamination. Indeed, concerns over abstract risks in drinking water are at the surface of the popular consciousness and may be easily triggered by a perception of lax protection of water resources supported by easily relatable examples of regulatory failures.

As is generally the case (Slovic and Weber, 2002), it has been extreme, isolated events like the outbreak in Walkerton, Ontario that have caused alarm and sparked the public’s interest in safe drinking water. The outbreak in Walkerton was responsible for over 2,000 illnesses and seven deaths in a small community (O’Connor, 2002). However, this accounted for less than 3% of the total illnesses and less than 8% of the total deaths thought to be attributable to contaminated drinking water in Canada every year (Edge et al., 2008). The fact that the majority of drinking water related risk occurred outside of this well publicised event demonstrates that large populations stand to benefit from a dialogue on the improved management of drinking water, even though this dialogue is moved along by low-probability, high-impact events like the outbreak in Walkerton.

Regional egalitarianism is a defining characteristic of the Canadian social context. Public polls indicate that Canadians are highly supportive of egalitarianism, that is, that income and opportunity should be independent of ability (Aalberg, 2003). Canada’s system of equalisation payments is a widely recognised symbol of inter-regional egalitarianism, in place since the 1950s and entrenched in the 1982 constitution, aiming to harmonise the quality of social services between richer and poorer provinces (Kellock and LeRoy, 2007; Kasoff and Drennen, 2008). These expectations of an egalitarianism that transcends economic realities are almost universal and, particularly in discussions of public health, unquestioned, with one study describing it as the ‘mantra’ of the Canadian context (Giacomini et al., 2004). Indeed, regionalism, as important as national unity and

social welfare, has dominated political discourse and conceptions of representativeness and equality since Confederation. This contrasts starkly with, for example, the USA, where sex, race and ideology are the prevailing politically relevant categories (Malcolmson and Myers, 2009). Bird and Vaillancourt (2001) flesh out the fiscal arrangements within Canada designed to ensure universal access to social services between richer and poorer parts of the country and argue, however, that such arrangements only perpetuate regional economic inequalities, notably by distorting incentives for economic development.

The combination of risk perception with regional egalitarianism contextualises both the resonance of drinking water management with the informed public (e.g., the readership of the drinking water reports) and the default policy objectives that have motivated discourse thus far (i.e., expectations of interregional equality). We further probe this issue in Section 4.3 in light of evidence and theory as to whether centralisation improves equity and/or health outcomes.

4.2 The weight of law and expectations of cost-benefit analysis

This paper evaluates the strengths and weaknesses of centralised versus decentralised responsibility for drinking water quality. In this section, we describe the evidence for the potential responsiveness of the two management strategies to emerging contaminants, their ability to implement protective regulation and the scrutiny that any proposed regulations would be expected to face.

The federal government is currently able to post drinking water guideline quality values and standards for good practice at its own discretion, with little justification of the associated costs: it is up to an individual province to adopt (or not) the federal guidelines (or other standards) if it determines the benefits justify the costs. As we have seen, criticisms of the federal government's role in drinking water quality cite its failure to be sufficiently engaged in protecting public health. However, if federal guidelines gained legal effect, we would anticipate a surge of criticism and demands for proof that expected benefits absolutely justify costs associated with meeting the guideline values. While Canadians would gain a common baseline water quality, we anticipate that this baseline would be designed to withstand cost-benefit analysis; a framework in many ways incompatible with precautionary regulation. It is instructive to turn to the example of the USA, whose centralised drinking water regulatory system resembles the desires of the critics of the Canadian federal government's regulatory approach to drinking water.

The US EPA regulates drinking water quality at the federal level on the basis of the Safe Drinking Water Act (SDWA), its amendments and other guidelines, such as executive orders treating the role of cost-benefit analysis within regulatory agencies. Since the regulations passed by EPA require mandatory compliance of all drinking water systems in the country, prior to regulation, EPA is required to demonstrate that a drinking water contaminant poses a threat to human health, that it occurs with frequency and at levels of concern to public health, and that regulation represents a meaningful opportunity for health risk reductions. Since 1998, EPA has made several regulatory determinations on compounds it has selected for evaluation from its Contaminant Candidate Lists (CCL), the system by which it identifies and screens possible new targets for regulation. In total, 17 chemical contaminants have undergone review in an effort to assess whether health benefits would justify regulatory costs. Of these 17, six are thought to be present in the drinking water of at least one million Americans in levels that exceed

EPA's health reference level, while another four are thought to occur above the health reference level in the drinking water of between 100,000 and one million Americans. Still, EPA has decided against regulation for all 17 contaminants it has evaluated (Federal Register 2003 and 2008). While it has taken the EPA ten years to decide against regulation of 17 emerging drinking water contaminants, some of which affect large populations across the USA, Health Canada has adopted guideline values for four of these, along with another six identified as candidates for regulation by EPA, but still pending evaluation. As always, it is up to provinces and territories to opt in to these standards. The slow pace at which drinking water regulation is decided upon or against in the USA speaks mainly to the retarding effect of cost-benefit analysis, where reaction to a risk is delayed until EPA can justify why or why not it is appropriate to enforce new standards of water quality on publicly funded water systems across the country. The difficulty of this task is compounded by the nationwide variation in the relationship between costs and benefit of a hazard and a potential regulation, and the inherently subjective exercise of deciding which it is worthwhile to regulate, and at what levels.

Proponents of federal regulation tend to encourage allowing provinces and territories to enact stricter rules as they deem appropriate, so that the federal standards serve only as a baseline. This is technically the case in the USA, where individual states are free to regulate any contaminants as long as the regulations are not lower than those promulgated by EPA. However, only a minority of states (California, New Jersey and New York – representing about 20% of the US population) have numerical drinking water standards more stringent than those of EPA. The additional coverage provided by these states still leaves the majority of highly exposed populations without legal protection at the state level. Thus, while the goal of federal and state protection is to provide public safety, they are overlooked by both levels instead of being protected by both levels. To cite but one example, an estimated 10,000 to 781,000 Americans, almost entirely in states lacking sub-national drinking water regulation, are exposed to hexachlorobutadiene in their drinking water at levels above the health reference level (US EPA, 2003). US EPA opted not to regulate hexachlorobutadiene because exposed populations were still too rare to justify a national rule.

We can only speculate on how Canadian federal agencies would have reacted if the stakes were as they are in the USA, that is, with federal regulations having the force of law. Still, it is worth noting some similarities that may justify extrapolation to the Canadian context. Like the USA, Canada has a well-developed, mandatory regulatory impact assessment (RIA) process that is embedded in the regulatory culture (Volkery, 2004). The basic requirements of new regulations were reaffirmed most recently in 1999 and invoke a separate Environmental Assessment of Policy (EAP) and, burdensomely, a demonstration that the benefits *outweigh* the costs (Government of Canada, 2000). This language is more severe than the analogous US directives for cost-benefit analysis; since 1993 only a demonstration that benefits of proposed regulations *justify* costs is required (Morgenstern, 1999). As we have seen, data on contaminant occurrence on a national level are lacking in Canada, but we would not expect to see more homogeneous quality than in the USA; the primary causes of water quality differences among US states are climatic, hydrologic and demographic variations as well as regionalisation of manufacturing and agriculture (US EPA, 1999) phenomena that define the Canadian context as well. While a strengthened federal role might justify disengagement on the part of provinces and territories from this expensive regulatory arena, the self-propelling

nature of bureaucracies might promote a dual system wherever provincial and territorial authorities have established a drinking water regulatory system. Indeed, we might expect a further fragmentation of the regulatory landscape as some provinces and territories disengage entirely and others stay their course. While we have shown the requirement to conduct cost-benefit analysis may slow responsiveness to emerging contaminants, we are not arguing for less cost-benefit analysis or a more precautionary regulatory culture. Indeed, increased precaution in drinking water regulation would mean some other benefit foregone. As we will see, there are competing opportunities for risk reduction and, without cost-benefit analysis, we would have no way of ensuring we are allocating money rationally.

4.3 *Centralisation, equity and water quality as a local issue*

In this section, we compare centralised and decentralised frameworks vis-à-vis arguments about social/economic justice and equity, introduced as priorities to Canadians in Section 4.1.

Although drinking water regulations would become more equitable if centralised, it might in fact be at the expense of public health *even in terms of drinking water risk*. In Section 4.2, we saw that national regulations in the USA have been unfeasible partially because it is not possible to justify mandatory intervention across the country when only small populations would benefit, or when the benefits are uncertain. Even though states are technically free to enforce regulations stricter than those passed by the US EPA, most do not.

In Section 4.2, we described evidence that the pan-Canadian guidelines may be currently more able to promote health-protective regulations because of the relatively low burden of cost-benefit analysis. However, this advantaged is somewhat muddled by the realities of the federal-provincial-territorial subcommittee on water quality. The Walkerton report observed that the Subcommittee has a consensus-oriented approach and a tendency to settle on the lowest common denominator (i.e., less protective regulations). For example, the high guideline value for turbidity is reportedly attributable to the Yukon being unwilling to invest in lowering turbidity and simultaneously not willing to be in violation of the Canadian guideline values; the result is that the standard at the federal level is higher than it would have been (O'Connor, 2002).

We therefore do not find evidence that drinking water centralisation works to better protect health outcomes.

Conversely, removing the ability of provinces and territories to decide what level of drinking water intervention it can afford in consideration of other opportunities for risk reduction might in fact increase *overall risk* if the opportunity cost for a province or territory to meet federally mandated drinking water standards is high. Canada would make better use of the existing decentralised nature of its regulatory framework by basing health guidelines on the best available science, rather than weakening them to satisfy the interests of the provinces or territories.

In spite of the pressures facing EPA, we see that it ensures a baseline water quality to all Americans. Indeed, greater centralisation in line with the US model would seem to represent progress towards equity among Canadians. Advocates of increased responsibility for drinking water regulation on the part of the federal government and a generally more centralised regulatory system cite equity among Canadians and surer protection of public health as the overall goals. Although centralising rules and guidelines

for drinking water quality management would help harmonise the risk attributed to drinking water contaminants, it might in some instances be at the expense of overall public health or wellbeing. Widely publicised debates over the regulation of arsenic and perchlorate in the USA exemplify the great difficulty of calculating trade-offs between cost factors and protectiveness of public health on a national level. This is particularly true when detection ability allows for quantification of compounds at levels lower than the dose at which a health response has been measured or at levels unachievable by conventional treatment technologies (Calder and Schmitt, 2010).

Risk from drinking water contaminants, whether of short-term outbreaks or long-term cancer incidence, is but one part of a greater risk profile that influences public policy decisions. Standardisation of water quality standards across Canada is in effect a move towards risk equity, but *in terms of drinking water risk alone* (and this equitable risk is not necessarily lower). The greater picture of risk is very regional, varying even from one Canadian province or territory to another. For example, the car accident death rate per 100,000 people between 2000 and 2004 was 7.0 in Ontario, but 16.4 in the Yukon Territory (Ramage-Morin, 2008). Obesity rates in 2004 varied between 18% for men and 20% for women in British Columbia and 33% for men and 35% for women in Newfoundland and Labrador (Tjepkema, 2005). Heavy drinking is more prevalent in Atlantic Provinces and in the Territories than elsewhere in Canada (Public Health Agency of Canada, 2008). Probably, risks attributable to drinking water quality vary nationally as well, though there has been no comprehensive study on the subject. Regardless, it is certain that drinking water represents relatively greater risk in some jurisdictions than in others. The variability of these other risks means that drinking water risks do not rank consistently in regulatory priorities from one jurisdiction to the next. These other risks may also warrant public investment. Therefore, the Canadian model of decentralised regulation allows provinces and territories to decide on risk reduction priorities. Spending to diffuse drinking water risk, while perhaps a good decision for one area, might be a bad decision for another, if the opportunity cost is high. This is the flipside of the issue we explored earlier: that centralised regulation may tend to default against regulation where it is not justifiable everywhere.

4.4 Research and decision-making: splitting fixed costs

The research and decision-making effort in regulation represents substantial costs that do not necessarily scale down. A fully decentralised model with every province and territory carrying out the research and analyses in parallel would be unfeasibly inefficient. In this respect, centralised systems clearly have the advantage of efficiency. In the interest of improving the current decentralised model, we ask in this section if there is a way to pool efforts that might be duplicative (e.g., health risk valuation, assessment of treatment technologies), while retaining the possible advantages of decentralised decision-making.

The federal government might make a meaningful contribution to the protection of public health if it aimed more explicitly to facilitate decision-making on the part of provinces and territories. Information on risks, costs and benefits could be used by subnational regulators to determine the appropriate level of intervention in consideration of other opportunities for risk reduction. This would serve the dual purpose of promoting the protection of localised highly exposed populations where a centralised regulation might be unwarranted (as in the case of emerging contaminants not regulated by EPA)

and accounting for the variable opportunity cost of drinking water risk reduction. Under this structure, for example, Yukon and Ontario could use the same data to justify respectively permissive and stringent standards for turbidity, a drinking water characteristic that is apparently a smaller spending priority in Yukon. The cost-benefit analysis would be done once, at the federal level, and the results would serve as the basis for provinces and territories to make rational decisions. Ontario already has binding regulations for a number of contaminants not regulated, for example, in the USA, but it is not clear that the information on costs and benefits in the Ontarian context is available for other provinces and territories that might benefit from it.

Arguments for decentralisation of drinking water regulation in Canada depend on the premise that provinces and territories would invest rationally in public health initiatives if the federal government did not intervene. That is, an argument in favour of decentralisation is persuasive if centralisation of drinking water regulation would deprive Canadian provinces and territories of opportunities to address bigger public health hazards with the funds they are instead made to allocate to drinking water. This is principally because of the entrenched role of government in Canada as a reallocator of resources and decision-maker in the interest of equalising public health outcomes. For example, greater public support in Canada than in the USA for regulation of tobacco products (Studlar, 2002) points to differences in public expectations of regulators' intervention in matters of overlapping individual and public health. Extrapolating from the example of tobacco control, we might expect regulators in the USA to be less constrained by a public expectation that they would be actively involved in risk management initiatives other than drinking water management.

4.5 Special considerations for Native communities

Drinking water management in Native communities poses unique challenges, the most obvious of which is their status outside the scope of provincial responsibility. Because provincial governments are not involved in negotiations with or management of Native lands, and the federal government is not otherwise engaged in enforcement of drinking water standards, the systems that ensure the safety of drinking water for the majority of Canadians are not applicable to residents of these communities. However, the jurisdictional challenges facing decision-makers are more complicated than optimising allocation of responsibility; chronic water quality problems in native communities are compounded by the challenges of ensuring access to safe water without violating native rights to self-government. We note also that Native communities are distinct from the rest of Canada in that basic access to safe drinking water free from pathogenic contamination remains elusive. Here, debate on regulation of trace chemical contaminants is much less important than effective operational procedures for detecting and mitigating risk of short-term illness and death, a peculiarity in an industrialised country. In 1995, for example, Health Canada and Indian and Native Affairs Canada¹ (INAC) identified that one quarter of the water systems in First Nations communities 'posed potential health and safety risks to the people they served'. In 2001, INAC found "a significant risk to the quality or safety of drinking water in three quarters of the systems" (OAGC, 2005a).

While all parties agree there is a problem, sources differ as to the causes. The OAGC reports that the federal government has spent nearly \$2 billion on safe drinking water initiatives in First Nations communities between 1995 and 2003 and attributes continued difficulties to the incomplete scope and intermittent application of federal policies on safe

drinking water and inadequacies in the technical expertise available to native communities (OAGC, 2005a). As Bird and Vaillancourt (2001) point out in a more general context of the welfare of First Nations communities, however, “federal performance in this area is hardly an advertisement for more centralised provision of social services”.

In Indian and Northern Affairs Canada (2006), announced an action plan to “ensure that First Nation leaders have access to the tools and resources they need to deliver clean water to their residents”. Tellingly, the announcement promised access to safe water via new tools and resources rather than a right to safe water. For example, the report does not mention a need for increased accountability on the part of water system operators or a new regulatory or monitoring framework. INAC and Health Canada accepted all of the OAGC’s recommendations in the 2005 report with the exception of the institution of a regulatory regime. Instead, they undertook to explore the feasibility of such a programme, citing concerns over self-governance on the part of First Nations leaders (OAGC, 2005a). Bill S-11, introduced in March 2010, is an effort to close what the sponsors of the Bill refer to as a ‘regulatory gap’ and allow the governor-in-council to give legal effect to certain types of recommendations related to drinking water on First Nations lands on the recommendation of the Minister of Health (Parliament of Canada, 2010). As of August 2013, the Bill is in the hands of the Senate Standing Committee on Aboriginal Peoples that has been hearing stakeholder comments since February 2011. Thus far, comments indicate that concerns include lack of clarity on funding responsibilities among INAC, Health Canada and Environment Canada, the lack of provisions for funding any regulations that are eventually passed under the Act and a lack of consultation of First Nations peoples (Council of Canadians, 2011).

It is beyond our scope to evaluate the quality or extent of the consultations INAC has held. Still, the cost of delaying a regulation likely to improve drinking water quality might exceed the benefits of further consultation. Indeed, the Act serves merely to facilitate individual regulations that may be proposed at a later date and so this groundwork is essential to move forward with specific regulations that may lead to improved water quality imply further consultation themselves. However, as the Council of Canadians report points out, the Act does not enshrine consultation as a waypoint to more specific regulation.

Beyond Bill S-11, there is some evidence to show that water quality in First Nations communities has improved in recent years. ‘High risk’ water systems, i.e., those likely to provide unsafe water owing to major deficiencies in several operational aspects, have decreased in number from 193 in 2006 to 49 in 2010 (Indian and Northern Affairs Canada, 2010).

The proportion of First Nations residents considering their water as ‘somewhat safe’ or ‘very safe’ increased from 62% in 2007 to 69% in 2009 (a change significant above the 99% level),² although this figure remains substantially lower than the 89% of respondents in non-First-Nations communities of similar size (Ekos Research Associates Inc., 2009).

Still, all actors agree there is a significant disparity between drinking water quality realities in native communities and the rest of Canada. Advances in legislation are slow and create anxieties about lack of consultation and funding. We have seen that even with heavy monetary investment, native communities are faced with a shortage of trained personnel and technical ability to implement measures that arguably give ‘access’ to

clean water. Years of effort has led to the development of a regulatory framework that, given the reactions of stakeholders, seems as likely to exacerbate mistrust and create anxieties as it is to bring about improved water quality in the near future. Clearly, the challenges faced in the First Nations context transcend the topics of water quality management we have explored in this paper. Indeed, effective regulation and policy decisions depend on more than science; these decisions must have the trust of all stakeholders. Adding to historical misgivings between First Nations and the settler population is the continued lack of transparency, as reflected, for example, in the Council of Canadians (2011) report, an experience shared by the broader Canadian population.

4.6 Summary of findings

The Canadian drinking water regulatory system is highly decentralised. This has produced a highly heterogeneous landscape of drinking water regulation. This paper has shown that Canadian political sensitivities to regionalism interact with risk perceptions to energise public opinion in favour of centralising and strengthening regulatory intervention in drinking water.

Indeed, this paper uncovers three main impediments to a fully decentralised system:

- 1 regulatory research and analysis has little economy of scale, and it would be very inefficient for these exercises to be repeated in every jurisdiction
- 2 because Native communities are not under provincial/territorial jurisdiction, which is largely responsible for drinking water quality, they seem to fall through the cracks in the system
- 3 the Canadian public are only likely to support decentralisation if provinces and territories are actively allocating public funds to public health initiatives in proportion with the magnitude of risks (if provinces and territories opt to spend less money on drinking water risk abatement, the Canadian public are likely to demand they use the money saved on addressing a greater public health risk).

We have however seen that decentralisation presents a theoretical benefit that is largely borne out by the evidence: local decision-making allows different populations to tailor spending to the local circumstances (relative risks in drinking water and between drinking water and other priorities) and that this does not undermine ‘equity’ (in drinking water or otherwise). Indeed, we found that the Canadian and American experiences with centralisation have led to more permissive standards than might otherwise exist if the risks were addressed locally.

5 Discussion

When dissenting claims of inadequate federal intervention and unequal protection are put in the context of the public’s existing uneasiness with the quality of drinking water and a deep cultural aversion to health inequalities, we see to what extent they are likely to reaffirm anxieties and gain currency with an informed public. The risk perceptions that energise public opposition to unequal drinking water standards may also explain the gap between the foci of academic and popular literature on water governance: we have seen that the former focuses on developing effective barriers to minimise pathogenic

contamination of drinking water, whereas the latter focuses very much on standards for chemical contaminants.

The water quality guidelines decided upon by the federal government are in effect the result of some cost-benefit analysis. It is a value judgement produced on the basis of national data that is not likely to be the same for every province, territory or even city. In view of the problems liable to be caused by giving them legal effect across Canada, the federal government might instead aim to provide the (more) neutral cost-benefit information to enable local regulators to decide how much intervention is appropriate in consideration of their other problems and opportunities for public investment. Throughout our discussion, it has been clear that we could make better judgements about water quality if we had access to better data. This is partially due to a shortage of original research or efforts to knit existing information together, but also owed to a lack of data availability and general government transparency. Although nothing on the federal level is legally binding, Health Canada and associated working groups have published considerable amounts of advisory information (e.g., non-binding standards) that is obviously tailored to the Canadian context. However, researchers and the public have access to very little information on the decision-making process used to inform final federal government publications. This contrasts with EPA that publishes all supporting documentation for its regulatory determinations and allows for reinterpretation by researchers and other stakeholders.

Adding to the technical cost/benefit considerations that ideally underpin regulation are political influences such as industrial lobbies, well investigated examples of which include the regulatory sagas of vinyl chloride and lead in the USA (see Markowitz and Rosner, 2002). Explicitly political influences on policy are however not within the scope of this paper.

Currently, the federal government markets its intervention in water quality management as being directly engaged with the health of Canadians. For example: “Its mandate and expertise lies in protecting the health of all Canadians by developing the Guidelines for Canadian Drinking Water Quality in partnership with the provinces and territories” (Health Canada, 2009). Critics are right to question the ability of the federal government to play this role when there is no legal mechanism enabling it to do so; ultimately, it is up to the provinces. In this regard, the federal government might gain legitimacy by embracing its real role as provider of information and expertise to assist more local levels of government that are actually legally responsible for drinking water quality to make rational decisions. It therefore seems that the best use of federal resources would be to ensure access to safe water where it is the responsible level of government and where it has neglected this responsibility, rather than repeating the work of provincial and territorial regulators.

Cost-benefit and contaminant occurrence data are currently very limited for regulations and guidelines developed in Canada, perhaps because guidelines developed at the federal level do not have the force of law. This is echoed by other researchers (e.g., Bakker and Cook, 2011). However, guideline values established at the federal level can be influenced by members of the federal-provincial-territorial subcommittee who want to strike a balance between a health-based standard and cost considerations (O'Connor, 2002). Therefore, federal entities intervening in drinking water regulation are subject to the pitfalls of managing drinking water on a national level but are not affected by requirements for transparency and do not facilitate rational decision-making on a more

local level. Politics always plays a role in determining the outcomes of legally binding regulation. Here, however, it is distorting the scientific evaluations made at the federal level that are at the basis of eventual regulations on the provincial/territorial level. This is perhaps the most serious barrier to efficient allocation of resources in drinking water risk abatement and an invitation to criticisms from commentators on environmental and health policy.

Putting the interactions of all actors in the context of risk management theory and practice has led to specific conclusions on the optimal division of responsibility and on strategies to optimise the allocation of resources. Decentralised management of drinking regulation, especially for chemical contaminants, is an inherently more logical approach than centralisation. However, the transaction costs of this system may prove prohibitive if scientific and economic analyses are not centralised, depoliticised and made much more transparent. Furthermore, resulting regional water quality inequalities are likely to be a politically unviable consequence unless provincial/territorial policy-makers can demonstrate any savings on drinking water investment are being used to tackle bigger risks elsewhere. Finally, the federal government should embrace its role as a facilitator of decision-making on a local level if it is to respond to legitimate criticisms and promote good governance of drinking water well into the 21st century.

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Notes

- 1 As of May 2011, this department is known as Aboriginal Affairs and Northern Development.
- 2 Survey results are normal distributions centred at means equal to the point estimate of the outcome (69% in 2009 and 62% in 2007). The standard deviations of both normal distributions (1.27 in 2009 and 1.89 in 2007) produce 95% of the probability density within the margin of error cited by Ekos Research Associates Inc. (2007) (± 3.7 in 2009 and ± 2.5).