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# **CANADIAN WATER IN A THIRSTY WORLD: PRESSURES AND CHALLENGES**

by

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Ryerson University, 2002

Toronto, Ontario

A thesis presented to Ryerson University and York University

in partial fulfillment of the requirements

for the degree of Masters of Arts

in the program of Communications and Culture

Toronto, Ontario, Canada, 2008

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Canadian Water in a Thirsty World: Pressures and Challenges

Megan Price

Masters of Arts, Communications and Culture

Ryerson/York Universities, 2008

## **Abstract**

Water is, and has been the driver of civilizations. In Canada there exists a “myth of superabundance” within both the government and public psyche which has driven profligate and unsustainable water use. Jurisdictional fragmentation, pollution and the potential for bulk water transfers threaten Canadian water. With a lack of a cohesive federal policy for water, Canadian water is at risk. At its root this, like all resource management, is a cultural problem. Any solutions to this seemingly intractably complex problem are ultimately social in origin and rest on a paradigm shift in resources management in the country. Historical examples are employed to contextualize the situation. The move to the “soft-path” management of water with concomitant reduction of reliance on infrastructure to reduce pressures is addressed. These domestic issues are made more pressing my global water scarcity.

## **Acknowledgements**

Many thanks to Arne Kislenko for guiding me through this process and pushing me to do what I wanted and not what I thought others wanted. Thank you to MTT for reading and re-reading not only this but everything I've written. To Mike for putting up with me over the last two years, I know it hasn't been easy. Also thanks to my wonderful and supportive family, especially Mum whose patience and kindness astound me everyday, and Dad, a great teacher.

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## **Introduction**

Water is fundamental for life. While clichés abound and it is easy to make broad generalizations, to say that water is the foundation of civilization is not a stretch. Dating to antiquity, there are cases of water scarcity, water conflict, water as creator, and water as destroyer. It is a prerequisite for development, and management of it was the catalyst for socio-political organization in some regions. The lack of water has caused the collapse of civilizations.

Today humankind has the technology to alter water on an unprecedented scale. Modern industrial societies use exponentially more water than non-industrial societies and are as dependent on water resources as ancient ones, if not more so. Massive dams, inter-basin transfers, the paving of wetlands and the irrigation of deserts are some of the ways in which humanity has transformed global watersheds. Increasing populations, pollution and the integrated global economy have necessitated these feats, but simultaneously left 2 billion people without sufficient water for drinking and sanitation. The United Nations (UN), World Bank and many non-governmental organizations (NGOs) have made it a priority to tackle this problem. However, since the first freshwater conference in 1977, the number of people in water scarcity has increased, demonstrating that efforts to reduce water poverty have not been effective.

This thesis is not a comprehensive analysis of global freshwater. It is far too complex and contentious an issue for one document to cover. Instead, this thesis places Canada within the context of global water scarcity. This is an incredibly complex topic, one which touches on many disciplines, from policy to development literature and history to scientific endeavours. This thesis bridges three broad perspectives around water: the historical, the theoretical and the practical, all of which intersect via culture. Culture drives the way in which humanity views

water, and thus how it is treated. This thesis starts by exploring the meanings of water, underpinned by notions of cultural materialism which allow for cross-cultural comparison. These anthropological observations are rooted in history before the Canadian context is introduced. It is both a practical and theoretical document.

Employing one approach is not adequate to properly address the issues which surround water management. At its root this thesis explores the connections between resource management and culture. These are much more intimately tied than first assumed, but by contextualizing the contemporary research with historical case studies, this thesis shows how this connection between culture and resources dates to antiquity and is just as true today as it was for ancient civilizations. Wise management of natural resources is a cultural matter, one which is intimately tied to anthropological, social and cultural questions.

Because this subject deals with many disciplines, an interdisciplinary approach to the topic is necessary. The thesis is not rooted in one theoretical paradigm. This would be too constricting for such a huge topic, and ultimately it is the opposite of what experts agree is needed: an approach which bridges divergent perspectives on water. Various theories and disciplines are introduced that work together to form a cohesive view of the major water management issues which face Canada and Canadians. Cultural anthropology, historical analysis, policy analysis, and economics are used to weave a cohesive picture of water issues. Case studies are employed to illustrate points about the nature of humanity's relationship with water and how it has not changed significantly over thousands of years.

Theoretical concepts such as "wicked problems" and the "soft-path" to water management show how effective solutions need widespread social buy-in, and how that might be

accomplished. Theoretical discussions around the commodification process are also central for water management of the 21st century. Discourse analysis is used to explore the usefulness of key terms such as “sustainable development.”

Water scarcity is a very real issue, and though many theoretical strands are broached, the priority for this thesis is for these theories to inform action. As pressures increase on global freshwater supplies, Canada, with its abundance of the resource, will face pressure from many sectors to deliver water to other parts of the world. Moreover, Canada already has its own water problems which will only be exacerbated by the global freshwater crisis. With little to no literature contextualizing global water problems within a Canadian context, there is an opportunity for forward-thinking policies, but also the danger that nothing will be done. Thus, in order to deal with these global problems, domestic issues in Canada must be addressed. Jurisdictional fragmentation, commodification, environmental degradation and overconsumption threaten Canadian water politically, ecologically and socially.

Canadian water policy and issues have rarely been framed in such a way. With sustainability of water use being the goal, and agreement that complex problems require social solutions, this study aims to demonstrate how new approaches are needed. Canada is the second highest user per capita of water in the world. This is simply not sustainable, and major water management changes must occur if the resource is to be protected. This will require a real change in the cultural attitude of Canadians to water. This poses difficulties as complex social problems require equally complex solutions. Some have termed these “meta-” or “wicked” problems because of their extreme complexity. Treating each problem in isolation is impossible, as every problem hinges on the solution to another. What is clear is that water must cease to be

viewed as an unlimited resource and start to be considered as a potentially scarce one. There are already instances of localized water scarcity in Canada, and with climate change and increased populations the strain on renewable fresh water will only increase.

Water management in Canada is problematic for a number of reasons. Provinces “own” the resource, except in cases when the federal government has jurisdiction (e.g., fisheries or aboriginal reserves). There is no national policy covering water or long-term, legally binding strategies for sustainability. Water rights are the backbone of water policy, and they differ throughout the country, an additional stumbling block to national regulation. What Canadians are left with are piecemeal solutions, often implemented reactively to water-related disasters. Federal initiatives regularly fail, and the situation worsens.

This lack of policy comes at a critical time, as there are already pressures from foreign countries, primarily the United States, to gain access to Canadian water resources. One major consideration is how water is tied into trade agreements such as the North America Free Trade Agreement (NAFTA) and the General Agreements on Trade in Services (GATS). For Canadians, water is different than other natural resources; it resonates more deeply and has meanings beyond other natural resources. While Canadians might favour the selling of lumber or oil, they consistently oppose water exports; yet water has been assigned a Harmonized Sales Tax (HST) number under the General Agreement on Trades and Tariffs and is considered a good under international agreements. There is intense debate over whether or not water in its natural state should or can be considered a good. At the base of this dichotomy is the fundamental notion of water: is it a social or commercial good? Historically, it has always been perceived as a social

good. To many, however, the notion of water a social good is in direct contradiction to its inclusion in these trade agreements.

Water is a highly politicized issue. There is strong opposition to the notion of commodification of water, as cultural ideas about “nature” and what is “natural” often contradict notions of modern “industrial” and “commercial” society. On the other hand, Canadians’ profligate water use seems to demand a market solution, and making water too expensive to waste has been demonstrated to be effective in other countries. Shifting from supply-side to demand-side management (and ultimately to what is called the “soft-path”) of the resource seems to have had promising effects in many countries. Where there are market mechanisms that regulate water, such as metering consumption, charging progressive tariffs and using “full cost” accounting measures decreases consumption. In the case of Sweden, recognizing water as a “good” has reduced use and spurred conservation technologies. It is clear that there is a distinction to be made between privatization and commodification of the resource. Privatization refers to delivery of the resource (as in privatizing water services in any given urban area) whereas commodification has more serious ideological ramifications (should the water in the Great Lakes be considered an export?).

Major concerns arise when these market solutions are to be implemented. Once water comes under global trade, environmental and social considerations will inevitably be compromised at the expense of profit. Thus water has become a tool for anti-globalization activists. Vandana Shiva writes in *Water Wars* that “[w]ater must be free for sustenance needs. Since nature gives water to us free of cost, buying and selling it for profit violates our inherent

right to nature's gift and denies the poor of their human rights.”<sup>1</sup> Along with the anti-globalization movement, water protests have become enmeshed with discourses of development and human rights. Water is a powerful symbol, thus protestors suggesting it is threatened (the source being global business interests), sparks rage. From the Philippines to the United Kingdom, and from New Zealand to Canada debates on privatization of water are often heated and emotional. Their arguments speak in language of “human rights” and “a fight for survival.” Others invoke “laws of nature” which ensure every person an ample and free supply of water. Whether or not, however, these debates are more about ideology or reality is unclear. What is clear is that it is a very difficult balancing act to protect the social aspects of water while managing it through market mechanisms. Some have called it the most contentious challenge facing the water community.<sup>2</sup>

The pressures Canadian waters are facing in the 21st century are fundamentally different than those it has tackled successfully in the past. New actors are being given agency, but with more people involved, more conflict over use arises. No longer can humanity engineer itself out of water scarcity as it did in the 20th century. Environmental and social concerns over large-scale infrastructural projects have made them less feasible than they were even 20 years ago. Given how important water is, Canadians would be surprised to discover there are no national drinking water standards, that it is unclear who should regulate what aspect of the resource, and that the most up to date federal water policy is 21 years old. With conflicting interests having a stake in Canadian water, and increasing global pressure, it is a complex situation whose causes are both ecological and economic but ultimately social and cultural in solution.

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<sup>1</sup> Vandana Shiva, *Water Wars: Privatization, Pollution and Profit* (Cambridge, MA: South End Press, 2002), 35.

<sup>2</sup> Meena Palaniappan et al, "Water Privatization Principles and Practices" In *The World's Water: 2004-2005* (Washington: Island Press, 2004), 45.

## Cultural Meanings of Water

Water is, and has always been a substance of deep meaning for cultures around the world.

It is universally a deeply symbolic substance, both as the essence of life and essential *for* life.<sup>3</sup>

Though specific meanings fluctuate culturally and temporally, the presence of water rituals and symbolism are ubiquitous. Water is, and has been, imbued with meaning and is “a fundamental element in virtually all … cosmological schemes.”<sup>4</sup> For such a powerful symbol it is remarkably fluid, within it are encoded many, often divergent meanings. It is signifier of both life and death, of production and destruction, and of fluidity and solidity, so it is not surprising that there exists a complicated relationship between it and humanity. It is wild, yet tameable, and always carries with it the power to destroy while also being essential for life. It is a substance of seemingly endless possibilities. Water can signify elements of both progress (the invention of steam-powered engines) and tradition (water rites tying people to their ancestors).<sup>5</sup> Throughout the 20<sup>th</sup> century, massive dam projects such as the Aswan Dam were built, bringing water to millions, making humanity less at the mercy of its ebb and flow. These innovations provided life to farmers who could count on predictable water patterns. It became a resource humanity managed. Lest humanity praise itself too highly for “conquering” water, however, it always has the

<sup>3</sup> There are several texts from differing disciplines which underscore this including: Stephen Halliday, *Water: A Turbulent History* (Gloucestershire, UK: Sutton Publishing Limited, 2004); Colin Richards, "Henges and Water," *Journal of Material Culture* 1, no. 3 (1996), 313.; Veronica Strang, *The Meaning of Water* (New York: Berg, 2004); Veronica Strang, "Common Senses: Water Sensory Experience and the Generation of Meaning," *Journal of Material Culture* 10, no. 1 (2005), 92. As well see Tuan's anthropological text for an exploration of the connections between the physical environment and humanity: Yi-Fu Tuan, *Topophilia* (Englewood Cliffs, NJ: Prentice Hall, 1974).

<sup>4</sup> Richards, *Henges and Water*, 316.

<sup>5</sup> For example see Vernon Scarborough L., "Ecology and Ritual: Water Management and the Maya," *Latin American Antiquity* 9, no. 2 (1998), 135.

potential to destroy. The disasters of the Chinese dams of Banqiao and Shimatan are but two examples that remind humanity of water's destructive capabilities.<sup>6</sup>

In cultures around the world, as well as in Canada, there are four themes which water often represents. The first, and possibly most powerful, is that of water being a matter of life and death. In many ways this relationship informs all other meanings of water. The Qu'ran proclaims "and Allah has sent down the water from the sky and therewith gives life to the Earth after its death." The word *Shari'a* was originally used to describe the law of the water.<sup>7</sup> The Christian baptism is another way in which water is tied to giving life. The second broad theme is that of transmutation and transformation. The fluidity of water has been used for centuries to underscore transformation in human life. Jesus turning water into wine, Heraclitus' famous quote "You could not step twice into the same river" and contemporary references to the hydrological cycle as a symbol of life processes<sup>8</sup> all show this. Thirdly, water is cross-culturally encoded as a substance of spiritual identity. From Australian Aboriginal myth<sup>9</sup> to Madagascarian water blessing rituals,<sup>10</sup> water is revered as a substance which connects humanity to the divine.

The fourth theme is water as a symbol of power and agency. Roman baths and fountains were a demonstration of power and prestige while in ancient Mayan civilization water was controlled by the elite to centralize power.<sup>11</sup> Americans tamed the great western rivers with massive dam projects in the 20<sup>th</sup> century. These massive structures were not just built to deliver

<sup>6</sup> Diane Raines Ward, *Water Wars: Drought, Flood, Folly and the Politics of Thirst* (New York: Riverhead Books, 2002).

<sup>7</sup> See I. Faruqui, Asit K. Biswas and Murad J. Bino, *Water Management in Islam* (Tokyo: United Nations University, 2001), 1.; *Water Wars: Drought, Flood, Folly and the Politics of Thirst*, 187.

<sup>8</sup> See Marq De Villiers, *Water: The Fate of our most Precious Resource*, Third ed. (Toronto: McClellan & Steward Ltd., 2003); Halliday, *Water: A Turbulent History*; Sandy Toussaint, Patrick Sullivan and Sarah Yu, "Water Ways in Aboriginal Australia: An Interconnected Analysis," *Anthropological Forum* 15, no. 1 (2005), 61.

<sup>9</sup> Patrick Sullivan and Sarah Yu, "Water Ways in Aboriginal Australia: An Interconnected Analysis," *Anthropological Forum* 15, no. 1 (2005), 63.

<sup>10</sup> Scarborough, *Ecology and Ritual: Water Management and the Maya*, 145.

<sup>11</sup> Ibid., 136.

needed water but to demonstrate how powerful each particular society was - a flexing of proverbial muscles.

In the Canadian context, many of these themes are echoed. Canadian national identity, mythology and ideology are based on the country as a vast expanse of water. From the country's motto: "*Ad Mare Usque Ad Mare*" to the images of Canadian "coureurs de bois," exploring "uncharted" wilderness, water features prominently. Harold Innis, in his book *The Fur Trade in Canada: An introduction to Canadian Economic History* argues that it was the watersheds of the country that opened it up for exploitation of the natural resources, starting with fur. In this way "the waterways of the beaver areas were of primary importance and occupied a vital position in the economic development of northern North America."<sup>12</sup> It was the water, he argues, which made it possible for settlement of North America. The importance of water to the Canadian identity can be found in advertisements from tourist boards to beer commercials, which usually include the requisite shots of seemingly endless lakes and rivers. The quintessential Canadian summer is, for many, at a cottage, on a dock, on a lake. This "hydrological nationalism" is paradoxical as it is "hinged not only with a reshaping or domination of nature but also with the preservation of wilderness, or untamed nature."<sup>13</sup>

The notion that Canadians are keepers of the wild strongly resonates with the Canadian psyche. The importance of this stewardship can be seen in the language of published material from the government of Canada, ranging from comments about identity ("Canada's lands, waters, and wildlife provide the foundation for Canada's health and economy and are important to the

<sup>12</sup> Harold Innis, *The Fur Trade in Canada: An Introduction to Canadian Economic History*, 4<sup>th</sup> ed. (Toronto: University of Toronto Press, 1999 [1930]), 6.

<sup>13</sup> Andrew Biro, "Half-Empty Or Half-Full? Water Politics and the Canadian National Imagery," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 326.

quality of life of all Canadians.”<sup>14</sup>) to the impact of water on the economy. Environment Canada mentions in many of its documents exactly how much money is generated by Canadian wilderness (\$11.7 billion spent by Canadians on nature activities, with an additional \$17.3 billion added by US visitors.<sup>15</sup>) In 1996 Canada even commissioned a report entitled “Importance of Nature to Canadians,” which found that by either economic or cultural indicators, nature is of extreme value to Canadians.<sup>16</sup> Over 60% of Canadians would be willing to spend more money on protecting the environment<sup>17</sup> and that the environment tops the lists of things which are of concern to Canadians, often beating out the economy, health, and education. While Canadians allow the export of oil or softwood, there are vehement objections when it comes to water. This demonstrates that somehow water is special, different than other resources.

In his chapter on water and national identity, Canadian scholar Andrew Biro notes that notions of water and nature also mesh perfectly with the other significant way in which Canadians define themselves: as *not* American:

With all that water – and natural beauty more generally – “increasing concern” about ecological issues is presented as coming to Canadians *naturally*. And this view fits conveniently with a Canadian nationalism defined against the modern, hydrologically engineered (nature-dominating, imperialist) society to the south.<sup>18</sup>

It is clear that in the discourse around nature, Canadians see themselves and their country as special, as stewards of a vast and infinite wilderness. There is a disconnect in policy, however.

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<sup>14</sup> Government of Canada. *Canada's Performance 2005: The Government of Canada's Contribution*. (Online). Ottawa: Treasury Board of Canada Secretariat, 2005. [http://www.tbs-sct.gc.ca/report/govrev/05/cp-rc04\\_e.asp](http://www.tbs-sct.gc.ca/report/govrev/05/cp-rc04_e.asp)

<sup>15</sup> Environment Canada. *The Importance of Nature to Canadians: The Economic Significance of Nature-Related Activities*. (Online) Ottawa: Minister of Public Works and Government Services Canada, 2000. [http://www.ec.gc.ca/nature/pdf/nature\\_e.pdf](http://www.ec.gc.ca/nature/pdf/nature_e.pdf).

<sup>16</sup> Ibid.

<sup>17</sup> Environment Canada. *The Importance of Wildlife to Canadians: Highlights of the 1991 Survey*. (Online) Ottawa: Environment Canada, 2003. <http://www.ec.gc.ca/nature/highlights/executiv.htm>.

<sup>18</sup> Biro, *Half-Empty Or Half-Full? Water Politics and the Canadian National Imagery*, 323.

More often than not Canadian environmental regulations, if they exist at all, are incomplete, ineffectual and underused. This is especially true when it comes to water.

Underpinning these anthropological observations is that water has always been considered a social good. Access to it has always been of paramount importance. Agriculture, trade and development have always hinged on reliable access to clean, fresh water. In places where there is not a reliable source of water it has been brought in, most spectacularly with the aqueducts of the ancient world.

## **Historical importance of Water**

Istanbul (formerly Constantinople) has been an important port for thousands of years.

Despite its strategic import, however, it was not well situated with regards to fresh water<sup>19</sup> so aqueducts have been built since the 2<sup>nd</sup> century CE.<sup>20</sup> With the increase in population which the relocation of the capital of the Roman Empire to Istanbul in CE 330, the citizens soon needed more water. Starting in the Istranja mountain range the aqueduct of Valens runs 250kms through dense forest until it reaches Constantinople. The system is much more complex than the more famous Roman one, and is the longest series of aqueducts in the preindustrial world.<sup>21</sup> The water was not just brought in to meet the basic daily needs of the populations, but also to turn Constantinople into a true capital city with great baths and fountains; a symbol of power and wealth, a testament to the superiority of the Roman Empire.<sup>22</sup>

For the maintenance of a stable civilization, access to fresh water is a prerequisite. The Roman and Byzantine empires demonstrate that without water there is no development. The opening of the American West due, in large part to massive dam construction during the early part of the 20<sup>th</sup> century demonstrates that 2000 years later water was still a catalyst of development. It is equally true that when water becomes scarce, or disappears it has disastrous effects on the civilizations on which it depends.

<sup>19</sup> David Nicholle, John Haldon and Stephen Turnbull, *The Fall of Constantinople: The Ottoman Conquest of Byzantium* (Oxford: Osprey Publishing, 2007), 143.

<sup>20</sup> Richard Bayliss and James Crow, "The Water Supply of Constantinople 2002," *Anastasian Wall Project*, (2002), 2. <http://longwalls.ncl.ac.uk/FieldworkReports/English/2002/2002report.pdf>.

<sup>21</sup> Nicholle, Haldon and Turnbull, *The Fall of Constantinople: The Ottoman Conquest of Byzantium*.

<sup>22</sup> Bono, Crow and Bayliss, *The Water Supply of Constantinople: Archaeology and Hydrogeology of an Early Medieval City*, 1326-7.

The collapse of the Mayan empire between 680CE and 900CE, the Akkadian empire of 2200BC, and the civilization at Angkor Wat in the mid 16<sup>th</sup> century are all cautionary tales for those who would push the limits of carrying capacity of an ecosystem. The Mayan collapse occurred during the Terminal Classic Period over the course of a century, coinciding with three major drought events centered at approximately 810, 860 and 910CE <sup>23</sup> with centres in the lowland south collapsing before those in the north.<sup>24</sup> In much the same way, the Akkadian civilization of 2200 BC succumbed to drought as well. The first to unite the disparate tribes of Mesopotamia into a cohesive civilization, the empire linked remote agricultural regions in the north to the population centres of the south.<sup>25</sup> By 2150 BC, however, the civilization which once stretched 1300 kilometers<sup>26</sup> had all but disappeared. On the other side of the world several thousands of years later and in an extremely different climate the Khmer civilization at Angkor disappeared in the mid 16<sup>th</sup> century. The city was built on extremely complex canals, and reservoirs to harness the rains of the monsoon. As the population grew, so did the complexity of the infrastructure until it had become so rigid as to be unable to deal with unexpected climate events.

While unexpected climate events catalyzed the decline in these three examples, it was the failure of social adaptation which sealed their fate. Rainfall was the primary source for the

<sup>23</sup> Gerald H. Haug et al, "Climate and the Collapse of Maya Civilization," *Science* 299, no. 14 March (2003), 1731; Diamond, *Collapse: How Societies Choose to Fail Or Succeed*, 174.

<sup>24</sup> For a more comprehensive overview of the Maya collapse see: Aimers, *What Maya Collapse? Terminal Classic Variation in the Maya Lowlands*, 329-377; Richardson Benedict Gill, *The Great Maya Droughts: Water, Life and Death* (Albuquerque: University of New Mexico Press, 2000).

<sup>25</sup> Paul B. deMenocal, "Cultural Responses to Climate Change during the Late Holocene," *Science* 292, no. 5517 (2001), 669.

<sup>26</sup> Richard Kerr, "Sea-Floor Dust shows Drought Felled Akkadian Empire," *Science*, 279, no. 5349 (1998), 325.

Mayans' water,<sup>27</sup> so when prolonged drought struck, irrigation and agriculture were vulnerable. This put pressure on the rulers who created and controlled water resources with elaborate ceremonies and hierarchical power structures.<sup>28</sup> When the rains failed, and the rulers could no longer be counted on to provide water for the crops, the water management which had underwritten political power failed, and so, ultimately did the political power. The Akkadian demise was similar: sediment cores taken from the bottom of the gulf show that the drought coincided with the abandoning of the northernmost parts of the empire.<sup>29</sup> The agricultural north relied on rainfall as there is no evidence of irrigation<sup>30</sup> so when the drought hit the population moved further south, putting pressure on the resources of the southerly states. "Droves of immigrants would have further strained a sociopolitical system already stressed by the same drought ... until the whole system collapsed under the strain."<sup>31</sup> The climate events brought on sociopolitical strain that in these cases that was unbearable.

While the Akkadians and Mayans were, to a certain degree slaves to the climate, the decline of the Angkorian civilization is a testament to the necessity of sustainable development. Over the course of its civilization "The people of Angkor changed everything about the landscape ... it's very difficult to distinguish what is natural and what is not."<sup>32</sup> Increased infrastructure and increased populations forced the clearing of forests, bringing with it the associated ecological problems such as increased sedimentation in downstream channels.<sup>33</sup> This

<sup>27</sup> Haug et al, *Climate and the Collapse of Maya Civilization*, 1733.

<sup>28</sup> Lisa Lucero. "The Collapse of the Classic Maya: A Case for the Role of Water Control." *American Anthropologist*, 104, no. 3 (2002), 822.

<sup>29</sup> Kerr, *Sea-Floor Dust shows Drought Felled Akkadian Empire*, 325.

<sup>30</sup> Ann Gibbons, "How the Akkadian Empire was Hung Out to Dry," *Science* 261, no. 5124 (1993), 985.

<sup>31</sup> Kerr, *Sea-Floor Dust shows Drought Felled Akkadian Empire*, 325.

<sup>32</sup> Richard Stone, "The End of Angkor," *Science* 311, no. 10 March (2006), 1365.

<sup>33</sup> Matti Kummu, "The Natural Environment and Historical Water Management of Angkor, Cambodia," Department of Water Resources, Helsinki University of Technology, [http://users.tkk.fi/~mkummu/publications/kummu\\_WAC\\_WashingtonDC\\_2003.pdf](http://users.tkk.fi/~mkummu/publications/kummu_WAC_WashingtonDC_2003.pdf) (accessed May 5, 2008).

caused problems all the way down the ecological chain so when the civilization experienced a few years of erratic monsoons, it was enough to trigger the disruption and decline of this hydraulic city.<sup>34</sup>

The main lesson to be learned from these examples is that despite human ingenuity, systems still fail. It would be wise to take this into account as humanity moves into a period of increasing unpredictability in water supplies. Climate change, population pressures and environmental degradation will potentially alter rainfall patterns in dramatic ways. Natural systems will not adapt to human activities, thus human activities must adapt to natural systems.

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<sup>34</sup> For more details see: Damian Evans et al, "A Comprehensive Archaeological Map of the World's Largest Preindustrial Settlement Complex at Angkor, Cambodia," *Proceedings of the National Academy of Sciences* 104, no. 36 (2007), 14277.

## Sustainable Development

Not surprisingly, then, a major strand in the water scarcity debate is the notion of sustainable development. Throughout the 20<sup>th</sup> century there has been an increasing recognition that the degradation of natural systems is of paramount concern to humans. The environment as an important part of development was first taken up in the Stockholm Declaration of the United Nations Conference on the Human Environment from 1972, which recognized that human development is contingent on the viability of the natural world.<sup>35</sup> Eight years later, the World Conservation Strategy's publication of *Caring for the Earth: A Strategy for Sustainable Living* recognized that the planet could no longer be considered an "externality." In this document, the goal was described as:

development that is both people-centred, concentrating on improving the human condition, and conservation-based, maintaining the variety and productivity of nature. We have to stop talking about conservation and development as if they were in opposition, and recognize that they are essential parts of one indispensable process.<sup>36</sup>

It was the Brundtland report of 1985, however, which would prove to seriously galvanize the sustainable development movement.<sup>37</sup> The oft-quoted definition used in the Brundtland report is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."<sup>38</sup> Brundtland, however, does not define "development" means or what constitutes a "need," this is problematic as it leaves the term

<sup>35</sup> See Appendix A for the relevant declarations.

<sup>36</sup> IUCN, "Caring for the Earth: A Strategy for Sustainable Living," <http://coombs.anu.edu.au/~vern/caring/care-earth1.txt> (accessed July 24, 2007).

<sup>37</sup> For more on the significance of the Brundtland report see: Peter Bartelmeus, "Sustainable Development: Paradigm Or Paranoia?" *International Journal of Sustainable Development* 3, no. 4 (2000), 358.; Alan Boyle and David Freestone, eds., *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford: Oxford University Press, 1999).

<sup>38</sup> World Commission on Environment and Development and Gro Harlem Brundtland, *our Common Future*. (New York: Oxford University, 1987), 43.

ambiguous, its main drawback. To a neo-liberal economist, “sustainable development” has drastically different implications than to a radical environmentalist, yet both employ the term in their own theoretical justification.

The term sustainable development is slippery; specific enough that all can agree it should be a goal, yet vague enough to not necessitate any action. It is agreed that the way forward for humanity should be sustainable, but when brought into the realm of policy-making, it has engendered conflict and disagreement about how this sustainability should be achieved. In the mainstream “three pillars” approach, attempts are made to balance societal, environmental and economic factors, but there is disagreement over which of these issues should be given precedence and how they should interact. Economic factors often carry more weight in the triad, subsuming other, more human, factors.<sup>39</sup> It is almost universally agreed that the way forward for humanity should be sustainable, but when rendered into action it becomes an axiomatic platitude that often engenders conflict.

Alternative definitions show how differently the term can be interpreted depending on the ideological or political motivation of the body defining it. For example, Eckholm’s definition as: “economic progress that is ecologically sustainable and satisfies the essential needs of the underclass”<sup>40</sup> has a much more socially conscious bent while The U.S. government’s Center for Excellence for Sustainable Development understands the term in a more economic sense as: “a strategy by which communities seek economic development approaches that also benefit the

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<sup>39</sup> For critiques of the notions of sustainable development see: Adams, *Green Development*, 2nd Edition; Arturo Escobar, *Encountering Development* (Princeton, NJ: Princeton University Press, 1995).

<sup>40</sup> W.M. Adams, *Green Development*, 2nd Edition (London and New York: Routledge, 2001), 4.

local environment and quality of life.”<sup>41</sup> Though the defining the same term, these understandings can be seen to be in conflict. Some have argued that the term has become a used as a “discursive trick” by large multinational organizations such as the World Bank and IMF to justify their practices and push unpopular privatization agendas under the rubric of sustainability.

Sustainable Development is almost universally accepted to be a “good thing” but when the time comes to define it and move forward to policy-making under its supposed tenets, the concept becomes fractured and ultimately meaningless. Nowhere can these definitional difficulties be seen more than in debates surrounding water. In the quest for sustainability, should water be a private or public good? Which mechanisms will be most effective in maintaining its quantity and quality? Does privatizing water give incentive to conserve, if so, what are the implications of this commodification? Will technological advances be the path to sustainability? How does one differentiate between “needs” and “wants”? North Americans are profligate users of water, much of it not used out of need, but in wasteful activities.

Though the literature almost universally points to problems with the term as lacking consensus on any particular approach, it is still adopted as a policy goal by development agencies, NGOs and businesses. This includes the government of Canada. Canada has released reports on environmental sustainability, and it repeatedly says it is committed to the Brundtland ideals of sustainability.<sup>42</sup> In Environment Canada’s Sustainable Development Strategy for 2007-2009 it is noted that integration of the “three pillars” is necessary for any strategy of sustainable

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<sup>41</sup> U. S. government Center for Excellence for Sustainable Development. "Glossary." <http://www.cbc.ca/news/background/g8/glossary.html> (accessed July 25, 2007).

<sup>42</sup> Environment Canada, "Sustainability," <http://www.ec.gc.ca/default.asp?lang=En&xml=354F26A4-61A0-4359-A874-B4F135E07854> (accessed June 11, 2008).

development,<sup>43</sup> but doesn't mention how that is to be achieved. This has not escaped notice. In a 2001 report tabled in the House of Commons, the commissioner of the environment and sustainable development, Johanne Gélinas noted: "I am concerned that some departments view their sustainable development activities as a paper exercise rather than truly trying to make their activities more sustainable."<sup>44</sup> International organizations, NGOs, businesses and governments concur on the need for basic water and sanitation to be met for populations, and agree that human intervention is necessary for this, and yet nothing seems to get accomplished as year after year goes by with the same rhetoric. With no viable way to achieve sustainable development, it seems as if conflict over use of natural resources will be exacerbated as the global community uses them up at a rapid pace.

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<sup>43</sup> Environment Canada, *Environment Canada's Sustainable Development Strategy 2007–2009*. (Online) Ottawa: Her Majesty the Queen in Right of Canada, 2006. [http://www.ec.gc.ca/sd-dd\\_consult/PDF/SDS2007\\_e.pdf](http://www.ec.gc.ca/sd-dd_consult/PDF/SDS2007_e.pdf).

<sup>44</sup> Commissioner of the Environment and Sustainable Development, *Managing for Sustainable Development in Federal Departments*. (Online) Ottawa: Government of Canada, 2001. [http://www.oag-bvg.gc.ca/internet/English/med\\_mr\\_20011002\\_e\\_15426.html](http://www.oag-bvg.gc.ca/internet/English/med_mr_20011002_e_15426.html).

## **Conflict and Scarcity**

Most rivers traverse more than one country, aquifers lie under more than one territory, and lakes and other bodies of water make for political boundaries. Due to this, it is a resource which is ripe for conflict.<sup>45</sup> Water conflicts are said to be asymmetrical in nature, as the upstream state potentially has the ability to control the quality and quantity of the resource at the expense of those downstream.<sup>46</sup> They are thus often viewed as “zero sum” games where the upstream state holds the downstream state hostage.<sup>47</sup>

The potential for conflict over water is great, with approximately 260 rivers around the world running through two or more countries.<sup>48</sup> Peter Gleick, in his 2006-2007 comprehensive review of the world’s freshwater resources, *The World’s Water*, lists 166 conflicts dating from 3000 BC to 2006 in which water played a major, or instigating role.<sup>49</sup> In most cases water conflict is local in scale, between either individual users, or between the conflicting needs of communities. This was the case for Canada in 2005 in a conflict over the diversion of polluted water from Devil’s lake in North Dakota to Canadian watersheds. North Dakota wished to drain the lake to the Sheyenne River, which ultimately drains into Manitoban watersheds. The levels of the lake were getting high and had the potential to affect local residents. Canada argued that this diversion would violate the boundary waters treaty of 1909 which states that neither party can pollute water they share. After protracted debate, including an emergency session of the Canadian Parliament, North Dakota was allowed to use the Sheyenne River outlet, but with

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<sup>45</sup> Frederick Frey as quoted in: De Villiers, *Water: The Fate of our most Precious Resource*, 417.

<sup>46</sup> Helga Haftendorn, "Water and International Conflict," *Third World Quarterly* 21, no. 1 (2000), 68.

<sup>47</sup> Leif Ohlsson, "Water Conflicts and Social Resource Scarcity," *Phys. Chem. Earth (B)* 25, no. 3 (2000), 214.

<sup>48</sup> Sandra Postel, "Entering an Era of Water Scarcity: The Challenges Ahead," *Ecological Applications* 10, no. 4 (2000), 943.

<sup>49</sup> Peter H. Gleick, ed., *The World's Water 2006-2007* (Washington, DC: Island Press, 2006), 192-212.

concessions on filtration and monitoring made to Manitoba.<sup>50</sup> Relationships between the US and Canada are characterized by this kind of negotiated resolution, but they are conflicts over use nonetheless.

Conflicts between countries such as Canada and the US are characterized by negotiated settlements but violence does erupt over water, and it is usually in scarcity situations. Thomas Homer-Dixon's stark warning is that "in many cases environmental scarcity powerfully contributes to mass violence."<sup>51</sup> The most oft-quoted site of conflict or potential conflicts are the Ganges, Jordan and Nile systems. Conflict in these areas is not new. In fact, these regions have all seen conflict in the past, some for up to 4000 years.

There are 250 million people in the Nile basin who rely on its waters for food and water. This number is expected to double in the next 25 years.<sup>52</sup> In 1980, when Ethiopia mused about damming the Nile, Egyptian President Anwar Sadat noted that if Ethiopia proceeded "there will be no alternative but for us to use force."<sup>53</sup> The Ethiopians backed away from this plan in face of certain military defeat. Close by, control of the Jordan headwaters, was arguably the basis for the 1967 war in the region. After the Six Day War, and occupation of the Golan Heights, Israel claimed all the territory covering the headwaters of the Jordan River, territory previously held by Syria and Lebanon. To this day, groundwater withdrawals for Israeli irrigation and water consumption come from three aquifers, all but one under occupied territory.<sup>54</sup> Palestinians pay

<sup>50</sup> Joseph M. Flanders, "Transboundary Water Disputes on an International and State Platform: A Controversial Resolution to North Dakota's Devils Lake Dilemma," *North Dakota Law Review* 82, no. 3 (2006), 1026.

<sup>51</sup> Homer-Dixon, *Environmental Scarcity, Mass Violence and the Limits to Ingenuity*, 362.

<sup>52</sup> Ward, *Water Wars: Drought, Flood, Folly and the Politics of Thirst*, 186.

<sup>53</sup> *Ibid.*, 186.

<sup>54</sup> Miriam R. Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," *International Security* 18, no. 1 (1993), 120.

six times as much for water as the settlers in the same region<sup>55</sup> which has forced many Palestinians out of agriculture and into other sectors for work.

While the Middle East is clearly a hotbed of water conflict, it is not alone. Disputes over the Ganges River with Bangladesh are also just as seemingly intractable. These disputes have become so enmeshed with religious and cultural factors that it is impossible to disentangle one from the other.<sup>56</sup> Approximately 35 million are reliant on the Ganges water, which posed a problem when the Indians built the Farraka barrage which diverts water from Bangladesh toward the Indian city of Calcutta.<sup>57</sup> The main outcome of this has been the mass migration of Bangladeshis, primarily to India.<sup>58</sup> This, in turn caused social stress in the regions which had accepted the large number of refugees.

Even if water shortages do not lead to war outright, they certainly lead to other types of social stresses such as famine, increased poverty and the spread of infectious diseases. They uproot people from their traditional lands, into the mega-slums of the developing world. Echoed in this situation is the history of the Maya, and the Akkadians whose droughts engendered mass migrations as well. Though he does not write exclusively about water, Thomas Homer-Dixon is concerned with how scarcity leads to conflict in society and shows how even if there are no international conflicts, that domestic conflict has the potential to destabilize Western interests by

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<sup>55</sup> Ibid., 127.

<sup>56</sup> De Villiers, *Water: The Fate of our most Precious Resource*, 24.

<sup>57</sup> Aaron T. Wolf, "Conflict and Cooperation along International Waterways," *Water Policy* 1 (1998), 255.

<sup>58</sup> For more details see: Thomas F. Homer-Dixon, "Environmental Scarcities and Violent Conflict: Evidence from Cases," *International Security* 19, no. 1 (1994), 5.; Ashok Swain, "Displacing the Conflict: Environmental Destruction in Bangladesh and Ethnic Conflict in India," *Journal of Peace Research* 33, no. 2 (1996), 189.

destabilizing trade and economic relations, provoking migrations and generating complex humanitarian disasters that divert militaries and absorb huge amounts of aid. Policymakers and citizens in the West ignore these pressures at their peril.<sup>59</sup>

In North America, is it exceedingly unlikely that any conflict over water use will come to violence, the history of water conflicts shows that in cases of scarcity there is invariably human migration. Homer-Dixon has found in his research that most of those displaced by environmental factors are displaced within their own country. For example, in 2005 when the native reserve in Kasheshewan, Ontario had to be evacuated due to contaminated water, the displaced first nations could be considered environmental refugees as they were displaced to various centres around Ontario. Three years later decisions had still not been made as to whether or not the community should be relocated, and if so, where.

While the term “refugee” is well known in the context of violent regimes, or persecution of minority groups, it has been used less frequently in the context of environmental catastrophes. The first piece of literature to use the term “environmental refugee” was a 1985 book of that title by Essam El-Hinnawi for the United Nations Development Program. He wrote that “all displaced people can be described as environmental refugees, having been forced to leave their original habitat (or having left voluntarily) to protect themselves from harm and or to seek a better quality of life.”<sup>60</sup> This was not a reference to water scarcity specifically, but even before widespread acknowledgement of the effects of environmental stresses there was literature referring to environmental degradation and migration.

There is a small, but comprehensive body of work on environment, migration and displaced peoples, with Norman Myers and Astri Suhrke being the most prolific authors and

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<sup>59</sup> Thomas Homer-Dixon, "Environmental Scarcity, Mass Violence and the Limits to Ingenuity," *Current History* 85, no. 604 (1996), 359.

<sup>60</sup> Essam El-Hinnawi, *Environmental Refugees* (New York: United Nations Development Program, 1985), 4.

researchers.<sup>61</sup> A refugee is differentiated from a migrant by their involuntarism and vulnerability, thus it is argued that populations who must move due to factors such as drought, desertification or flooding must be considered refugees. The literature almost universally points to a major policy problem: the lack of recognition by international bodies of those displaced by the environment as refugees. The international community has been reluctant to create the classification of environmental refugee, despite the fact that by the best estimates some 25 million people could be considered as such (as of 2002), and that the effects of climate change could push that number to 150 million in the coming century.<sup>62</sup> While the classification of environmental refugee is not yet internationally recognized, it will not stop this migration. Canada, with its historically open immigration policies will undoubtedly see some flow of people to its borders due to environmental scarcity.

It is ironic that there is the potential for violence over water on the “blue planet.” At first glance, it seems there should be plenty of water to go around. Roughly 70% of the surface is covered in water. Best estimates suggest that there are roughly 1.4 billion km<sup>3</sup> of water on earth.<sup>63</sup> However, 97% of that water is in the oceans, and is too salty to be suitable for drinking or agriculture, unless treated by prohibitively expensive desalination techniques. Another 2% is tied up in the Arctic and Antarctic ice sheets. Further, a large percentage of the fresh water is trapped deep underground and is, at this point, technologically impossible to reach. The world’s lakes and rivers thus contain approximately 0.26% of the planet’s fresh water (which is only 3% of the total amount of Earth’s water). This usable water is also not evenly distributed throughout the world, but is instead concentrated in relatively few countries.<sup>64</sup>

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<sup>61</sup> See bibliography for suggested readings by these authors.

<sup>62</sup> Myers, *Environmental Refugees: A Growing Phenomenon of the 21st Century*, 757.

<sup>63</sup> De Villiers, *Water: The Fate of our most Precious Resource*, 27.

<sup>64</sup> Ibid., 38.

Though each person needs a roughly equal amount of water, water is not equally distributed around the globe. Brazil, Canada, Russia and China hold the lions' share of water resources, whereas countries in more arid regions such as the Middle East or Sub-Saharan Africa are almost devoid of it. Even when looking within a country, there can be localized areas of scarcity, which are obscured by the national statistics, such as the South West United States, which is an area of scarcity within a country which has the 6<sup>th</sup> largest supply of renewable water.<sup>65</sup> In Canada the same holds true. The Okanagan valley, due to high water demands placed on its resources for intensive irrigation, is in water stress.<sup>66</sup> Parts of the southern Prairie provinces do not have adequate supply to meet demand. There are a number of factors which dictate what kind of scarcity a community will experience. These are predicated on quality, quantity, access and overuse. While much of the scarcity in Middle Eastern and Sub Saharan African contexts involves either inadequate supply, or wasteful use, in other parts of the globe scarcity is not determined by quantity, it is by quality. During monsoon season in India, there is plenty of water. Its quality, however, is dubious and it is difficult to collect. It is estimated that many of China's rivers are too polluted to support fisheries, and the disappearance of the Yellow River's freshwater dolphin is merely the highest profile case of aquatic species disappearance.

In Canada there have been some major concerns regarding quality of water, such as the incidents at Walkerton, North Battleford, and the reserve at Kasheshewan. In Canada's St. Lawrence Seaway the dolphins and belugas that call it home are threatened by human activity. Canada is also actively polluting many of its lakes as well. Currently the government of Canada, under schedule 2 of the Mining Act wishes to turn 16 freshwater lakes into "tailing impoundment

<sup>65</sup> World Resources Institute, "Freshwater Resources 2005," [http://earthtrends.wri.org/pdf\\_library/data\\_tables/wat2\\_2005.pdf](http://earthtrends.wri.org/pdf_library/data_tables/wat2_2005.pdf) (accessed May 26, 2008).

<sup>66</sup> David Richard Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy* (Vancouver: UBC Press, 2003), 44.

areas”<sup>67</sup> in which, subject to the mining act, “the owner or operator of a mine may deposit or permit the deposit of waste rock or an effluent that contains *any* concentration of a deleterious substance and that is of *any* pH into a tailings impoundment area.”<sup>68</sup>

Others lack water not because they cannot access it due to structural reasons but rather they cannot afford it. Prime examples are those who are not connected to a municipal system, and thus must pay water vendors. This puts them at the mercy of the inflated prices which vendors charge: “[i]n Cairo, the poor pay vendors 40 times the real cost of delivery; in Karachi the figure is 83 times; and in parts of Haiti, 100 times, or a third of residents’ income.”<sup>69</sup> Thus the poorest are excluded from access to safe drinking water and turn to other sources, which are often polluted. In Buenos Aires, before the system was privatized, those who had no access got water from unsafe sources (such as polluted rivers and groundwater near cesspools), leading to high mortality rates, especially among children.<sup>70</sup>

The literature on water scarcity is broad and diverse. Threads range from scientific and technical literature through the humanities, policy and development literature. As with discourse on sustainable development, statements are made, and numbers measured without the recognition of how these data should, or can, be applied. Broad statements and good intentions abound but goals continue to fail to be met. Despite concerted effort the numbers of people in water stress and scarcity situations is increasing. This is significant for Canada in a number of ways. Canada is often characterized as a land with infinite water. As the aqueducts of the ancient world and huge dam projects of the modern world demonstrate, humanity will do almost

<sup>67</sup> Terry Milewsky, "Lakes Across Canada Face being Turned into Mine Dump sites." *Cbc.Ca*, Monday, June 16, 2008. <http://www.cbc.ca/canada/story/2008/06/16/condemned-lakes.html>.

<sup>68</sup> Canada. Department of Justice, *Metal Mining Effluent Regulations* (Online) Government of Canada, 2002. <http://laws.justice.gc.ca/en>ShowFullDoc/cr/SOR-2002-222//en>. (emphasis mine).

<sup>69</sup> Ward, *Water Wars: Drought, Flood, Folly and the Politics of Thirst*, 206.

<sup>70</sup> Alexander J. Loftus and David A. MacDonald, "Of Liquid Dreams: A Political Ecology of Water Privatization in Buenos Aires," *Environment & Urbanization* 13, no. 2 (2001), 179.

anything to bring water to where it is needed. Global water scarcity will thus undoubtedly affect Canada, as water scarce countries look for new ways to satisfy their water needs.

In the popular press, exaggerations of Canada's water riches are rampant. Numbers quoted claim that Canada has 20-40% of the world's fresh water.<sup>71</sup> How true is this "myth of superabundance?"<sup>72</sup> Not very, as it turns out. David Schindler, perhaps Canada's leading water scientist states bluntly that "the glib assurances of water abundance that we frequently hear from the media, politicians, and even environmental groups are lies, unsupported by meteorological or hydrological data."<sup>73</sup> In many ways, assumptions around water and its seemingly endless supply are the very things which prohibit serious discussion about water scarcity.

While Canada does have a large proportion of the world's standing fresh water, a distinction must be made between renewable and non-renewable fresh water. Renewable water is defined by the United Nations as "the average annual flow of rivers and recharge of aquifers generated from precipitation."<sup>74</sup> That is, renewable water is water that is recharged through the hydrologic cycle. Freshwater which is not considered renewable is not used in world resources calculations. If it were exploited, it could not be replaced through the hydrologic cycle. For example, the Great Lakes, Canada's largest lake system, houses some 22% of the world's fresh, surface water, but only 1% is renewed, the rest of the volume is a remnant from the glacial period.<sup>75</sup> While Canada's reputation as a land of lakes is justified (there are an estimated 2 million of them in the country, making up 7.6% of Canada's land area<sup>76</sup>) water in lakes is not

<sup>71</sup> Dan Shrubsole and Diane Draper, "On Guard for Thee? Water (Ab)Uses and Management in Canada" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 37.

<sup>72</sup> Sprague, *Great Wet North? Canada's Myth of Water Abundance*, 28.

<sup>73</sup> David Schindler, "Foreword" In *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), xiii.

<sup>74</sup> UNFAO, "Review of World Water Resources by Country," <ftp://ftp.fao.org/agl/aglw/docs/wr23e.pdf> (accessed May 25, 2008).

<sup>75</sup> Ibid.

<sup>76</sup> Environment Canada, "Freshwater Website," [www.ec.gc.ca/water](http://www.ec.gc.ca/water) (accessed May 25, 2008).

considered to be renewable, and therefore not considered part of Canada's supply of water. Exploitation of this water would be unsustainable. So while according to Environment Canada, Canada's lakes do contain about 20% of the global volume of lake water, it is not a benchmark from which to build policy or trade.

When non-renewable water is removed from the equation, Canada has 6.5% of the globe's fresh water.<sup>77</sup> This places Canada tied for third with Indonesia, with the US and China coming an extremely close 4<sup>th</sup> with 6.4% respectively.<sup>78</sup> So, in theory, Canadians have access to essentially the same amount of water as the US. However, further complicating supply is the accessibility of this renewable freshwater. Most of Canada's watersheds drain north to the Arctic Ocean, away from where the population lies. Barring any major hydrological schemes to reverse the flow of these rivers, this water is inaccessible for use. Therefore all the renewable fresh water in Canada which is accessible to the population, (the majority of whom live within 300kms of the US-Canada border), is 2.5% of the world's supply.<sup>79</sup> With Brazil at 12.4%, the Russian Federation at 10%, Indonesia at 6.5% and, the US at 6.4%, Canada drops from third in the world to 8<sup>th</sup> behind Colombia, Peru and India.<sup>80</sup> For exploitation purposes, Canadians have access to approximately one third of the amount of the "thirsty neighbour" to the south. This "myth of superabundance" has been responsible for Canada's inaction on all things water.

While no one would argue that Canada is nationally water-poor - 2.5% of the global freshwater renewable resources is still a large amount - Canadians use the second most water per capita, behind the US. For personal use, Canadians use, on average 433 litres of water per day.<sup>81</sup>

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<sup>77</sup> Environment Canada, "Freshwater Website". ; UNFAO, *Review of World Water Resources by Country*.

<sup>78</sup> World Resources Institute, *Freshwater Resources 2005*.

<sup>79</sup> John B. Sprague, "Great Wet North? Canada's Myth of Water Abundance" In *Eau Canada*, ed. Karen Bakker (Vancouver, BC: UBC Press, 2007), 28.

<sup>80</sup> World Resources Institute, "Freshwater Resources 2005".

<sup>81</sup> Natural Resources Canada, "Water Consumption".

This compares to Israel at 135 and Sweden at roughly 200.<sup>82</sup> The amount of water used by individual households is merely a drop in the proverbial bucket when it is compared with water use by other sectors of Canadian society. Most of Canada's renewable water is not used by municipal water services, nor is it used by agriculture. The primary user of Canadian water is hydroelectric engineering projects. They account for 63% of water withdrawals.<sup>83</sup> While hydroelectric power may seem to be the perfect renewable energy source, it neither pollutes nor removes water from the system, it is far from that. Hydroelectric power stations have an impact on the surrounding environment. The reservoirs created by these dams "increase evaporation, raise temperatures downstream, trap silt and nutrients and may release a toxic form of mercury, rendering fish unsuitable for human consumption."<sup>84</sup> When all water withdrawals are taken into account, each Canadian uses a staggering 4,400 litres of water *a day*.<sup>85</sup>

Canadians excessive use of water is due in many cases to the history of water rights in the country. Many water scholars point out that policies historically *encouraged* water use. In many parts of the Canada (especially the west) the doctrine of "prior appropriation," or "first in time, first in right" is the basis for law and policy. This is a situation where the first person to find and use the water had rights to it, and did not have to consider riparians downstream. Other rights are based on the "use it or lose it" principle where one had rights to water, so long as they could use it all. Once you could not use the water, the rights were reallocated. In contrast, central Canada's water rights are based on the old English riparian system which accords rights to all users along a river or body of water and Quebec is based on a seigniorial rights system. In the North water rights are based on statute. None of these systems developed with conservation or scarcity issues

<sup>82</sup> UNFAO, "Review of World Water Resources by Country".

<sup>83</sup> Natural Resources Canada, "Water Consumption".

<sup>84</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 45

<sup>85</sup> Shrubsole and Draper, *On Guard for Thee? Water (Ab)Uses and Management in Canada*, 40.

in mind. In terms of making a comprehensive national policy, it is difficult as there is not one set of water rights which govern the country's water.<sup>86</sup> With jurisdiction for water management largely being the provinces domain, it is easy to see how these very different approaches to water can lead to difficulty in designing a cohesive federal policy. Even where there is consensus on rights, they are not necessarily used in the best interest of Canadians. Often companies take advantage of the water rights systems to extract *more* water out of a watershed. The only place where there is some agreement is over bulk water exports. All provinces except New Brunswick have laws, regulations or policies to prohibit export<sup>87</sup> but whether or not this domestic legislation would stand up to a challenge under NAFTA is unclear.

These systems of rights lack conservation incentives. These rights developed well before the governments were committed to the notion of sustainability. With policies built around these rights, it is no wonder that a lack of incentive to conserve has lead to overexploitation and unsustainable use of the resource. These rights systems encourage excess and are based on a supply-side model of water management. This model is coming under increasing scrutiny as water supplies become increasingly stressed, especially in western Canada, and to a more drastic degree throughout the world. Canada for its part is woefully unprepared for the pressures it will face.

Since the first major global conference dedicated to water at Mar del Plata, Argentina in 1977 Canada has been working with the international community on water scarcity issues. Mar del Plata was organized by the United Nations and its goal was to highlight the growing water crisis around the world. This was followed by the UN declaring the 1980s the "International

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<sup>86</sup> Ibid., 47.

<sup>87</sup> Karen Bakker, "Appendix 1: A Survey of Water Governance Legislation and Policies" In *Eau Canada: The Future of Canada's Water*, ed. Karen Bakker UBC Press, 2007), 384.

Drinking Water Supply and Sanitation Decade” and the creation of the World Water Council (WWC) and Global Water Partnership (GWP). There are biennial meetings held by the UN (the next one scheduled for 2009 in Istanbul) to discuss water issues. World water forums are held (the first in Marrakech Morocco in 1997, followed by the Hague in 2000, Kyoto in 2003 and Mexico City, 2006.<sup>88</sup> The 1992 Dublin conference made groundbreaking reference to water as not just a social good, but proclaimed it a commodity. 2003 was declared the year of freshwater by the UN.

In 1990, Malin Falkenmark suggested that, at the time, the best estimates available predicted that by the year 2025 1.1 billion people would be living in conditions with severe water scarcity.<sup>89</sup> Ten years later, Sandra Postel noted that the number of people who are predicted to be in water stress by 2025 had increased to 3 billion.<sup>90</sup> By 2007, Nadir Ajam notes that “the number of people affected by water scarcity is projected to increase from 1.7 billion today to 5 billion by 2025.”<sup>91</sup> These leaps seem to indicate that the current methods of dealing with water scarcity are not as effective as they should be in order to alleviate scarcity conditions globally. There are myriad debates surrounding how to frame scarcity, as well as policy options and technical solutions to mitigate it, it is agreed that, at its root, water scarcity is a problem of population’s pressure on resources.<sup>92</sup> It is usually determined by “dividing the amount of annually available renewable water by UN population figures from standard sources.”<sup>93</sup> Peter Gleick recommends that an international standard be applied which states that 50 litres per person per day (l/p/d) is

<sup>88</sup> Gleick, *The World's Water 2006-2007*, 183.

<sup>89</sup> Falkenmark, *Rapid Population Growth and Water Scarcity: The Predicament of Tomorrow's Africa*, 85.

<sup>90</sup> Postel, *Entering an Era of Water Scarcity: The Challenges Ahead*, 942.

<sup>91</sup> Najam, *Environment and Globalization: Five Propositions*, 19.

<sup>92</sup> There has been much literature on this topic, much of which stems from the “Limits to growth” argument which posits that there cannot be infinite population growth on a finite planet. With respect to water, see: Charles Vorosmarty et al, “Global Water Resources: Vulnerability from Climate Change and Population Growth,” *Science* 289 (2000), 284.

<sup>93</sup> Ohlsson, *Water Conflicts and Social Resource Scarcity*, 219.

the minimum that individuals should have access to, irrespective of their social, economic or political status.<sup>94</sup> This measure of 50 l/p/d has been generally accepted in the literature as a goal to work towards. Considering that in Canada, the average person uses approximately 430 l/p/d for personal use, 50 l/p/d seems a modest amount.

Developed countries such as Canada and the US use proportionally many times more resources than those in developing nations. China and India are developing rapidly and expect a living standard similar to that of the west. The effect of these populations industrializing to meet global economic growth projections is an exponential increase in water use. This increases both the reliance on irrigation to feed the booming population, as well as the pollution which follows development. This scarcity crisis is especially visible in the developing world where the population is expected to quadruple by the end of the next century.<sup>95</sup> These two factors together put enormous pressures on the scarce water available. This can be seen the American South West, as well as increasingly in the Canadian Prairie provinces. While the global population doubled between 1950 and 2004, water use tripled.<sup>96</sup> That rate of growth, coupled with the fact that much population growth is occurring in already arid regions, is simply unsustainable.

Ecological degradation and irrigation issues are also contributing to this growing scarcity: the outcome of making a river toxic from industrial pollution or sewage effluents, or diverting it such that it no longer runs to populations which depend on it, all lead to the same result of societies having no access to usable water. Major technological achievements in irrigation and dam-building have come up against environmental limits, especially in the developed world.

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<sup>94</sup> Gleick, *Basic Water Requirements for Human Activities: Meeting Basic Needs*, 83.

<sup>95</sup> Falkenmark, *Rapid Population Growth and Water Scarcity: The Predicament of Tomorrow's Africa*, 81.

<sup>96</sup> Adil Najam, "Environment and Globalization: Five Propositions," *International Institute for Sustainable Development* (2007), 21.

Pollution-driven scarcity is the kind which Canada is likely to face. The country has a large volume of water, but the economy also relies heavily on industry. The water pollution associated with the tar sands project is merely one example. It has produced several toxic lakes which invariably leech chemicals into the watershed and out into the environment at large. The largest dam in Canada (and, in fact, the world) is the Syncrude dam near Fort Mc Murray in Alberta. It is used to contain the toxic tailings from the oil sands project. Inevitably some toxins leak into the watershed. Nearby to the Syncrude dam is a river that feeds into Mackenzie watershed, the largest one in the country.

The Great Lakes Basin, the largest concentration of fresh water lakes in the world, has 22% of the world's available fresh water, but is under a tremendous amount of stress. 40 million people depend on it, (30% of Canada's population and 10% of the US) as well it supports major industrial centres on its shores. 50% of Canadian manufacturing depends on the lakes, and 25% of Canadian agriculture.<sup>97</sup>

The 2005 "Fourth Interim Report of the Standing Senate Committee on Energy, the Environment and Natural Resources" report on the state of Canada's water, (specifically in the western provinces), outlined the "shocking" state of both knowledge of, and policies around water in Canada. It noted that something must be done now, and that "failure to respond will jeopardize life as we know it."<sup>98</sup> It underscores the blindness with which the government is forging ahead. With little to no knowledge of what the environmental impacts of current behaviours will be, it is unclear what the policy responses should be. The report notes that human

<sup>97</sup> Environment Canada, "Great Lakes Overview," <http://www.on.ec.gc.ca/greatlakes/default.asp?lang=En&n=FC147FA0-1> (accessed July 2, 2008).

<sup>98</sup> Canada. Senate. Fourth Interim Report of the Standing Senate Committee on Energy, the Environment and Natural Resources. *Water in the West: Under Pressure*, (Online) 2005, <http://www.parl.gc.ca/38/1/parlbus/commbus/senate/com-e/enrg-e/rep-e/rep13nov05-e.pdf>, 5.

activity is destroying ecologically sensitive areas (particularly wetlands) and Canadians are “gambling” with their most precious resource.<sup>99</sup>

Though it might be shocking to the average Canadian that there is such a lack of knowledge of water resources, experts have long been reporting this fact.<sup>100</sup> The extent of groundwater is not known, all aquifers in the country have not been mapped and “no figures exist to show exactly how freshwater species depend on groundwater or how to calculate the amount of groundwater that can be pumped out of a spring before affecting the health of the river to which it is linked.”<sup>101</sup> This ignorance is detrimental to the ability to manage water systems sustainably. Thus the Senate Committee called for immediate funding for water research, including having all aquifers in Canada mapped by the year 2010. As of 2007, according to National Resources Canada, only 9 of 30 aquifers had been mapped, with 3 more in progress, leaving data on 18 unknown.<sup>102</sup>

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<sup>99</sup> Ibid., 7.

<sup>100</sup> See warnings from: Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy* and Linda Nowlan, "Out of Sight, Out of Mind? Taking Canada's Groundwater for Granted" In *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 55.

<sup>101</sup> Ibid., 56.

<sup>102</sup> Natural Resources Canada, “Groundwater Mapping Program”.

## Canadian Water Governance

While surprising that there is such a large knowledge gap in this area, there has been much ink spilled as to the reasons which underlie the poor ecological governance track record of the government of Canada.<sup>103</sup> Canada's environmental policy, and specifically its water policy are woefully inadequate:

Canada has a moth-eaten patchwork quilt of voluntary national guidelines, inconsistent provincial standards, and crumbling municipal infrastructure that, in some cases, fails to adequately reduce the risks of acute and chronic waterborne disease.”<sup>104</sup>

While there are mechanisms in place to punish polluters, these are generally voluntary and are rarely used. Reports are issued which underline the critical state of Canada's water, especially in the western provinces, yet bills die on the order paper, as with the Senate's 2001 bill which proposed that water be added to the *Food and Drugs Act*, and thus regulated by the federal government. Bill C-156 which would have essentially prohibited all bulk water transfers or interbasin transfers as well as restricting smaller scale ones also died.<sup>105</sup>

In her anthology of papers on Canadian water policy, Karen Bakker makes the argument that weak governance is at the heart of water problems, and that this weak governance is not challenged due to the cultural perceptions which Canadians hold: the myth of superabundance. Water policy experts agree that the myth of superabundance has caused water to be used often in the most inefficient ways, and most suggest following the example of countries such as Sweden and moving from supply-based toward a demand-based approach to management of the resource.

<sup>103</sup> There are a number of texts which deal specifically with the jurisdictional fragmentation of Canadian environmental policy such as: Kathryn Harrison, *Passing the Buck: Federalism and Canadian Environmental Policy* (Vancouver: UBC Press, 1996). and Rob De Loe and Reid Kreutzer, "Challenging the Status Quo: The Evolution of Water Governance in Canada".

<sup>104</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 27.

<sup>105</sup> Canada. Depository Services Program. “Water Exports and the NAFTA” by David Johansen. (Online) Ottawa: Government of Canada, 1999. <http://dsp-psd.tpsgc.gc.ca/Collection-R/LoPBdP/EB/prb995-e.htm>.

David Boyd notes in his book *Unnatural Law* that Canada and Sweden are two countries which have a comparable amount of water per capita, yet Sweden's per capita consumption is half that of Canada's per capita consumption and notes that "environmental law and policy appears to be the primary determinant of the difference in performance between the two nations."<sup>106</sup> Sweden has a strong national policy governing water and Canada does not.

How the system became such a "patchwork" of legislation dates back to the beginning of water governance in Canada. With water resources (or the environment, for that matter) not being explicitly mentioned in the 1867 British North America Act, it left jurisdiction to be determined depending on the ways in which water is used in relation to other jurisdictions, such as fisheries, municipal treatment, foreign affairs or trade and international relations.<sup>107</sup>

Whether coming from academics such as Bakker, Boyd, Harrison or Schneider or government reports such as the Senate report<sup>108</sup> or Francois Cote's overview of Freshwater management in Canada,<sup>109</sup> there is agreement that one of the major problems of water governance in Canada is the fragmentation of responsibility between the federal, provincial/territorial and municipal level. The literature around Canadian water policy almost universally points to the jurisdictional problems of having three levels of government involved in managing one resource, and the lack of strong federal policy to oversee the resources as well as the lack of strong, independent watchdogs to enforce any regulations that might exist. Natural Resources Canada notes in a report on freshwater that "significant potential exists in Canada for

<sup>106</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 301.

<sup>107</sup> Canada. Library of Parliament. Research Branch. *Freshwater Management in Canada: I. Jurisdiction* by Francois Cote. (Ottawa: Science and Technology Division, 2004a), 13.

<sup>108</sup> Canada, *Water in the West: Under Pressure*.

<sup>109</sup> Canada, *Freshwater Management in Canada: I. Jurisdiction*, 2004a. Canada. Library of Parliament. Research Branch. *Freshwater Management in Canada: IV. Groundwater* by Francois Cote. (Ottawa: Science and Technology Division, 2006).; Canada. Library of Parliament. Research Branch. *Freshwater Management in Canada: III. Issues and Challenges* by Francois Cote. (Ottawa: Science and Technology Division, 2005).; Canada. Library of Parliament. Research Branch. *Freshwater Management in Canada: II. Resources, use and Treatment*. by Francois Cote. (Ottawa: Science and Technology Division, 2004b.).

conflict between competing users of water”<sup>110</sup> not the least of which is conflict between levels of government. Water is a resource, and ostensibly in Canada resources are governed provincially. However the federal government has jurisdiction insofar as water crosses provincial jurisdictions, and in the more obvious cases of fisheries, navigation, shipping and trade. Saunders and Wenig go so far as to suggest that “virtually all water could be argued to possess an extraprovincial character because of the regional or global nature of the resource.”<sup>111</sup>

Twenty federal departments have, in some form, something to do with managing water resources. From the Canada Mortgage and Housing Corporation to Health Canada to Foreign Affairs, the federal government undoubtedly has jurisdiction over water at times. However, in the end, it is the provinces which “own” the water. This provides a stumbling block for the creation of a comprehensive national strategy on water. Kathryn Harrison notes that it needn’t be so, and that “constitutional uncertainty persists primarily because the federal government has taken a narrow view of its own powers.”<sup>112</sup> This sentiment is echoed in Boyd, Bakker and Schindler’s works. Shared federal-provincial responsibilities include agriculture, health, interprovincial water issues and significant national water issues.

Though there is no federal legislation which has been successful at managing Canadian water, there are several acts, which have influenced water policy in the country. These include the Canadian Environmental Protection Act (CEPA) of 1999, the Fisheries Act of 1970, and the 1970 Canada Water Act. These give the government powers, should they choose to use them. The Canada Water Act of 1970, ironically is perhaps the weakest of the three. It outlines the ways in which the federal and provincial governments could work together. The Canada Water

<sup>110</sup> Natural Resources Canada. *Freshwater: The Role and Contribution of Natural Resources Canada*. (Ottawa: Natural Resources Canada, 2005), 27.

<sup>111</sup> J. Owen Saunders and Michael M. Wenig, “Whose Water? Canadian Water Management and the Challenges of Jurisdictional Fragmentation” In *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 120.

<sup>112</sup> Harrison, *Passing the Buck: Federalism and Canadian Environmental Policy*, 54.

Act does not provide any agency with the authority to enforce legislation. It merely authorizes the federal government to engage in committees with the provinces in water management issues,<sup>113</sup> however it “neglected to consider whether the provinces would be on-side”<sup>114</sup> so in the end, only the section on phosphate regulation was implemented, due to provincial resistance.

Unlike the Canada Water Act, the Fisheries Act actually has the power to create and enforce legislation regarding watersheds. Although its mandate is not necessarily water management, it is actually the most powerful of the three pieces of legislation. It has far reaching powers to protect both fish, and the habitat in which fish are found. Because fisheries are a national responsibility the legislation has the teeth to enforce laws which protect fish and their habitats. Not only does it prohibits “‘deleterious substances’ from entering waters frequented by fish”<sup>115</sup> but also prohibits their habitats from being destroyed by industrial effluents and agricultural runoff.<sup>116</sup> This is a powerful watershed management tool. The Minister of Fisheries and Oceans is required to table an annual report with information on enforcement activities. In the 2002-2003 report there was a “national total of over 3,900 inspections, 88 investigations, 19 prosecutions, and 4 convictions”<sup>117</sup> Many successful water policy initiatives are enforced through the Fisheries Act.

The third of the major piece of federal legislation which concerns water is the Canadian Environmental Protection Act (CEPA). Its passing (in 1999) significantly strengthened the federal government’s role in water management. It has the potential to have broad sweeping powers to protect the environment from pollutants. When it came into force (in 2000) it was

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<sup>113</sup> “Canada Water Act”. R.S., c. 5(1st Supp.), s. 1. (Online) (Ottawa: Department of Justice Canada, 1985), [http://laws.justice.gc.ca/en>ShowDoc/cs/C-11/bo-ga:s\\_1::bo-ga:s\\_2//en?page=1&isprinting=true](http://laws.justice.gc.ca/en>ShowDoc/cs/C-11/bo-ga:s_1::bo-ga:s_2//en?page=1&isprinting=true).

<sup>114</sup> Bakker, Appendix 1: A Survey of Water Governance Legislation and Policies, 374.

<sup>115</sup> Ibid., 374.

<sup>116</sup> Canada, Freshwater Management in Canada: I. Jurisdiction, 4.

<sup>117</sup> Ibid.

highly significant as it represented the re-emergence of the federal government into policy areas from which it had retreated at the provinces' behest.<sup>118</sup> There are legal ramifications if the Act is broken. It is intended to include progressive principles such as ecosystem and watershed managements as well as implementing forward thinking policies such as the precautionary principle in addition to not only pollution mitigation, but also prevention.<sup>119</sup> It has the power to regulate designated toxic substances from cradle to grave and once a substance is designated toxic "CEPA places a legal duty on the federal government to design control measure within two years and implement those measure within another eighteen months."<sup>120</sup> However CEPA is impaired by the fact that out of thousands of toxic chemicals that are known to scientists, only 52 substances were designated when CEPA was implemented. Since then the government has retreated and instead of regulating all substances found to be toxic it is now "promising only to develop 'action plans', which may rely on voluntary, non-regulatory approaches."<sup>121</sup> Given how unsuccessful voluntary approaches have been, this significantly reduces its potential powers to protect watersheds and ecosystems.

The Federal Water Policy of 1987 had lofty goals. The two goals outlined in the policy were to "protect and enhance the quality of the water resource" and "to promote the wise and efficient management and use of water."<sup>122</sup> It advocated the "polluter pays" principle and fair pricing. It had 25 specific policy statements regarding everything from drinking water to pollution issues, to transboundary water issues. It was a forward-thinking document. Unfortunatley, despite the grand rhetoric, the majority of its recommendations were never

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<sup>118</sup> Harrison, *Passing the Buck: Federalism and Canadian Environmental Policy*, 116.

<sup>119</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 39.

<sup>120</sup> *Ibid.*, 39.

<sup>121</sup> Harrison, *Passing the Buck: Federalism and Canadian Environmental Policy*, 156.

<sup>122</sup> Environment Canada. *Federal Water Policy* (Online) Ottawa: Her Majesty the Queen in Right of Canada, 1987. <http://www.ec.gc.ca/Water/en/info/pubs/fedpol/Eng.pdf>, 3.

implemented.<sup>123</sup> Twenty-one years later the federal government is still issuing documents which give the same warnings and note the same problems in Canadian water legislation, underscoring the lack of movement in water management in the country.

The failure of the Federal Water Policy statement and the Canada Water Act, in contrast with the relative success of the Fisheries Act shows that for legislation to be successful at mitigating and preventing pollution that there must be attached mandatory measures to reduce harm to the environment. The polluting industries cannot be left to policy themselves, as voluntary measures to reduce harm have proven ineffective. Even legislation with “teeth” offers no guarantee of its success. Binding federal regulations, where they do exist, often do not use their powers to stop practices, or to inhibit economic development. The federal government usually upholds the status quo, if it gets involved at all.

There are many ... examples of problematic discretion at the federal level. Under the *Canadian Environmental Assessment Act*, the federal government retains the discretion to approve a project even when experts determine that the project will have “significant adverse environmental effects.” Over 99.9 percent of projects subject to federal environmental assessment are approved<sup>124</sup>

This discretionary nature is a clear weakness as industrial and agricultural groups often have much stronger lobbies in Ottawa than environmental groups. Also problematic is the lack of transparency in the process. Much of the data on enforcement is not available to the public.<sup>125</sup> At the provincial level the same sort of hands-off approach can be seen, so while the provinces might have the power to protect drinking water, for example, they are not required to do so and generally do not.<sup>126</sup>

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<sup>123</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 15

<sup>124</sup> Ibid., 232.

<sup>125</sup> Bakker, *Appendix I: A Survey of Water Governance Legislation and Policies*, 387.

<sup>126</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 232.

This is at its root a cultural issue. Kathryn Harrison in her book *Passing the Buck* notes that “[e]nvironmental protection typically involves diffuse benefits and concentrated costs, and thus offers few political benefits but significant political costs.”<sup>127</sup> This argument is reminiscent of the tragedy of the commons argument, authored by Garret Hardin<sup>128</sup> where benefits are gained by individuals with the costs being outsourced to “externalities” such as the environment. It is to the advantage of individuals to maximize their productivity at the expense of the environment. The personal benefits strongly outweigh the costs, which are diffused through the system, thus there is no incentive to conserve.

Over the last 20 years, and even with the passing of important bills such as CEPA and despite the grand rhetoric of the Water Act of 1987, the federal government has declined to use its potential powers over water, allowing the provinces to establish policies on everything from trade to urban water services. Though the provinces would most certainly resist more involvement of the federal government in water affairs, it is becoming increasingly necessary. Federal issues such as trade, security, climate change and other environmental considerations are becoming the hinges around which water policy is determined. Another roadblock is the current culture of “small” government and the resistance to regulation. Discussions of more laws and regulations, as well as consolidation of federal government power are not possible within the current political climate. There is increasing antagonism between Ottawa and the provinces, especially over environmental issues such as the tar sands, offshore oil drilling and climate change initiatives, making implementation of stronger federal water regulations all but impossible.

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<sup>127</sup> Harrison, *Passing the Buck: Federalism and Canadian Environmental Policy*, 5.

<sup>128</sup> Garrett Hardin, "Tragedy of the Commons," *Science* 162, no. 3859 (1968), 1243.

To add another layer of legislation on to the already fragmented Canadian water management landscape are Canada's international obligations. In most cases this means the United States. For over a century, there has been little conflict over transboundary waters between the two countries, especially considering how many watersheds, river systems and lakes are shared by the two nations. This is, in large effect due to the oldest piece of water legislation in Canada: the *Boundary Waters Treaty* of 1909. It outlines the ways in which water is to be shared between the US and Canada and has been effective in preventing any major conflict between the two governments. The most obvious example of transboundary water, the Great Lakes Basin and St. Lawrence Seaway, has its own International Joint Commission (IJC) to mediate and regulate uses of the system.

The IJC enforces the Great Lakes Water Quality Agreement (GLWQA) of 1972 which is an agreement between the riparian states and provinces of the great lakes. They mediate between scientists, policy experts, and the various levels of both US and Canadian governments. They have to date been very effective in preventing any disputes between the two countries over this incredibly important watershed.<sup>129</sup> As with all water management, things are more complex than they seem. Since the IJC involves provincial and state authorities, any agreement into which they enter is not necessarily federally binding, which, in the case of United States (and their differing water rights with much more federal power) is problematic for initiating any change.

A spectre which has the potential to disrupt the generally good water relations which Canada shares with the United States is that of bulk water exports. The vast majority of the Canadian population is opposed to bulk water exports. Public opinion has not shifted in the last

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<sup>129</sup> Canada, *Freshwater Management in Canada: I. Jurisdiction*, 10.

30 years on this matter.<sup>130</sup> If they do occur, the likely mechanism is by interbasin water transfers, rerouting Canadian water into American watersheds. In previous decades diversions were argued against due primarily to economic and social reasons, but as environmental consciousness began to be raised through the 1980s and 1990s, these large projects became ecologically untenable. It now seems unlikely that anyone will try to revive large-scale diversions which were in vogue in the 1960s and 1970s. However talk of bulk transfers is never far from the surface, and will be explored in further detail below.

The question remains, however, if there is general consensus among policy makers, academics and economists, why have there been no effective water policy decisions made in Canada in over twenty years? Most scholars suggest that the dichotomy between the popular conception of water and the reality of water supply in Canada is a major barrier to moving forward with comprehensive, forward thinking policy. Most scholars suggest changing this conception is the first step in implementing progressive policies.

As already noted, perhaps the most contentious issue around water is how to treat it. It is essential for life, yet can be a tradable good. Many scholars, from many different fields have written on the essential paradox of this situation. Whatever the ideological commitments that people have towards water there remains the fact that water is scarce around the globe, and for centuries humanity has been trying to solve these water crises through a variety of means, some more successful than others.

Current solutions to water scarcity tend towards large-scale engineering solutions, such as dams, the mass mining of underground aquifers and irrigation systems. The theories that underlie

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<sup>130</sup> Tony Clarke, *Turning on Canada's Tap? Why we Need a Pan-Canadian Policy and Strategy Now on Bulk Water Exports to the U.S.* (Ottawa: The Polaris Institute, April, 2008), 21.

these efforts are technologically deterministic. Very rarely are environmental costs considered, they have been considered externalities to the equation. When the problem is conceived of as simply a supply issue, that is, how to get X water to X city, ecological implications are not considered. Market mechanisms guide these principles, usually through privatization of services. While North American mega-dam building has all but ceased, projects continue unabated in China, India and Pakistan. Increasing environmental awareness has caused the World Bank to stop financing such large projects, but in cases where World Bank funding is not used, (such as the Three Gorges Dam in China) the building continues unabated.

Large-scale damming is at best a marginal and short-term solution to water scarcity. The dams at Aswan in Egypt and the Three Gorges Dam in China are prime examples. At Aswan, the initial building of the dam resulted in the displacement of 90,000 people. Though it did protect against flooding, Aswan also traps silt in the reservoir, constantly lowering the holding capacity of the reservoir, Lake Nasser. The silt that should have been allowed to travel back up the river, providing fertile soil in which Nile farmers could plant their crops, has resulted instead in increased salinity of soil in the region. Ecologically it has added to increased salination of the Mediterranean and has done significant damage to the Nile delta.<sup>131</sup> The Three Gorges Dam, the largest hydroelectric dam in the world will also provide stability, in the form of reliable energy and protection against flooding, but it, too has been a humanitarian and ecological disaster. Millions of people have been displaced or killed, but the social impacts of the dam are, generally speaking ignored.<sup>132</sup> In addition to the human cost, the ecological cost has been severe<sup>133</sup> In the

<sup>131</sup> De Villiers, *Water: The Fate of our most Precious Resource*, 124.

<sup>132</sup> Li Heming, Paul Waley and Phil Rees, "Reservoir Resettlement in China: Past Experience and the Three Gorges Dam," *The Geographical Journal* 167, no. 3 (2001), 196.

<sup>133</sup> Elizabeth Economy C, "The Great Leap Backward?" *Foreign Affairs*, September/October, 2007, (accessed August 27, 2007).

United States, the country that pioneered the building of large dams, the government has recommended the removal of several dams, as they have determined that the ecological costs outweigh any benefits.<sup>134</sup>

Though there is no complete list of Canadian dams, the Canadian Dam Association notes that there are 849 large (over 10m) dams in Canada and the total number of dams in the country is somewhere around 10,000.<sup>135</sup> This is staggering for a population of only 30 million. Canada contains 10 of the world's largest 40 dams,<sup>136</sup> and though most are used to produce hydroelectricity, some are used for water supply, especially in the Prairie provinces. Environment Canada notes that the construction of dams has many ecological side effects, including barriers to movement of nutrients, alteration of downstream sediment movement, resulting in the modification of biogeochemical cycles. They also note that dams compromise aquatic and riparian habitat.<sup>137</sup> This data doesn't include dams such as the Syncrude dam which house industrial effluents, or tailings, which would add another 84 (large) dams to the list, dams which are arguably more environmentally damaging due to associated pollution.

In addition to the cost on human lives, the ecological and economy, no dam is permanent. Depending on the amount of silt each accumulates over time, and they all accumulate silt, each dam has an inevitable shelf life; it is merely a matter of time for each specific project. In fact, "a true cost accounting of dams almost always shows the bottom line in red."<sup>138</sup> Dams are also equally difficult when it comes to political consequences. Unless the water source stays within one country (such as with the Three Gorges), a damming project will effect riparian states

<sup>134</sup> Postel, *Entering an Era of Water Scarcity: The Challenges Ahead*, 944.

<sup>135</sup> Environment Canada, *Water Availability in Canada*. NWRI Scientific Assessment Report Series No. 3 and ACSD Science Assessmet Series No. 1. (Burlington: National Water Research Institute, 2004), 9.

<sup>136</sup> Ibid., 9.

<sup>137</sup> Ibid., 9.

<sup>138</sup> De Villiers, *Water: The Fate of our most Precious Resource*, 139.

downstream. The prime example of this is the Colorado River in the Southwestern United States, which, by the time it reaches Mexico, is a mere drainage tube. This causes bilateral difficulties between the US and Mexico.

Another technological fix used throughout the world is the mining of aquifers (massive underground lakes where a large percentage of the world's fresh water lies). Much of it is too deep to presently access, but the water that is presently accessible is being tapped at an unsustainable rate. The Ogallala aquifer in the Southwestern United States is being replenished at the rate of 6 to 8 km<sup>3</sup>/yr however, it is being depleted at the rate of 22.2 km<sup>3</sup>/yr to fill the swimming pools of Los Angeles and to light the strip of Las Vegas. In Saudi Arabia, the Saq aquifer is being replenished at 0.3 km<sup>3</sup>/yr while it is being mined at 1.43km<sup>3</sup>/yr.<sup>139</sup> In Canada data on aquifers is incomplete, and this lack of knowledge has been highlighted in senate reports and academic journals. To mine Canadian aquifers without knowing about their size, watershed and ecology is a patently unsustainable and unwise decision.

Scientists are only beginning to understand the implication of mining aquifers, but one of the impacts is ground collapse; it is estimated that Mexico has dropped 15 meters in some places due to aquifer mining. The Central Valley in California, for its part, has "subsided 10 meters in fifty years."<sup>140</sup> In addition to that, industrial waste seeps into the ground, polluting aquifers. In Israel overexploitation of the regions aquifers has lead to a leaching of sea water, increasing their salinity and making them unsuitable for use.<sup>141</sup> When an aquifer is discovered, as with the one recently found in the Sudan, it is quickly tapped and the water is brought to the surface for use in

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<sup>139</sup> Gleick, *Water in Crisis: Paths to Sustainable Water use*, 577.

<sup>140</sup> De Villiers, *Water: The Fate of our most Precious Resource*, 192.

<sup>141</sup> Lowi, *Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water*, 132.

irrigation and consumption. Very little attention is paid to the consequences of these actions, or to the fact that it will one day run out.

Irrigation, the driver of many of these large projects is the single biggest drain on the world's water supply. Most water-scarce countries use approximately 70% of their fresh water in irrigation projects. This is not necessarily wasted water as such, since irrigated land is very productive. (While 15% of the world's cultivated land is irrigated, irrigated land does account for almost 40% of the global harvest.<sup>142</sup>) Irrigation is the most water-intense activity on this planet, and with populations expanding in parts of the globe without access to fresh water, new ways of bringing water to these nations will have to be developed (the American Southwest and Sub Saharan Africa being prime examples). Though there is not widespread irrigation in Canada, talk of the South West US running out of water raises discussions of bulk water exports, and raises concerns. The other problem with irrigation is that it inevitably leads to rising salinity in the soil. Eventually, irrigated pastures will become unusable because the level of salt in the soil cannot sustain crop-growing; therefore, those who farmed that land will be forced elsewhere, turning them into environmental refugees.

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<sup>142</sup> De Villiers, *Water: The Fate of our most Precious Resource*, 155.

## **Commodification and Privatization**

With large infrastructural projects going out of favour, another solution to water is a market one. This approach allows the buying and selling of water, under the supposition that “[w]hen the price of water reflects its true cost, the resource will be put to its most valuable uses.”<sup>143</sup> In 1992 the International Conference on Water and the Environment (ICWE) was held in Dublin, Ireland. It was attended by over 500 participants from over 100 countries with over 80 international governmental organizations and NGOs. Resulting from the gathering was the “Dublin Statement on Water and Sustainable Development” consisting of four principles. These principles were then presented by the experts to the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992.<sup>144</sup> Principle Number Four was the most contentious, and has largely overshadowed the other three principles coming from the conference. It stated that water should be treated as an economic good. The details of the principle read:

... it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.<sup>145</sup>

By 2008, it has largely been accepted that water is be managed as an economic good, but there are many people who object vehemently to both the ideological implications and practical ways in which this is to be achieved.

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<sup>143</sup> Rogers, de Silvab and Bhatia, *Water is an Economic Good: How to use Prices to Promote Equity, Efficiency, and Sustainability*, 2.

<sup>144</sup> See Appendix B for the full list.

<sup>145</sup> International Conference on Water and the Environment, "The Dublin Statement on Water and Sustainable Development," <http://www.gdrc.org/uem/water/dublin-statement.html> (accessed June 1, 2008).

Water as an economic good is certainly not a new phenomenon. Much of the development of European water systems, such as treatment and refuse systems, were private through the medieval period until the cholera epidemics of the 19<sup>th</sup> century forced the reconception of water as a “common good.” This was the case in the American Southwest as well. Through the early 20<sup>th</sup> century, many water resources continued to be managed through public (or, in some cases public/private) mechanisms. It has been, however in that last 20 years, often in concert with development projects, that privatization of water services has seen a drastic increase. In 1990, two years before the Dublin Principles were set, private companies were responsible for water services to 51 million people. Twelve years later that number was 300 million.<sup>146</sup> So while privatization of water on a local scale can be traced back for centuries, in today’s climate the global water market grows at 6 percent a year and is a \$260 billion dollar business.<sup>147</sup> The World Bank often ties money for infrastructure to privatization practices.

To say the privatization of water is a contentious topic is an understatement. Within this debate are two strands, that of the act of privatization (the pragmatic), and the reconception of water as a commodity (ideological). Discussions of water privatization and commodification seem to elicit some of the strongest reactions to globalization pressures. Maude Barlow, sums up both the pragmatic and ideological concerns activists have with regards to water:

The commodification of water is ethically, environmentally, and socially wrong. It would ensure that decisions regarding the allocation of water are based on commercial, not environmental or social-justice considerations ... Privatization of water means that the management of water resources is based on the principles of scarcity and profit maximization rather than long-term sustainability.<sup>148</sup>

<sup>146</sup> Palaniappan et al, *Water Privatization Principles and Practices*, 46.

<sup>147</sup> Ibid., 45.

<sup>148</sup> Maude Barlow and Joanne J. Myers, "Blue Gold: The Fight to Stop the Corporate Theft of the World's Water," Carnegie Council, <http://www.cceia.org/resources/transcripts/830.html> (accessed May 8, 2008).

Although in the privatization process, it is not the water which is being charged for, perse, but the delivery of it, it is a significant distinction that is often lost in the discourse and rhetoric of anti-globalization activists. Activists point to examples in Cochabamba, Bolivia where the privatization scheme by international corporations failed miserably, decreasing access and dramatically increasing prices.<sup>149</sup> Similar privatization schemes in Buenos Aires, though promising at first were ultimately unsuccessful.<sup>150</sup>

Many activists point to the apparent paradox of how conservation can be promoted by an entity whose purpose is to profit from the selling of a scarce resource. It is difficult to imagine how profiting from the sale of water could be an incentive to use less. The User Pay Principle (UPP) argues that, if the resource is priced at a level that reflects true value, it becomes an incentive for conservation of the resource. The difficulty lies in determining what is the “full cost.” Questions arise such as how to price the intrinsic value of nature, or loss of biodiversity of an ecosystem. Often the solution to these questions is to simply ignore the “moral” costs. Adil Najam notes that “[m]any critical ecosystem services including watershed filtration, soil fertility and climate stability are un-valued (or under-valued) and, therefore, as these ecological services are threatened, there are no market signals that would spur technological development of alternative supplies.”<sup>151</sup> Increasingly, however, in jurisdictions such as Ontario after the Walkerton disaster, there has been a push to try to account for the “full cost” of water which is intended to take into account damage to watersheds and protection of biodiversity in the pricing of the service. However, definitions still make this problematic.

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<sup>149</sup> See Appendix C for case study.

<sup>150</sup> Alcázar, Lorena, Manuel A. Abdala, and Mary M. Shirley. *The Buenos Aires Water Concession*. Washington DC: The World Bank Policy Research Working Paper 2311, 2000.

<sup>151</sup> Najam, *Environment and Globalization: Five Propositions*, 12.

Privatization of water services most often occurs in developing nations. It is these countries which, generally speaking, have the weakest infrastructure, the lowest access rates and highest rates of waterborne diseases. It is argued that it is these jurisdictions where privatization potentially has the most to offer. It is often difficult for these nations, which rely on international aid, to resist privatization efforts when aid money is tied to this kind of restructuring. By tying the privatization of water into agreements such as the General Agreement on Trade in Services (GATS), and making signing on to it a prerequisite to ascension into the world economy, countries create a favourable environment for investment by transnational corporations.<sup>152</sup> Especially in countries which have weak central governments it is argued that privatization can increase efficiency, decrease waste and spur innovation. However, it is these jurisdictions where there is also the greatest risk as weak governments "are unable to provide the oversight and management functions necessary to protect public interests."<sup>153</sup> Gleick, Homer-Dixon and others point to this irony in their work. Proponents of privatization argue the exact opposite of those who condemn market mechanisms. They suggest the market can be used to increase quality, access and equitability in water supply. As with anti-privatization activists, their arguments run along both ideological and pragmatic lines. Peter Gleick outlines the pressures which governments face to privatize water, noting that pressures come from a variety of sources, societal, pragmatic, ideological but what often seals the deal is the economics of privatization.<sup>154</sup>

In the current socio-political climate, everything is viewed through an economic lens. The most pressing questions that are asked are usually of an economic nature, and every action must

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<sup>152</sup> Varghese, Varghese, Shiney. "Water Services Under the World Trade Organization." (*WTO Cancun Series Papers. Institute for Agriculture and Trade Policy*, 2003): 2.

<sup>153</sup> Palaniappan et al, *Water Privatization Principles and Practices*, 47-8.

<sup>154</sup> Gleick et al, *The New Economy of Water the Risks and Benefits of Globalization and Privatization of Fresh Water*, 22.

be economically justifiable. Water falls under this same worldview. Most prominent water scholars have endorsed pricing water in a way which will reduce consumption and spur technical innovation while trying to balance this with the “social good” notions espoused by activists. Like the fourth Dublin principle, they endorse water as *both* a social and economic good, and try to make policy that satisfies both qualities. Gleick, a proponent of market based conservation initiatives warns that “water has vital social, cultural, and ecological roles to play that cannot be protected by purely market forces.”<sup>155</sup> The oft-cited Pacific Institute Principles outline the balancing act which should be achieved for successful privatization.<sup>156</sup> This includes the balance of public and private interest, the subsidization of the poorest so that they have access to clean fresh water, the transparency of any privatization processes, and the ultimately sustainability (social, economic and ecological) of any project. He also goes on to say that, to date, no privatization projects have satisfied all these criteria. Most schemes fail deliver the protections to the poorest and are often not transparent processes. This is reminiscent of the “three pillars” of sustainable development which, while being a progressive idea, might be one that is impossible to achieve.

In Canada there is, at the moment, very little in the way of privatized water services. Halifax and Hamilton as well as Vancouver have a modified privatization scheme called Public-Private Partnership agreements (PPP), where the source remains public, but the service is delivered privately. Some municipalities have terminated their contracts as the benefits promised have not been delivered (such as in Halifax) while others continue to provide water through this partnership. In the United States there has been more widespread privatization, with spectacular

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<sup>155</sup> Gleick et al, *The New Economy of Water the Risks and Benefits of Globalization and Privatization of Fresh Water*, vii.

<sup>156</sup> See Appendix D.

failures, such as in Atlanta. The largest privatization of its kind in the US, it was rife with problems, mainly the “the company’s failure to return the promised cost savings, evidence of poor service, improper billing, and water-quality problems”,<sup>157</sup> and so their 20 year contract was terminated only 4 years in.

For Canada and Canadians, the broader debate, the question of the commodification of water is one which arguably, has the potential to have more serious effects than privatized municipal sources. The Oxford English Dictionary defines Commodification as “[t]he action of turning something into, or treating something as, a (mere) commodity; commercialization of an activity, etc., that is not by nature commercial.”<sup>158</sup> This is controversial process for many things, from indigenous knowledge and plants to natural resources and even space are being commodified, and the process is being met with resistance at all turns. Water, under international law is both a good, and not a good. Under GATT water has an HST number, which is used for international commercial classification. It defines water as number 22.01: “waters, including natural or artificial waters and aerated waters, not containing added sugar or other sweetening matter nor flavouring; ice and snow.”<sup>159</sup>

This definition leads to the questions of whether or not water in its natural state is considered a commodity. The implications of this are enormous. Canada, in order to protect water in its natural state, does not consider it a commodity. The government of Canada, to allay fears of selling of bulk water to the US underscored this point with a statement released in 1999 in response to concerns about NAFTA which stated “[w]ater in its natural state is not covered by the NAFTA, the FTA, the GATT, or any other trade agreement. Lakes, rivers, or aquifers are

<sup>157</sup> Peter H. Gleick, ed., *The World's Water 2004-2005* (Washington, DC: Island Press, 2004), 47.

<sup>158</sup> OED Online, "Commodification," (accessed June 30, 2008).

<sup>159</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 60.

simply not goods or products, any more than are the fish swimming in them or the oil and gas trapped under them.”<sup>160</sup> Despite what seems to be a strongly worded statement from the government, this may not be true. Some legal scholars argue that water, in its natural state *could* be considered a commodity in certain situations. Steven Shrybman, offering a legal opinion on the matter goes so far as to state that despite what the Canadian government might say about the commodity status of *in situ* water that

...under both US and international law, water in its natural state is considered a commercial good. Moreover a very large portion of Canadian water resources would already have to be considered as having entered into commerce, because it is being used to generate power, irrigate crops, support industry and service individual consumers.<sup>161</sup>

The implication is not merely one of terminology. Once something is considered a “good,” it enters into the global economy and is subject to the rules and regulations of any other commodity under NAFTA and other trade agreements. It is a question of which protections are binding, those offered by joint declarations of governments, or international legal and trade documents. What is clear is that, once water is removed from the watershed, it is subject to all the rules and regulations which govern any other commodity.

For Canadian water activists this is alarming for several reasons. Chapter 11 of NAFTA is a clause which allows “American corporate investors ... to sue Canada for financial losses.”<sup>162</sup> For a clause in a trade document to allow a corporation the power to sue a government is unusual. This has already happened when the government of British Columbia was sued by American water corporation Sun Belt for ceasing to provide access to the province’s water. It is a

<sup>160</sup> Canada. “Water Exports and the NAFTA” by David Johansen.

<sup>161</sup> Steven Shrybman, *A Legal Opinion Concerning Water Export Controls and Canadian Obligations Under NAFTA and the WTO* (Vancouver: West Coast Environmental Law Research Foundation, 1999).

<sup>162</sup> Maude Barlow and Tony Clarke, *Blue Gold: The Battle Against Corporate Theft of the World's Water* (Toronto: Stoddard Publishing Co Ltd, 2002), 4.

drawn out and complex case, the details of which are beyond this thesis,<sup>163</sup> but suffice it to say that there has been precedent for American corporations to take Canadian governments to court over the treatment of water resources. Chapter 11 causes further alarm because hearings made under it are in private, and thus there is no transparency in the system.

Another concern is that under Article 1102, “National Treatment,” it states that:

Each Party shall accord to investors of another Party treatment no less favorable than that it accords, in like circumstances, to its own investors with respect to the establishment, acquisition, expansion, management, conduct, operation and sale or other disposition of investments.<sup>164</sup>

This means that under NAFTA nationality doesn’t matter: Canada must treat foreign investors the same way as it treats its own. This essentially means that once a domestic company is given rights to exploit water then foreign companies are entitled to these same rights<sup>165</sup> This has the potential to open the door to foreign companies who might want to export water to more arid regions. Another article which has the potential to impinge on national sovereignty is Article 309. Under this Article NAFTA also prohibits outright bans on the export of any natural resource. This has the potential to affect domestic legislation, a complicated patchwork even without foreign restrictions. This has the potential to restrict the domestic measures that might be put in place to protect the resource. That parliament has passed bills stating that water is not to be sold, and interbasin transfers are not to be made, may not mean anything in an international trade dispute.

The last main concern over Canada’s obligations under NAFTA is the so-called “proportionality clause.” Article 315 states that a country cannot reduce the amount which they

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<sup>163</sup> For a more detailed study of the case and NAFTA suit filed under Chapter 11 see: Karen Campbell and Yasmin Nizami, *Security Or Scarcity? NAFTA, GATT and Canada's Freshwater* (Vancouver: West Coast Environmental Law, 2001).; Gleick et al, *The New Economy of Water the Risks and Benefits of Globalization and Privatization of Fresh Water*.

<sup>164</sup> NAFTA, as quoted in: Peter Gleick, ed., *The World's Water*. (Washington, DC: Island Press, 2002), 52.

<sup>165</sup> Barlow and Clarke, *Blue Gold: The Battle Against Corporate Theft of the World's Water*, 4.

are export unless there is a concomitant recline in domestic use.<sup>166</sup> In other words, if water were to be exported in bulk, the government of Canada would have a hard time “turning off the tap” without reducing Canadians’ dependence on the resource.<sup>167</sup>

Though the rhetoric is alarming, bulk water transfers are not something which are imminent. They are not economically feasible at this time, especially in comparison with other technologies and policies such as conservation, reduction in demand, conservation and even desalination.<sup>168</sup> Also, allowing bulk water transfers would be political suicide, given how strongly the Canadian public feels about them. However, like the Alberta tar sands, whose development was originally eschewed on much the same grounds, scarcity might make these schemes more feasible. This is a potential outcome that Environment Canada has noted.<sup>169</sup> If an extreme drought hit the American Southwest, the idea would most certainly be floated and would be politically difficult to avoid. With the legal mechanisms already in place to deal with bulk water, should this situation arise it might challenge Canada’s ability to say “no.” Canada has, however not been completely complacent in dealing with bulk water exports. They have lately used the language of conservation and environmentalism to try to protect watersheds and prevent interbasin transfers.

The government is aware of the potential threats to water under NAFTA. Due to the possible implications of this trade agreement, in 1999 the IJC issued a report “concluding that the Great Lakes are non-renewable, with an eye to ensuring that they would be subject to a GATT

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<sup>166</sup> Campbell and Nizami, *Security Or Scarcity? NAFTA, GATT and Canada's Freshwater*, 5.

<sup>167</sup> Clarke, *Turning on Canada's Tap? Why we Need a Pan-Canadian Policy and Strategy Now on Bulk Water Exports to the U.S.*, 23.

<sup>168</sup> Environment Canada, *Threats to Water Availability in Canada*, (Burlinton: National Water Resources Institute, 2003), 6.

<sup>169</sup> Ibid., 98.

Article XX exemption.”<sup>170</sup> The Article XX exemption is one which ostensibly protects the environment. It states that no barriers to trade can apply, except in the cases:

- (b) necessary to protect human, animal or plant life or health; ...
- (g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption; ...<sup>171</sup>

Though it has yet to be tested, it is clear that the governments who wish to protect water resources from bulk export are beginning to use environmental and social good discourses to “protect” them from export, instead of contesting the interpretation of trade agreements. The government of Canada introduced this tack in 1999. Basing its strategy on ecological, not trade grounds Canada has prohibited new interbasin transfers out of environmental concern (with existing diversions grandfathered). Banning them on environmental grounds sets the government up for an Article XX exemption. By “[p]rotecting water, its ecological integrity and its use at the source, within natural rather than political boundaries”<sup>172</sup> the government hopes it can protect Canadian watersheds.

It remains to be seen if this strategy will ultimately be successful, as water transfers tend to be the “elephant in the room” when environmental strategies are discussed. What is certain, however, is that construction of the problem environmentally, has changed neither the trade agreements, nor the possibility that if export were to begin, it would be difficult, if not impossible to reduce export quantities, even if an environmental argument was used. In the international NAFTA tribunal (a closed-door process) it is unlikely that environmental groups would be able to compete against well funded multinational corporations. This precedent has

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<sup>170</sup> Gleick et al, *The New Economy of Water the Risks and Benefits of Globalization and Privatization of Fresh Water*, 17.

<sup>171</sup> Campbell and Nizami, *Security Or Scarcity? NAFTA, GATT and Canada's Freshwater*, 4.

<sup>172</sup> Ibid., 4.

been set over the history of Canada's environmental regulatory history. Despite environmental costs, businesses are usually allowed to proceed, with natural ecosystems and biodiversity considered as externalities. Most existing laws, as David Boyd argues, are biased towards individuals (or corporations) at the expense of the community, or the environment<sup>173</sup> and there is no reason to believe that a NAFTA tribunal would change this precedent. There is already a lack of meaningful opportunities for public participation, including effective mechanisms for enforcement by the public<sup>174</sup> in the Canadian system so it is difficult to see how the addition of another jurisdictional layer will increase transparency of any trade negotiations. This approach is also criticized by Maude Barlow who states that given the choice of viewing it as a trade issue or an environmental issue, it should be tackled as a trade one. "By not having the guts to deal with water as a trade issue, but only through environmental legislation, ... the federal government is leaving us open to further challenges by foreign companies seeking lost profits."<sup>175</sup>

Canada also wishes to protect its supply of water from obligations under development schemes. There are those who suggest that Canada has a moral obligation to share its water "riches" with those in poorer countries. With so many people lacking access to fresh, clean water, and Canada having much more per capita, the argument has been made that Canada should be obliged to "share." This would also require bulk exports, most probably by large tanker ships. This is the major reason why Canada consistently and constantly blocks attempts in the international community to have water declared a "human right." If such a declaration is made, Canada may find itself in a position where it is obligated to export the resource in mass quantity. Once something is declared a human right it cannot be sold, and there is an obligation

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<sup>173</sup> Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy*, 46.

<sup>174</sup> Ibid., 245.

<sup>175</sup> Canada. "Water Exports and the NAFTA" by David Johansen.

for countries to provide it. Again, the Canadian government employs environmental, not economic arguments to rebuff this argument, stating that “more sustainable alternatives are than long-distance importation by ship are available [such as] conservation, recycling, reuse and reallocation of local resources and improved water treatment and distribution systems.”<sup>176</sup>

The above methods, if implemented domestically would mark a new direction for water management in Canada. Conservation, recycling, reuse and other sustainable initiative mark a paradigmatic shift from Supply-side management to that of Demand-side management. Supply-side management (SSM), the paradigm of the last few centuries of water management assumes that humans will find/divert/drill for the water needed to sustain current water-intensive lifestyles. This type of management is typified by the large scale dams and diversions which were built with gusto throughout the 20<sup>th</sup> century. In the Canadian context the centerpiece of this ideology would have been the North American Water and Power Alliance (NAWAPA). Developed in the 1960s, this project would have seen the rocky mountain trench used as an 800km long water pipe for water to be delivered to the southern US from the Mackenzie and Yukon River basins. It is telling that at the time it was not environmental concerns which killed the project, but economic ones. SSM, also called the “hard path” due to its reliance on infrastructure has been successful in getting water to millions of people, and was a large factor in driving the green revolution (particularly in South Asia) in the second half of the 20<sup>th</sup> century. It also, however, had many unintended consequences. As described previously, dams have displaced millions of people, caused ecological damage and are never permanent solutions. Large scale diversions, and reversing the flows of rivers (as NAWAPA was to do) are

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<sup>176</sup> Environment Canada, *Threats to Water Availability in Canada*, (Burlinton: National Water Resources Institute, 2003), 6.

ecologically unsound. SSM's primary concern is providing water, not matter what the ecological cost. It does not value environmental considerations, and, since large projects often happen with no local involvement, the poor suffer disproportionately. To top it all off, this approach has not been successful; over 1 billion people still lack access to safe, clean drinking water.<sup>177</sup> It is clear that this type of supply-side management is becoming less tenable in the current climate.

Water policy specialists such as Oliver Brandes and Peter Gleick point to the failures of SSM, and note in the future are challenges which will make this approach untenable:

Issues such as regional and international water conflicts, the dependence of many regions on unsustainable groundwater use, the growing threat of anthropogenic climate change, and our declining capacity to monitor critical aspects of the global water balance are all inadequately addressed by water planners and policymakers. If these challenges are to be met within ecological, financial, and social constraints, *new approaches are needed.*<sup>178</sup>

This shift entails movement from reliance on large infrastructure to meet needs, to a reconceptualization of what, exactly, "need" is. It will most certainly require decreases in consumption. Many European countries are major proponents of this shift, which seeks to reduce demand for the resource by spurring innovation (such as low-flow toilets, and drip irrigation) and implementing market solutions as well as projects to increase public awareness.<sup>179</sup> Brandes, and others see Demand-side management (DSM) as only a partial shift to the ultimate goal of managing water in the "soft-path" in which water is managed *only* in an ecologically sustainable context, putting natural and social stability at the forefront. This is the most challenging approach as it requires a truly interdisciplinary approach, taking a full cost approach, inclusive of environmental and social costs.<sup>180</sup> The soft-path "strives to improve the productivity of water use

<sup>177</sup> Peter H. Gleick, "Global Freshwater Resources: Soft-Path Solutions for the 21st Century." *Science* 302, no. 5650 (Nov 28, 2003): 1525.

<sup>178</sup> Ibid., 1524. (emphasis mine).

<sup>179</sup> Oliver M. Brandes et al, *At a Watershed: Ecological Governance and Sustainable Water Management in Canada* (Victoria: POLIS Project on Ecological Governance, 2005): 21.

<sup>180</sup> Ibid., 37.

rather than seek endless sources of new supply.”<sup>181</sup> It involves techniques such as “backcasting,” that is, determining supply before hand, and then putting systems in place to achieve this goal. This is comparison to SSM, which tries to estimate future use, not control it.

The soft-path requires a fundamental re-evaluation of the way water needs are to be met. This is why Brandes and others argue for a transition to DSM first, as a way to move in a more sustainable direction. In addition to economic tools, the soft-path encourages social and cultural tools to change public perceptions about efficiency, water use, and, ultimately, consumption. This requires a large social shift as well, with all demand-side models, it is the shift in consumption patterns which drives the change. The soft-path includes local communities in decision making processes in the hope that with more agency at the lower level, there will be more involvement and acceptance.

Canada, in light of its failures in water policy initiatives to date, has a unique opportunity to be a world leader in this reconception of water use. Of course, introducing new actors, and opening the decision making processes further complicates an already complex water management system in Canada. The issues are easy to isolate: profligate water use, pollution of watersheds, export of water and its ramifications as well as disjuncture between jurisdictions. International pressures such as climate change and security issues are set only to increase this complexity. What is much more difficult is to propose a solution or even an approach to solving these problems. In its publication “Threats to Canadian Water,” Environment Canada notes in passing that water management in Canada is a “wicked problem.”<sup>182</sup> It does not, however, go on

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<sup>181</sup> Gleick, *Global Freshwater Resources: Soft-Path Solutions for the 21st Century.*, 1525.

<sup>182</sup> Environment Canada, *Threats to Water Availability in Canada*, (Burlington: National Water Resources Institute, 2003).

to explore this in any detail but the concepts which underlie the term are at the heart of the debate.

## **Wicked Problem of Water**

Like problems which are complex in scope, involve large segments of the population and often having contradictory elements, hydropolitics is what has been termed a “meta-” or “wicked” problem. A term increasingly used to categorize sweeping social problems, it was first coined in 1973 by Horst Rittel and Melvin Webber. Although the concept was pioneered in the disciplines of management and social planning, it is increasingly gaining purchase in other disciplines, especially those which deal with complex social problems such as terrorism, climate change and poverty issues.

In Ritter and Webber’s conception of a “wicked” problem, there are 10 criteria that need to be satisfied,<sup>183</sup> which include the difficulty in defining the problem, the fact that one is never certain when the problem is “solved,” that the problems are not linear – there is no true/false or right/wrong solution – and that each problem is essentially unique so there can never be a uniform method for solving them. This is contrasted with linear, simple problems which the pure sciences and mathematics often encounter. When attempting to solve a meta-problem, solutions alter the problem in ways that are not predictable and often leave the situation more complex, or alter it such that it is impossible to return to the starting situation. In an article about the wicked problem of military involvement in Afghanistan, Roberts considers the rise of wicked problems in the late twentieth century: “[p]erhaps the expansion of democracy, market economies, privatization, travel and social exchanges highlight value difference and thus promote dissensus rather than consensus in the problem-solving process.”<sup>184</sup> The larger the number of people who

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<sup>183</sup> See Appendix E for the complete list.

<sup>184</sup> Nancy Roberts, "Wicked Problems and Network Approaches to Resolution," *International Public Management Review* 1, no. 1 (2000), 2.

have both access to information and agency, the more opinions and worldviews that need to be reconciled in order to reach a solution.

Though small, there is a body of literature on the “wickedness” of water problems. Most literature deals with the American context<sup>185</sup> and specifically the problems of the American South West.<sup>186</sup> David Freedman in particular emphasizes the need for interdisciplinary approaches to water management. Reminiscent of the soft-path to water, scholars, government and social scientists agree that water management will require a multifaceted approach. Technical solutions on their own do not work, but neither do only economic nor social ones. “Because of social complexity, solving a wicked problem is fundamentally a social process.”<sup>187</sup> As with the fine balance of sustainable development, all the costs of any particular policy must be weighed, even when it is unclear exactly what the costs are, or how they are to be determined. Solving meta-problems is difficult because solutions are contingent on a shared perception of the problem, but the nature of the problem is understood in different ways depending on the actor involved.

In the Canadian context both domestic and international issues around water make up the complexity of the problem. Each category is, in and of itself a complex problem, yet within each are further threads. The domestic threads include: overconsumption, jurisdictional fragmentation and ambiguity over Canadian trade obligations, while the international category includes threads

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<sup>185</sup> David M. Freedman, "Wicked Water Problems: Sociology and Local Water Organizations in Addressing Water Resources Policy," *Journal of the American Water Resources Association* 36, no. 3 (2000), 483.; Denise Lach, "Taming the Waters: Strategies to Domesticate the Wicked Problems of Water Resource Management," *International Journal of Water* 3, no. 1 (2005), 1.

<sup>186</sup> Christopher Lant, "Introduction: Human Dimensions of Watershed Management." *Journal of the American Water Resources Association* 35, no. 3 (1999), 483.

<sup>187</sup> Jeff Conklin, "Wicked Problems & Social Complexity." in *Dialogue Mapping: Building Shared Understanding of Wicked Problems* (London: Wiley, 2006), 14.

relating to climate change, security, and the status of water as a commodity. The international pressures on Canadian water fall within the jurisdiction of the federal government (security and trade) so it seems as though there should be a reciprocal federal response to these pressures. With such a fragmented system, to say that more federal leadership is needed is to dismiss the importance of the provinces but to say the provinces should lead is to dismiss the national nature of many of the problems. Canada is a confederation, and it would be difficult, if not impossible to enact policy on water outside of that context.

There is a huge discrepancy between the policy and action in Canada. Policy documents from the government of Canada, going all the way back to 1970, have consistently emphasized the need for wise management of water resources, and of the responsibility to protect the natural environment and the people who rely on it. Despite this discourse water is increasingly under threat in Canada with localized water scarcity and pollution problems running rampant. What accounts for this gap? Most literature points to the lack of cooperation between jurisdictional levels. Environment Canada's document on threats to Canadian water underscores this: "At the most fundamental level, this report reinforces the need for strong leadership and an enhanced spirit of interjurisdictional and cross-disciplinary teamwork to address the issues relating to Canada's future access to freshwater."<sup>188</sup>

Though the provinces "own" resources, it is difficult for any given province to deal with water issues in an autonomous way. This idea is echoed in international water disputes: water crosses many political boundaries, domestic and international. To merely suggest that new policies need to be put in place ignores the fact that historically these policies have never lived

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<sup>188</sup>Environment Canada, *Threats to Water Availability in Canada*, (Burlinton: National Water Resources Institute, 2003), xix.

up to their potential. After the 1970 Canada Water Act and 1987 Federal Water Act, nothing significant changed. The federal government could take more of a role in regulating water, but chooses not to. Economic concerns have consistently outweighed environmental ones, with supply side economic projections dictating the ways in which infrastructure is constructed to meet demands.

The tension between economic, social and environmental concerns has yet to be satisfied in a way which protects natural resources. What is clear, from the example of the Fisheries Act, is that for any successful policies to be implemented the legislation must have “teeth.” That the Fisheries Act, not the Water Act, has been more successful in protecting Canada’s water shows how binding federal legislation is needed for real changes to be made. The last thread in domestic water issues is how Canada’s trade obligations under NAFTA might potentially impact water supply in the country. It is unclear how protection of Canadian water would stand up to a NAFTA challenge, but concern from both the government as well as policy think-tanks, shows that the implications might be drastic.

There are also underlying pressures facing Canada from outside its borders. Three have the potential to directly impact Canadian water, and water policy: climate change, security and bulk water exports. Some of these pressures are acute and others are cumulative, but they are all interrelated. There is a clear gap in the literature detailing which role Canada will play in the coming decades as water scarcity increases globally, especially as a country which has a significant percentage of it. There is also little written on how legislation and policy in Canada is equipped to deal with these pressures.

The cumulative threat which drives many of these other pressures is uncertainty around climate change. To do an exhaustive summary of climate change data, controversy surrounding the issue and contesting theories is well beyond the scope of this thesis, so the conclusions of the IPCC, the internationally recognized UN body tasked to study the effects of climate change will be reviewed. The latest report notes that climate change is likely to exacerbate water scarcity in the world, with already-dry regions becoming dryer. Sub Saharan Africa, which supports millions of people, already has one of the highest rates of water scarcity on the planet. This is likely to get worse. The same goes for the South West United States, a region which houses much of the agricultural activity of the US. Climate change is also likely to increase dramatic weather events such as floods and droughts:

More intense and longer droughts have been observed over wider areas since the 1970s, particularly in the tropics and subtropics. Increased drying linked with higher temperatures and decreased precipitation has contributed to changes in drought. Changes in sea surface temperatures, wind patterns and decreased snowpack and snow cover have also been linked to droughts.<sup>189</sup>

In addition, the melting of Arctic ice has increased sea levels globally, with projections seeing an increase in the melt over the next century. All this will no doubt have a strong effect on Canada, especially the ecosystem and peoples of the north.

Though there is no certainty as to how climate change will affect Canada specifically, the report notes that it will likely lead to increased precipitation in the spring and winter, but decreased precipitation in the summer. It underscores the impact climate change is to have on

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<sup>189</sup> IPCC, *Summary for Policymakers*. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, United Kingdom: Cambridge University Press, 2007), 8.

Canada's Arctic, with warming of up to 10°C in the northernmost parts.<sup>190</sup> In addition to the dramatic impact this will no doubt have on the wildlife and lifestyles of those living in the North, it also has international implications for Canada as the "inhospitable" North becomes more and more lucrative for trade in the newly thawed passages which will be found there. This most certainly falls under federal jurisdiction.

In a post-9/11 world, almost everything is viewed through the lens of security. Water is no different. The global water shortage presents a number of security challenges for Canada, the most obvious of which is the melting of the polar ice that will likely open the North West Passage for a number of months a year. There is a long-standing dispute between Canada, the US and EU over the sovereignty of the Arctic waters. With the route's potential to shave valuable time off routes to Asia from Europe, this is an area which Canada's sovereignty will be challenged. Though there are understandings between the Canadian and US governments that the United States will consult with Canada on the use of these waters, the US does not recognize claims of sovereignty on the part of the Canadian government. There is, in fact an overlap of approximately 7,000nm<sup>2</sup> that both the US and Canada claim as their own Arctic waters.<sup>191</sup> With the US calling to increase oil drilling in the North, the ambiguity of the status of these northern waters is of concern. The US has demonstrated that access to oil is of primary importance and that it will go to great lengths to ensure reliable supply.

Like security issues, bulk water transfers are a potentially acute risk for Canada. All government sources repeatedly state that this is not the intention of the government, and to that

<sup>190</sup> J. H. Christensen et al, "2007: Regional Climate Projections" In *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. S. Solomon et al (Cambridge, UK; New York, NY, USA: Cambridge University Press, 2007), 899.

<sup>191</sup> International Boundary Research Unit, *Maritime Jurisdiction and Boundaries in the Arctic Region* (Durham University, 2008): 2.

end most provinces and the federal government have banned interbasin water transfers. However there is a growing literature which suggests scenarios under which these water transfers might become feasible. With sustainable development initiatives being driven primarily by economic considerations, this method of export is not out of the realm of possibility. Adding to this are the pressures exerted by the United States, backed by trade agreement such as NAFTA and GATS.

## Conclusion

Water is not just essential *for* life but water *is* life. Access to water determines whether development will occur, or if a society will be left to stagnate and decline. Temporally and culturally water means many of the same things to seemingly different peoples. Part of this cross-cultural meaning can be predicted as to a large degree as the physical nature of the substance generates meaning. From transformation to transmutation and life to death the meanings of water run deep in significance. Meaning can also be drawn from it as the substance of life for every creature on the planet. Without water there is no humanity. It is not surprising that history is littered with conflicts around water. It involves every aspect of daily life and that threats to it should therefore be taken very seriously.

The pressures which Canadian waters are facing in the 21<sup>st</sup> century are fundamentally different than those that have been tackled successfully in the past. In the past water problems were the problems of supply; how to harness water for development. This was achieved by infrastructure projects at the expense of ecological sustainability. Though they might seem similar, the pressures faced today are much more diffuse, require real social participation from often disparate groups and are not predictable in outcome. All of these realities are often used as justification to take no action. Canada, with a large share of renewable, global, freshwater supplies, would seem to be in a good position. Federal policies and documents are rife with language of “stewardship” and “wilderness,” and Canadians value this connection to the wild. From the formation of the Ministry of the Environment and its policy statements, to today’s papers on water and sustainable development, the notion that Canadians have a duty to protect water is privileged.

Unfortunately there is a disconnect between rhetoric and reality. While Canadians value nature, they also value the exploitation of it. The connection between resources and culture is not new. Ancient civilizations such as that at Angkor Wat have shown that when humanity over-engineers its environment, small changes in the environment can cause large scale disasters. For the Mayans, Akkadians and Angkorians it meant the regional decline of their civilization. The only difference in today's climate is the scale of any potential disasters. Technological innovations have allowed humanity to literally reshape the face of the planet. With larger and larger projects changing the landscape in more and more drastic ways, humanity cannot predict the consequences if natural systems' behaviour does not conform to the plans of engineers. Much like the Angkorians it would appear as if Canadians have plenty of water. Like them, massive infrastructural projects have been built to harness and manage water systems, often with little knowledge of the complete ecological costs. The Mayans' social hierarchy was contingent on available water for irrigation, just as Canadian's social and political structure is built on natural resources. And in each case, serious threats to water exist under the surface.

From Senate reviews to parliamentary library research, and from the writings of academics to the wording on policies, it is obvious that Canada has water problems. Perhaps because many Canadians think that there is no risk of water shortages to themselves, Canadians pollute what they do have, often without punishment; they consider selling it off; and they consume it at a higher rate than any other country in the world. Since the federal Water Act of 1970, and increasing environmental awareness this reality has not changed. Added to this is the fragmentation of the political process. Research has shown that the best way to deal with water is

on a watershed basis, but that proves politically difficult when each watershed might involve multiple provincial and federal jurisdictions. Owing to the fact that at any given time there might be four jurisdictions (municipal, provincial, federal and international) which have a say in the use of a particular watershed or lake system, inevitable conflict over water use arises. With provinces technically “owning” water, municipalities being in charge of drinking water and the federal government overseeing trade issues around water and having jurisdiction over all water which crosses over a political boundary, it is easy to see how there is much difficulty governing water. More regulation, especially at the federal level, seems impossible in a climate where tension between the provinces and federal governments make the news regularly over much smaller issues.

Added to this jurisdictional fragmentation are the conflicting notions of sustainability. Government documents are rife with language about sustainability; it has been published in numerous government texts that the Government of Canada is committed to sustainable development of water resources. While the discourse seems objective, true sustainable water management is difficult in a climate where economic interests outweigh ecological and social ones. Thus scholars advocate for a shift from the 20<sup>th</sup> century paradigm of supply side management to the soft-path to water. This will require a fundamental shift in the culture around water.

The solution to water issues requires a profound and fundamental change in both the culture of government and business. In much the same way as a cultural shift occurred around the acceptance of not drinking and driving, or wearing seatbelts, it must become incomprehensible for people to use water in an unsustainable way. Social and ecological

considerations must be put at the forefront, even if it means that regions suffer economically. Populations must be educated to view this not as a negative thing, but as something which will ensure that water resources will be available for generations to come. In jurisdictions such as Ontario the push to “full cost” accounting of water is a step in the right direction. Including environmental and social considerations in the calculation of the cost of water might be politically and economically difficult, but it is an effective way to ensure water resources are not used in an unsustainable way. That Canada often ranks last in UN and OECD reports of how sustainably resources are exploited shows that no real commitment has been made, by either business or government, to take resource scarcity issues seriously. If every person on earth lived the way Canadians did, it would require nine planets to sustain the current global population. Canadians use a profligate amount of water, and this is demonstrably not necessary.

As with all civilizations, resource exploitation and use is tied to cultural values. In the case of Constantinople, the great aqueducts were not only a vehicle for water transport but a symbol of the empire’s power and wealth. Even in a water-poor location such as Constantinople, public baths were provided as they were an important facet of the culture. For the Mayans, once the water ran out and the rulers could no longer “provide” for the people it caused civil unrest and ultimately the collapse of the civilization. Similarly for the Akkadians, the failure of the water system brought on mass migrations of people to the central areas and the already drought-ridden areas could not cope socially with this influx.

Canada depends on water spiritually and economically, socially and culturally. The lessons for Canada from historical examples are that no amount of lip service to or discursive trickery around the concepts of sustainability or stewardship, of social processes and the move to

the soft-path will affect actual change. It is only real change which will ensure long term viability of the nature upon which Canadians base so much of their identity and economy. This real change must be cultural in origin and it must start with government. This can be achieved through emphasis on public awareness, the push towards a soft-path for water, an essentially social, collaborative, cooperative process involving large segments of the population. The federal government must lead the way, stop taking a narrow view of its own powers and begin to introduce legislation with mandatory enforcement for those who break the law. This must be paired with public awareness campaigns which debunk the myth of water superabundance and clearly demonstrate the dangers which Canadian water faces. With the public on board and regulations in place a cultural shift can be catalyzed, engaging large portions of the population, engendering a solution to a problem in which everyone has a stake.

## **APPENDIX A**

### **Declaration of the United Nations Conference on the Human Environment**

1. Man is both creature and moulder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when, through the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights the right to life itself.
2. The protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world; it is the urgent desire of the peoples of the whole world and the duty of all Governments.<sup>192</sup>

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<sup>192</sup> United Nations Environment Programme, "Declaration of the United Nations Conference on the Human Environment," <http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503> (accessed July 24, 2007).

## **APPENDIX B**

### **Dublin Principles:**

**Principle No. 1** - Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.

**Principle No. 2** - Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

**Principle No. 3** - Women play a central part in the provision, management and safeguarding of water.

**Principle No. 4** - Water has an economic value in all its competing uses and should be recognized as an economic good.<sup>193</sup>

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<sup>193</sup> International Conference on Water and the Environment, *The Dublin Statement on Water and Sustainable Development*

## APPENDIX C

### Privatization Case Study – Cochabamba, Bolivia

There have been some spectacular failures when privatization schemes have been introduced, the most oft-cited instance of such opposition occurred in Bolivia in the year 2000. Cochabamba, the third largest city in Bolivia, had long had problems with water supply. SEMAPA, (Servicio Municipal de Agua Potable y Alcantillado), the public regulatory body was riddled with corruption and waste. In 1992, potable water coverage was reported to be only 57% and sewerage 48%.<sup>194</sup> Due to SEMAPAs mismanagement there was a situation of permanent water shortages and losses due to heavy leakage, “[i]n many areas of the city, water was only available for a few hours once or twice a week.”<sup>195</sup> Though the protests began in early 2000 and the immediate cause of the conflict lay in the privatization of the municipal supply arguably this conflict is one whose roots are embedded in the colonial history of the country.

Over the previous 15 years the population had grown very quickly in Cochabamba. The economy was restructured from agrarian-based to urban-based.<sup>196</sup> This lead to a mass migration of workers into the city due to the closing of rural and agrarian activities, such as the tin mines. Between 1976 and 1992 the population of Cochabamba grew from 205,000 to 414,000, without an increase of urban services.<sup>197</sup>

In addition to these population pressures was the precedent set by decades of privatization of other national services, as well as a 1997 decision which established the procedures for awarding water concessions. This paved the way for the privatization of water services. It was not difficult to predict that privatizing the water supply in the midst of these population pressures, poor quality of the water supply in conjunction with poverty and inequality might be a potential hotbed for conflict. As Sandra Postel, a water scarcity expert notes

<sup>194</sup> Willem Assies, "David Versus Goliath in Cochabamba: Water Rights, Neoliberalism, and the Revival of Social Protest in Bolivia," *Latin American Perspectives* 30, no. 3 (2003), 19.

<sup>195</sup> Andrew Nickson and Claudia Vargas, "The Limitations of Water Regulation: The Failure of the Cochabamba Concession in Bolivia," *Bulletin of Latin American Research*, 21, no. 1 (2002), 105.

<sup>196</sup> Assies, *David Versus Goliath in Cochabamba: Water Rights, Neoliberalism, and the Revival of Social Protest in Bolivia*, 18.

<sup>197</sup> Ibid., 19.

“[e]specially where privatization takes place in the presence of poverty and inequality ... it can lead to civil protest and violence.”<sup>198</sup>

Ostensibly to deal with the inequality and waste in the system a 40 year concession was given to an international consortium called *Aguas del Tunari* to privatize and regulate Cochabamba’s water supply. This was in June of 1999. During the contractual negotiations an increase of tariffs of 35% was agreed to. However, with the re-designation of some areas some residents ended up paying much more, for some approximately 200%.<sup>199</sup> The contract with *Aguas Del Tunari* stated that the consortium had a monopoly, and thus no one else could provide water including those residents who had resorted to digging their own wells. Also prohibited was the collection of rainwater, as all freshwater was to be regulated by the consortium.

In January of 2000 the first protests started. *La Coordinadora*, the group which became the main opposition to the privatization called for a 24 hour general strike in Cochabamba to protest against the rise in prices. This protest ended in a truce, with the government agreeing to review the deal with *Aguas Del Tunari*. This uneasy peace ended in April of 2000 when *La Coordinadora* left the negotiations took to the streets, fed up with what they saw as lack of respect for their position.

This is when the “water war” began. By April the 5<sup>th</sup> thousands of protesters had gathered and demanded that the contract with *Aguas del Tunari* be destroyed and that the company should leave the country within 24 hours. The protests grew and grew and by April 8<sup>th</sup> Hugo Banzer, the president declared a state of siege. Adding fuel to the fire, the information minister Ronald MacLean accused the protests of being fuelled by drug traffickers and which was clearly not substantiated. Television stations were closed after airing footage of a police officer shooting a protester in the face. By the 9<sup>th</sup>, with the protests showing no signs of abating, the government conceded and broke the contract with *Aguas del Tunari*. Banzer also agreed to modify Law 2029, which was done by April 11<sup>th</sup>. Thus the protesters were able to claim victory over a large multinational corporation. Ironically, however the water problems continued to plague the city, yet Cochabamba is always framed as a “victory” by anti-privatization activists. Lost in the struggle was the reality of the water situation.

<sup>198</sup> Sandra Postel and Aaron T. Wolf, "Dehydrating Conflict," *Foreign Policy* 126 (2001), 62.

<sup>199</sup> Nickson and Vargas, *The Limitations of Water Regulation: The Failure of the Cochabamba Concession in Bolivia*, 111.

## **APPENDIX D**

### **Pacific Institute Conclusions:**

#### **1. Continue to Manage Water as a Social Good**

- 1.1 Meet basic human needs for water. All residents in a service area should be guaranteed a basic water quantity under any privatization agreement. Contract agreements to provide water services in any region must ensure that unmet basic human water needs are met first, before more water is provided to existing customers. Basic water requirements should be clearly defined
- 1.2 Meet basic ecosystem needs for water. Natural ecosystems should be guaranteed a basic water requirement under any privatization agreement. Basic water-supply protections for natural ecosystems must be put in place in every region of the world. Such protections should be written into every privatization agreement, enforced by government oversight.
- 1.3 The basic water requirement for users should be provided at subsidized rates when necessary for reasons of poverty. Subsidies should not be encouraged blindly, but some subsidies for specific groups of people or industries are occasionally justified. One example is subsidies for meeting basic water requirements when that minimum amount of water cannot be paid for due to poverty.

#### **2. Use Sound Economics in Water Management**

- 2.1 Water and water services should be provided at fair and reasonable rates. Provision of water and water services should not be free. Appropriate subsidies should be evaluated and discussed in public. Rates should be designed to encourage efficient and effective use of water.
- 2.2. Whenever possible, link proposed rate increases with agreed-upon improvements in service. Experience has shown that water users are often willing to pay for improvements

in service when such improvements are designed with their participation and when improvements are actually delivered. Even when rate increases are primarily motivated by cost increases, linking the rate increase to improvements in service creates a performance incentive for the water supplier and increases the value of water and water services to users.

2.3 Subsidies, if necessary, should be economically and socially sound. Subsidies are not all equal from an economic point of view. For example, subsidies to low-income users that do not reduce the price of water are more appropriate than those that do because lower water prices encourage inefficient water use. Similarly, mechanisms should be instituted to regularly review and eliminate subsidies that no longer serve an appropriate social purpose.

2.4 Private companies should be required to demonstrate that new water-supply projects are less expensive than projects to improve water conservation and water-use efficiency before they are permitted to invest and raise water rates to repay the investment.

Privatization agreements should not permit new supply projects unless such projects can be proven to be less costly than improving the efficiency of existing water distribution and use. When considered seriously, water-efficiency investments can earn an equal or higher rate of return to that earned by new water-supply investments. Rate structures should permit companies to earn a return on efficiency and conservation investments.

### **3. Maintain Strong Government Regulation and Oversight**

3.1 Governments should retain or establish public ownership or control of water sources. The “social good” dimensions of water cannot be fully protected if ownership of water sources is entirely private. Permanent and unequivocal public ownership of water sources gives the public the strongest single point of leverage in ensuring that an acceptable balance between social and economic concerns is achieved.

3.2 Public agencies and water-service providers should monitor water quality. Governments should define and enforce water-quality laws. Water suppliers cannot effectively regulate water quality. Although this point has been recognized in many

privatization decisions, government water quality regulators are often under-informed and under-funded, leaving public decisions about water quality in private hands.

Governments should define and enforce laws and regulations. Government agencies or independent watchdogs should monitor, and publish information on, water quality.

Where governments are weak, formal and explicit mechanisms to protect water quality must be even stronger.

3.3 Contracts that lay out the responsibilities of each partner are a prerequisite for the success of any privatization. Contracts must protect the public interest; this requires provisions ensuring the quality of service and a regulatory regime that is transparent, accessible, and accountable to the public. Good contracts will include explicit performance criteria and standards, with oversight by government regulatory agencies and non-governmental organizations.

3.4 Clear dispute-resolution procedures should be developed prior to privatization. Dispute resolution procedures should be specified clearly in contracts. It is necessary to develop practical procedures that build upon local institutions and practices, are free of corruption, and difficult to circumvent.

3.5 Independent technical assistance and contract review should be standard. Weaker governments are most vulnerable to the risk of being forced into accepting weak contracts. Many of the problems associated with privatization have resulted from inadequate contract review or ambiguous contract language. In principle, many of these problems can be avoided by requiring advance independent technical and contract review.

3.6 Negotiations over privatization contracts should be open, transparent, and include all affected stakeholders. Numerous political and financial problems for water customers and private companies have resulted from arrangements that were perceived as corrupt or not in the best interests of the public. Stakeholder participation is widely recognized as the best way of avoiding these problems.

Broad participation by affected parties ensures that diverse values and varying viewpoints are articulated and incorporated into the process. It also provides a sense of ownership and stewardship over the process and resulting decisions. We recommend the creation of public advisory committees with broad community representation to advise governments proposing privatization; formal public review of contracts in advance of signing agreements; and public education efforts in advance of any transfer of public responsibilities to private companies. International agency or charitable foundation funding of technical support to these committees should be provided.<sup>200</sup>

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<sup>200</sup> Gleick et al, *The New Economy of Water the Risks and Benefits of Globalization and Privatization of Fresh Water*, v-vii.

## **APPENDIX E**

### **Horst and Rittel's Wicked Problem Criteria**

1. There is no definitive formulation of a wicked problem.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but good-or-bad.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly.
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another problem.
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
10. The planner has no right to be wrong (Planners are liable for the consequences of the actions they generate).<sup>201</sup>

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<sup>201</sup> Horst Rittel and Melvin Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4 (1973), 156-166.

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(1)  $\mu = 10 \cdot 10^6$