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Canada's Freshwater: Our New Challenge.

By Major Clay Rook

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ABSTRACT

Freshwater is the most important matter on this earth. Without it, humanity ceases to exist. Unfortunately, due to rapid world population growth, increased globalization, climate change and economic pressures, our most precious resource is in a state of emergency. Canada, not immune to this global crisis, is experiencing the onset of regional freshwater scarcity and municipal shortages. Overuse, misuses, poor water governance, and industrial demands have left Canada in position where decisions and action must be taken today before it is too late. Our bigest challenge however will be securing our water from future water security challenges. The US, our closet ally and economic partner, also faces significant freshwater supply challenges and severe shortages within the next 10 years. These future challenges will force them to look northward for alternative solutions in efforts to secure sufficient freshwater. Canada must start looking at this issue while we still have the opportunity and the time to shape our future water security enviroment. This paper addresses the problems and complex governance issues involved and proposes solutions. In doing so, it also identifies some key constraints that must be acknowledged in dealing with the freshwater needs of the US.

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CHAPTER 1 - INTRODUCTION

Freshwater shortages are a global problem.[1] It has been said that the twentieth century was about oil but the twenty-first century will be about water.[2] World population growth, increased economic demand and the repercussions of pollution and climate change have all placed the current global water supply in a state of emergency.[3] By 2050, the world's population is expected to rise from 6 to 9 billion people and in just under 15 years it is expected that two-thirds of the world's population will be living in water scarce conditions.[4] The finite supply of freshwater has been almost tapped out which is leading to a catastrophe that would be more devastating then running out of oil.[5] Water, therefore, is a strategic resource that is essential to every nation's security.

Canada is not immune. Over the years, growing water demand in Canada has resulted in overdrawing of finite freshwater supplies and regional water shortages. This situation, coupled with an imbalance between the location of freshwater sources and

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[1] Marq De Villiers, *Water: The Fate of our Most Precious Resource*, (Toronto: Stoddart Publishing Co., 1999), 6-15.

[2] Shawn Tully, "Water, Water Everywhere," *Fortune*, May 15, 2000; http://money.cnn.com/magazines/fortune/fortune_archive/2000/05/15/279789/index.htm; Internet; accessed 19 January 2010.

[3] Margret Catley-Carlson, "New Worlds of Water," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

[4] United Nations, "International Year of Freshwater 2003," http://www.un.org/events/water/brochure.htm; Internet; accessed 3 February 2010.

[5] Meena Palaniappan and Peter H. Gleick, "Peak Water," in *The World's Water 2008-2009: The Biennial Report on Freshwater Resources* (Washington: Island Press, 2009), 1.

population usage, amplified the deficiencies in regions and in turn provoked further drawing down of non-renewable supplies. The Canadian solution was to increase supply through building diversions, dams, storage and planning for massive water diversions.[6] However, these solutions have come with very significant environmental and public health costs.[7] Similar to the rest of the world, industrialization and urbanization has increased pollution, further aggravating the scarcity of freshwater sources. Surprisingly, Canada is facing a future freshwater crisis.

A major dimension of Canada's growing water crisis is the increasing need for freshwater in the United States (US) from shared boundary and, potentially, non-boundary freshwater sources. The US, also experiencing similar problems but on a much larger scale, is expecting massive freshwater shortages. In the next 10 years, the US, as a whole will be faced with shortages in more than 75% of its cities, and the Southwest region in particular, will have to deal with severe shortages within 20 years unless alternate freshwater supplies can be secured.[8] Considering the US has the largest economy and is currently the most powerful nation in the world, these shortages have caused legitimate concerns over the future use of the continental freshwater supplies. NAFTA and the intertwined nature of Canada's economy into the US only further complicate the issue. Without a significant breakthrough in technology for alternative

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[6] Rob De Loe and Reid Kreutzwiser, "Challenging the Status Quo," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 85.

[7] Karen Bakker, "The Governance Challenge," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

[8] Maude Barlow and Toney Clarke, *Blue Gold: The Battle Against Corporate Theft of the World's Water* (Toronto: McClelland & Stewart Ltd., 2002), 16.

water sources, the US will more than likely look to Canada, as it has in the past and at Canada's expense, to satisfy its strategic freshwater needs and ensure national security. Will Canada be able to protect its freshwater?

Unfortunately, throughout the years, Canada's various levels of government have been in disagreement over the jurisdictional authority for freshwater. As a result, the country has been unable to safeguard and protect its freshwater from corporate and external continental demands. Canadian federal system ensures decentralized governance of natural resources, even though water is a unique valuable resource. In distribution and movement alike it crosses jurisdictional and hydrological boundaries and is not only competed for but essential to multiple users throughout society.[9] Decentralization of water governance has caused fragmentation and variation of policy amoung the provinces continue to counter a united approach to protecting and preserving Canada's national freshwater in an environment that challenges its water security.

So how can Canada carry forward and protect its most precious natural resource from internal misuse and growing US demands under the current decentralized water governance setup? Does Canada really have a choice in protecting its sovereign waters against the US? This paper will demonstrate that Canada has no alternative but to establish and implement a national water policy that dictates federal leadership, jurisdictional authority over Canada's freshwater and an integrated approach with the

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[9] Karen Bakker, "The Governance Challenge," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

United States so that the current water crisis and future continental demands can be met with minimum impact to the environment and public health.

The paper will first focus on the myth of Canada's water abundance and the current water situation in Canada. In order to properly set the stage as to the realities of the North American water situation, it is essential that a special effort be made to build the proper foundation of facts and issues that are unfamiliar to most.

Thereafter, the paper will more swiftly discuss Canadian water management challenges and collaboration difficulties with the US. Special attention will be given to the Boundary Waters Treaty (BWT), the Council of the Great Lakes Governors and government legislation that has attempted to address bulk water diversion in response to growing US demands.

Thirdly, in order to fully appreciate the severity of the US situation, the paper will look at the present and future freshwater needs of the US and the constraints that NAFTA imposes on a possible Canadian response to satisfying the US needs.

In concluding, the paper will identify an impediment that Canada must acknowledge when dealing with future American freshwater needs. It will also consider actions that Canada may take to mitigate the impediment and ensure water protection and efficient action to deal with the growing Canadian and global freshwater crisis.

Water, water everywhere – but not a drop to drink.[10]

- Samuel Taylor Coleridge

CHAPTER 2 – THE BIG PICTURE

Water is essential to all life and it is the ecological backbone of our planet. Without it, our planet would cease to operate and therefore it is can be claimed that water is the most valuable resource that we have. The earth holds approximately 1.4 billion cubic kilometres of water.[11] Of this, 97.5% is salt water and the other 2.5% consist of fresh water.[12] Salt water in oceans, seas and bays covers over 71% of the earth and is important to the world ecological system; however it cannot be consumed like fresh water.[13] Fresh water, the other 2.5%, consists of approximately 36 million cubic kilometres of which, approximately 11 million cubic kilometres or 0.77%, is effectively re-circulated in the form of precipitation through the 'hydrologic cycle.'[14] The rest of the known useable water is trapped in icebergs, glaciers, permanent snow caps and deep ground water that is inaccessible.[15] What's left over for human consumption? Only

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[10] Samuel Taylor Coleridge, *The Rime of the Ancient Marine*, http://www.online-literature.com/coleridge/646/; Internet; accessed 25 March 2010.

[11] Maude Barlow and Tony Clarke, *Blue Gold: The Battle Against Corporate Theft of the World's Water* (Toronto: McClelland & Stewart Ltd., 2002), 5.

[12] Environment Canada, "Water," http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=11A8CA33-1; Internet; accessed 19 January 2010.

[13] Julian Caldecott, *Water: The Causes, Costs and Future of a Global Crisis* (London: Virgin Books Random House, 2007), 62.

[14] Barlow and Clarke, *Blue Gold …, 5.*

43,800 cubic kilometres of the 1.4 billion cubic kilometres is available for human consumption.[16] If this water was evenly distributed, it could provide every human being with approximately 8000 cubic meters a year.[17] Unfortunately, this is not the case for many reasons, but most importantly it is because of human intervention that the hydrologic cycle is unable to correct.

The hydrologic process provides the earth with renewable fresh water to consume is called the hydrological cycle. Constantly in motion, it is like a water wheel providing renewable fresh water to various regions around the earth. Renewable fresh water defined as "salt-free water that is fully replaced in any given year through rain and snow that falls on continents and flows through rivers and streams to the sea."[18] When the useable fresh water falls to the earth's surface, in the form of rainfall, the water flows directly into oceans or lakes via rivers. The water then evaporates, transpires and goes into the atmosphere where it condenses and turns into clouds. Cloud particles collide and grow, becoming too heavy to remain in the sky and fall to the ground as precipitation. This freshwater then becomes runoff and flows directly into large bodies such as the ocean or lakes, recommencing the cycle.

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[15] Michael Keating, *To The Last Drop* (Toronto: McMillan of Canada, 1986), 1.

[16] John B. Sprague, "Great Wet North? Canada's Myth of Water Abundance," in *Eau Canada*, ed Karen Baker (Vancouver: UBC Press, 2007), 25.

[17] Marq De Villiers, *Water: The Fate of our Most Precious Resource*, (Toronto: Stoddart Publishing Co., 1999), 37.

[18] World Resource Institute, 2002-2004, "*World Resources 2002-2004: Decisions for the Earth: Balance Voice and Power*," (Washington: WRI, 2003), 276.

Some of the water, however, is soaked into the ground through infiltration which creates groundwater. Groundwater infiltrates the earth's surface and is "found underground in the spaces between particles of rock and soil, or in crevices and cracks in rock."[19] Areas where water is trapped between rocks beneath the ground that forms water reservoirs, although in some cases still moving, are called aquifers. This moving ground water acts like underground rivers and flows towards oceans, rivers or lakes forming a critical supply of the hydrological cycle.[20] However, some groundwater, called meteoric water, only exists within a closed system and does not act like underground moving water. These static aquifers provide large secure supplies of groundwater that are not part of the hydrologic cycle but are only replenished and sustained by infiltration at the same rate as their withdrawals or they will decline.[21] It is estimated that within Canada, groundwater is 37 times more abundant than any surface volume of water in rivers and lakes.[22]

Of the 43,800 cubic kilometres of fresh water re-generated through the hydrologic cycle, Canada's portion, approximately 2,849.5 cubic kilometres, recycles precipitation as rain or snow throughout the system.[23] This is approximately 6.5% of the world's total

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[19] Environment Canada, *Groundwater – Nature's Hidden Treasure*; http://www.ec.gc.ca/eau-water; Internet; accessed 19 January 2010.

[20] Barlow and Clarke, *Blue Gold …*, 6.

[21] Ibid., 6.

[22] Munk Centre for International Studies, *Groundwater: A North American Resource*: Expert Workshop on Freshwater in North America, (Toronto: University of Toronto, 2002), 2.

renewable fresh water and ranks third, marginally ahead of the United States at 6.4% but behind Brazil and Russia at 12.4% and 10% respectively.[24] Considering that Canada has 7% of the world's land mass, this allocation of 6.5% of the world's renewable fresh water seems agreeably proportionate and therefore understandable. Canada also enjoys 9% of its total area covered by fresh water lakes and rivers and 25% of the world's wetlands.[25] There are more lakes area in Canada than any other country.[26] It is fortunate that Canada also shares the largest freshwater system in the world with the United States (U.S.). The Great Lakes boast 20% of the world's surface freshwater.[27] Based on this copious water supply and ample renewable fresh water, when applied to Canada's small population, one can not be surprised that Canadians only consume 2% of their total available natural renewable fresh water resource per year.[28] Canadians use approximately 1607 cubic metres per capita to meet all human uses (domestic, agriculture and industrial) from the annual renewable supply of 92,810 cubic metres per capita.[29] Based on this excess, one

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[23] Ibid., 2.

[24] World Resources Institute, *World Resources 2005*, (Washington: WRI, 2005), 209.

[25] Environment Canada, *Water: Quickfacts*; http://www.ec.gc.ca/eau-water; Internet; accessed 19 January 2010.

[26] Environment Canada, *Water: Quickfacts* … Internet; accessed 19 January 2010.

[27] Claire Farid, John Jackson and Karen Clark, *The Fate of the Great Lakes: Sustaining or Draining the Sweetwater Seas*, (Buffalo, NY: Buffalo News Press, 1997), 17.

[28] WRI, *World Resources 2002-2004 Data Table 11*, 275.

[29] Ibid., 275.

might assume that Canada is extremely 'water rich' in comparison to the rest of the world. In comparison, India has a renewable water supply of only 1261 cubic kilometres per year to support a population of approximately 1,157,000,000.[30] This calculates out to 1090 cubic metres per capita of total renewable water supply. This is notably less than what Canadians consume in a year and we have far fewer people. The data above from the World Resource Institute does not include surface water flowing in from neighbouring countries, nor does it take into account water flowing out of Canada through cross-border aquifers, rivers and lakes. Therefore, in Canada's case, it does not reflect the sole renewable water that originates from within Canadian territory. However, after computing internal renewable water resources, the overall renewable water supply was approximately 86,000 cubic metres per capita. Thus, the excess renewable fresh water is still overly abundant by comparison to India and to other nations as well.

So what's the big deal? Why are David Suzuki and other Canadian expert ecologists claiming that we are facing enormous water shortages in a North America where we have ample renewable freshwater supply in gross excess of our demands?[31] Why are national newspapers claiming that "Canada is home to roughly 40% of the Earth's store"[32] while most hydrologists are calling Canada's fresh water supply a myth? Interestingly, there is no agreement amongst academics on this issue. Marcel Boyer,

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[30] CIA, *The World Factbook*; https://www.cia.gov/library/publications/the-world-factbook/geos/in.html; Internet; accessed 1 February 2010.

[31] David Suzuki and David Boyd, *Green Guide* (Vancouver: Greystone Books, 2008), 36.

[32] Editorial, *Globe & Mail,* February 13, 1999.

chief economist of the Montreal Economic Institute, views Quebec's renewable fresh water as an unused, overabundant resource that eventually makes it way back to the seas and ocean once it is used.[33] Boyer also argues that diverting water beyond its natural watershed is not a new concept and more likely to be prevalent in the future, thus supporting the argument to legitimize water as an economic good.[34] The International Conference on Water and Environment held in Dublin, Ireland in 1992 also supported this concept where it defined water as an economic good.[35] Overall, the case for such an argument generally maintains that "per capita, Canada has an overall water surplus and is considered to have the potential to be a prime exporter of water, especially to the United States."[36]

The opposite and more widely accepted stance on this issue argues that Canadians and others are misled in their perception of Canada's water supply by the mere fact that there is so much visible surface water contained in lakes.[37] As one flies over the country, the visual perception of an abundant amount of water in Canada is a "function of the

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[33] Marcel Boyer, *Freshwater exports for the development of Quebec's blue gold*, Report for the Montreal Economic Institute (Montreal: Valna Graphisme & Impression, 2008), 10.

[34] Ibid., 5.

[35] International Conference on Water and Environment, "The Dublin Statement on Water and Sustainable Development," http://www.un-documents.net/h2o-dub.htm; Internet; accessed 2 February 2010.

[36] James McNiven and Farah El-Ayoubi, "Bulk Water Exports: Environmental Concerns and Business Realities (Halifax: Dalhousie Univeristy, 2006); available from http://www.ucowr.siu.edu/proceedings/2005%20Proceedings/Conference%20Proceedings/07-12-05%20Tuesday%20PM2/Session%2012/12.4.McNiven.pdf; Internet; accessed 2 February 2010.

[37] John B. Sprague, *Great Wet North …, 24.*

large number of depressions that hold water (ie. Lakes) left by retreating glaciers."[38] Topography coupled with a cool climate causing a slow evaporation rate makes it appear that Canada is very water-wealthy.

Supporting this last statement are leading experts on Canada's fresh water: Ralph Pentland, Adele Hurley and John Sprague. Sprague specifically illustrates how the proportion of water distribution compared to population within Canada distinctly limits available and accessible fresh water. Approximately 60% of Canada's annual fresh water supply flows northbound and drains in the arctic and sub-arctic regions.[39] Considering that 85% of the population lives within 250 kilometres from the Canada-US border, this annual freshwater flowing north is effectively unavailable for use leaving the remaining 40%, or about 2.6% of the global fresh water supply. When considering Canadian demographics, there is a significant difference from the amount of water available earlier discussed and puts Canada in a much different light, thus disposing of any myth that Canadian water supplies are more than sufficient.

Furthermore, the precipitation that does flow in the southern portion of Canada also cannot be completely considered to be practically available in its entirety. There are amounts of water that will directly flow into the Great Lakes and down the St. Lawrence, or be funnelled off the coastal mountains and terrain, both flowing back into oceans completely untouched by humans.[40] Additionally, one should not ignore the importance

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[38] David Schindler, "The future of Canada's Water," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), xiv.

[39] Environment Canada, *Water: Quickfacts* … Internet; accessed 19 January 2010.

and consumption of water in supporting forests, wildlife, and vegetation that must be calculated against the total renewable fresh water supply.[41] Peter Gleick, one of the world's leading experts on water resources claims that globally, Canada has no significant surplus and an average amount of freshwater.[42]

Further to this argument on Canadian fresh water supplies, Sprague demonstrates that the US has more renewable fresh water than the majority of Canadians. "Even excluding the Alaskan part of the US supply, the 48 contiguous mainland states receive 57% of the national supply …."[43] This equates to approximately 3.7 % of the global supply, making it much more than Canadian water supply, and if one includes both Hawaii and Alaska, it is almost 2.5 times what most Canadians, living within 250 kilometres from the Canada-US border, are supplied.[44] So why is there a paranoia that the US wants to tap into Canadian lakes and rivers and start pumping water south if they are endowed with greater quantities of fresh water than we are? The simple answer rests in the size of the US's dense urban population and the demand driven by the largest economic machine in the world.[45]

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[40] Michael Keating, *To the Last Drop* (Toronto: McMillan of Canada, 1986), 13.

[41] Tony Clarke, *Turning on Canada's Tap? Why we need a Pan-Canadian and Strategy Now on Bulk Water Exports to the U.S.*, A Polaris Report, April 2008. ;http://www.polarisinstitute.org/files/Turning%20on%20Canadas%20Tap-1-1.pdf; Internet; accessed 3 February 2010, 10.

[42] Peter Gleick, *The World's Water: 2006-2007* (Washington: Island Press, 2006), 346.

[43] John B. Sprague, *Great Wet North …, 26.*

[44] Ibid., 26.

The U.S faces regional shortages as a result of a misalignment between dense population and industrial centres with respective sustainable sources of freshwater. The majority of these centres has been operating a water deficit, using more water than the hydrologic cycle replenishes, thus causing a net depletion of regional sources of water. This situation is starting to occur in Western Canada and other Canadian regions.[46] In 2000, the US was consuming 21 billion gallons of water above the replacement rate.[47] Demand is also expected to increase in areas that are already regionally scarce of ample fresh water and many parts of the US are already faced with severe shortages. For example, some US southwest urban regions are expected to double over the next 20 years further increasing the demand.[48] According to the US General Accounting Office (GAO), 36 of 47 state water managers anticipate water shortages within the next 10 years given standard climatic conditions.[49] Factors such as pollution and climate change will also continue to exacerbate this issue.[50] In the foreseeable future, the overuse and impact

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[45] Tony Clarke, *Turning on Canada's Tap* …, 4.

[46] D.W. Schindler and W.F. Donahue, "An impending water crisis in Canada's western prairie province," *PNAS*, vol. 19, no. 19 (9 May 2006) 10-16; http://www.pnas.org/content/103/19/7210.full.pdf+html; Internet; accessed 6 February 2010.

[47] Gar Smith, "Water Wars, Water Cures," *Earth Island Journal* (San Francisco: Earth Island Institute, 2000) 31.

[48] Munk Centre for International Studies, *Groundwater: A North American Resource*: Expert Workshop on Freshwater in North America, (Toronto: University of Toronto, 2002), 8.

[49] United States General Accounting Office, *Report to Congressional Requesters: Freshwater* Supply 2003; http://www.gao.gov/new.items/d03514.pdf; Internet; accessed 3 February 2010.

[50] Tony Clarke, *Turning on Canada's Tap* …, 4.

of climate change and effects of increasing pollution in the US will force the government to find alternatives. Thus, the US will be tempted to look over the fence at its closest neighbour and devise ways of using the large fresh water pools in Canada's back yard. This is not a new concept. Over the past 50 years, diversions or proposed water transfers from Canada to the US have been planned and proposed.[51]

As discussed earlier, the misconception that Canada has significant fresh water resources not only exists in Canada but also extends to the US. Knowing this, it is important to understand why the US peers into Canada and salivates over a large amount of fresh standing water contained in lakes. Meanwhile, Canada has 7 of the 14 largest lakes in the world.[52] Yet water in these lakes only contributes to the hydrologic cycle through evaporation and rivers that run out from it, and the rest is stored water supplies. Similarly, aquifers that gain rainfall through infiltration above its equilibrium will eject the surplus by creating springs. To use Sprague's analogy to illustrate the utility of lakes and aquifers, "water sitting in lakes and aquifers is comparable to a capital resource of money that can be spent only once…the rivers running out of the lakes would represent interest and dividends that could be used every year for an indefinite time."[53] Considering this, the baseline volume of freshwater in lakes and aquifers is non-renewable if consumption or withdrawal is larger that the recharge. Only a small amount of lakes and aquifers are recharged each year. For example, the Great Lakes are the

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[51] Harold D. Foster and W.R. Derrick Sewell, *Water: The Emerging Crisis in Canada* (Toronto: James Lorimer & Company, Publishers, 1981), 30.

[52] Ibid., 10.

[53] John B. Sprague, *Great Wet North …, 24.*

result of glacier meltwater beginning millenniums ago that replenishes by 1% of volume per year.[54] The US portion of the Great Lakes makes up 90% of their standing water reserve and currently supports about 40 million people in total.[55] Over half of the 1% of its recharge is contributed by ground water flowing into the lakes; however, much of this water never makes its way back after it is used since it finds it ways in rivers and drains away.[56] If consumption outpaces replenishment, the balance of 'water' account will eventually deplete to the point where it no longer provides the 'interest', renewable freshwater, that the region relies on.

Peter Gleick describes this scenario as one where water takes on supply qualities of a non-renewable resource that he calls "Peak Water Theory".[57] Resources can be categorized as being either flow-limited like renewable resources, or stock-limited such as non-renewable resources that cannot be replenished in a practical period of time.[58] In the case of fixed local water resources that have a slow recharge or are consumed faster than they can be renewed, water becomes a resource that is stock limited and more or less

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[54] International Joint Commission, *A Guide to the Great Lakes Water Quality: Background for the 2006 Governmental Review* (2006); available from http://www.ijc.org/en/activities/consultations/glwqa/guide2bw.pdf; Internet; accessed 4 February 2010, iv.

[55] Jim Neil, "The Great Lakes Water Compact: Flawed but necessary?" *Update* Vol. 36, no. 2 (Oct 2008), 5.

[56] Fred Pearce, *When The Rivers Run Dry* (Toronto: Key Porter Books Limited, 2006), 30.

[57] Meena Palaniappan and Peter H. Gleick, "Peak Water," in *The World's Water 2008-2009: The Biennial Report on Freshwater Resources* (Washington: Island Press, 2009), 7.

[58] Ibid., 6.

non-renewable.[59] Similarly to Hubbert's Peak Oil theory, stock-limited water is initially found, consumption increases rapidly at a rate that is much higher than its recharge rate until some point where it peaks. Consumption then declines in proportion to declining supplies.[60] Eventually, the stock-limited water source will be depleted leaving the only source of future water completely dependent on the small negligible recharge rate, if one exists at all. In the case of substantial consumption of fossil groundwater supplies, land subsidence or saltwater intrusion often occurs; destroying what has taken thousand of years to recharge. Additionally, when water consumed from supply limited sources is never returned to the same water basins, such as the case for the Great Lakes, the water basin will eventually dry up.[61] Taking into account that this water is no longer in the regional hydrological system but remains in the overall global system, continuous over-consumption above nature's recharge rates will eventually create regional water scarcity and reduces the minimal recharge of freshwater through the depletion of water from the regional hydrologic system. In the case of the Great Lakes, this may take many years. However, according to Great Lakes United, a US-Canada joint environmental group, additional climatic influences in the next 40 years will assist in decreasing the flow from the Great Lakes to the St. Lawrence River by over a quarter.[62] Consequently this could jeopardize the flow of water to the Atlantic Ocean and alter the hydrologic system which

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[59] Ibid., 6.

[60] Ibid., 10.

[61] Tony Clarke, *Turning on Canada's Tap* …, 9.

[62] Barlow and Clarke, *Blue Gold* …, 36.

will in turn tilt "the balance of the ecosystem of the region in significant and sometimes unpredictable ways."[63]

Lakes and aquifers, therefore, are not always considered to be a renewable fresh water supply. The International Joint Commission (IJC), a joint Canadian – American commission initiated by the1909 Boundary Waters Treaty, states that waters such as the Great Lakes are considered to be non-renewable resources.[64] Of course, when water in static volumes such as lakes and aquifers are considered non-renewable resources, their consumption thus becomes similar to finite resources such as oil and natural gas. When water from these areas is consumed an alternative source eventually must be found.

It becomes clear that the overabundance of Canadian fresh water is not as positive as many believe and therefore the myth of ample quantities of such an important resource and the assumption that Canada is 'water rich' is without basis. In order to more completely assess this reality it is necessary to look further at the in-house demands and mismanagement on Canada's fresh water and secondary effects that impact overall supply, future use and distribution.

Consumption

Water is used in almost every aspect of our lives. Beyond the necessity to have water for life and to sustain the ecological system on earth, freshwater is also necessary for the production of consumer goods such as plastic bottles, magazines, barrels of oil,

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[63] International Joint Commission, *Protection of the Waters of the Great Lakes 2000*, Final Report to the Governments of Canada and the United States; available from http://www.ijc.org/php/publications/html/finalreport.html#10; Internet; accessed 5 February 2010.

[64] International Joint Commission, *Protection of the Waters of the Great Lakes 2000*, Final Report to the Governments of Canada and the United States; available from http://www.ijc.org/php/publications/html/finalreport.html#10; Internet; accessed 5 February 2010.

wedding rings, pencils, iPods, computer chips, cars, and agricultural products. Water is essential not only to our open market economy but also in providing energy to sustain our technological first world lifestyle. As such, North Americans are the largest consumers per capita of water in the world. Canadians, closely trailing the United States, use 343 and 382 litres per day per capita respectively.[65] By comparison, France uses less than half the Canadian consumption at 150 litres per day per capita.[66] This quantity is based on calculating total withdrawal of water and total intake for domestic use alone. According to Health Canada, 60 – 80 litres per day per capita is a sufficient amount to meet basic human needs plus sanitation, bathing and food preparation requirements.[67] Although domestic use has been on a shallow decline since 1991, Canadians still rank high with an average of 343 litres per day per person, which is significantly above most other nations.[68]

Water Use in Canada

Overall, Canadian consumption of water can be broken into three main categories: industrial, municipal and agricultural. The largest of the three is industrial for which thermal electrical power generation accounts for approximately 60% of the total water usage in Canada and 80% of the total industrial usage [69] Thermal energy to produce one

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[65] World Resources Institute, *World Resources 2005*, (Washington: WRI, 2005), 209.

[66] World Resources Institute, *World Resources 2005*, (Washington: WRI, 2005), 209.

[67] Dan Shrubsole and Diane Draper, "On Guard for Thee? Water (Ab)uses and Management in Canada," in *Eau Canada*, ed Karen Baker (Vancouver: UBC Press, 2007), 42.

[68] Ibid., 40.

kilowatt hour of electricity requires "140 litres of water for fossil fuel plants and 205 litres for nuclear power plants."[70] However, almost of all of the water used is discharged and returned back to its source and approximately 25% is reused in the cooling process of power generation prior to be discharged back to source. Only about 2% is consumed completely and no longer available for future use.

The second largest users within industry is manufacturing and mining which make up about 20% of the total water consumption.[71] It takes over 120,000 litres of water to manufacture one car and about 80,000 litres to make a ton of steel.[72] Most manufacturing companies "rely extensively on self-supply from fresh water sources – 83 percent in 1986."[73] Self-supplied means that these companies enjoy the use of bulk water at little to no cost where they draw water from lakes, rivers and groundwater.[74]

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[69] Statistics Canada, "Industrial Water Survey" *The Daily*, 12 March 2008, http://www.statcan.gc.ca/daily-quotidien/080312/dq080312c-eng.htm; Internet; accessed 5 February 2010.

[70] Environment Canada, "Withdrawal Uses," http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=851B096C-1; Internet; accessed 20 January 2010.

[71] Statistics Canada, "Industrial Water Survey" *The Daily*, 12 March 2008, http://www.statcan.gc.ca/daily-quotidien/080312/dq080312c-eng.htm; Internet; accessed 5 February 2010.

[72] Environment Canada, "Withdrawal Uses," http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=851B096C-1; Internet; accessed 20 January 2010.

[73] Michael Donahue, *Liquid Asset: Great Lakes Water Quality and Industry Need*, *Report* for the Great Lakes Commission, http://www.glc.org/docs/liqasset/liqasset.html; Internet; accessed 5 February 2010.

[74] Statistics Canada, "Study: Water use and the performance of the Canadian Economy" *The Daily*, 1 December 2004, http://www.statcan.gc.ca/daily-quotidien/041201/dq041201b-eng.htm; Internet; accessed 5 February 2010.

Fortunately, manufacturing and mining recycle around 51% of the total water drawn.[75] They will re-use water taken from source several times during processing before discharging back to its source. Of this, approximately 10% of freshwater used is consumed fully and considered lost for future use. Equally disappointing, of the remaining "6 727.8 million cubic meters of water that is discharged by manufacturing industries in Canada, 35.1% has not been treated before release."[76] Mining discharges waste water without treatment back to the source water supply which also has secondary effects. Approximately 60.9% of discharge from mineral extraction is untreated and most of the remaining discharge only goes through primary mechanical treatment.[77] In 2005, between these three users, a total of 38.6 billion cubic meters of wastewater was discharged.[78] Wastewater, or effluent, contains waste products. Regardless of whether or not it has passed through costly advanced treatment processes, they are unable to remove all the pollutants and chemicals. This water eventually becomes unusable for further domestic consumption, recreational activities and has the potential to further contaminate freshwater sources when it is discharged.

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[75] Statistics Canada, "Study: Water use and the performance of the Canadian Economy" *The Daily*, 1 December 2004, http://www.statcan.gc.ca/daily-quotidien/041201/dq041201b-eng.htm; Internet; accessed 5 February 2010.

[76] Environment Canada, "Industrial Water Use – 2005," http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=EC333114-1; Internet; accessed 20 January 2010.

[77] Environment Canada, "Industrial Water Use – 2005," http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=EC333114-1; Internet; accessed 20 January 2010.

[78] Statistics Canada, "Industrial Water Survey" *The Daily*, 12 March 2008, http://www.statcan.gc.ca/daily-quotidien/080312/dq080312c-eng.htm; Internet; accessed 5 February 2010.

The secondary effect of water use in industry is pollution, which has a major impact on water sources, habitat and future useable supply. 76.6% of the industry in the US Great Lakes region and 84 % of industrial demand on the Canadian side rely on water from the lakes.[79] As a result, of this high concentration of industry "the Great Lakes have turned into a giant waste dump."[80] In one year, 50 to 100 million tons of hazardous waste makes its way into the Great Lakes via the surrounding watershed and contaminated groundwater.[81] Less than 3% of the shoreline is now safe for swimming and fish are becoming too toxic for consumption.[82] In comparison in the US, 46% of all lakes are unsafe for drinking, fishing or swimming a result of industrial pollution from water discharged.[83] Many of Canadians rivers and lakes have met the same fate.[84] One major challenge is the enforcement of regulations and preventing reoccurrences through deterrence. In 2000, the province of Ontario had 1900 known violations of water

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[79] Michael Donahue, *Liquid Asset: Great Lakes Water Quality and Industry Need*, *Report* for the Great Lakes Commission, http://www.glc.org/docs/liqasset/liqasset.html; Internet; accessed 5 February 2010.

[80] Michael Keating, *To the Last Drop* (Toronto: McMillan of Canada, 1986), 61.

[81] Barlow and Clarke. *Blue Gold* …, 35.

[82] Ibid., 36.

[83] Maude Barlow, *Blue Covenant: The Global Water Crisis and the Coming Battle for the Right to Water*, (Toronto: McClelland & Stewart Ltd., 2007), 8.

[84] David Schindler, "The Myth of Abundant Canadian Water," *Innovations Canada*, http://www.innovationcanada.ca/en/articles/the-myth-of-abundant-canadian-water; Internet; accessed 9 February 2010.

pollution but only 4 cases were brought to justice.[85] Monitoring water quality and enforcement of environmental standards are therefore necessary in preserving future fresh water resources from the destruction that pollution causes to useable fresh water supplies.

Oil exploration and production companies are also large users of fresh water and significant contributors to polluting both ground and lake water sources. Each year in Alberta, over 200 billion litres of water are used to assist in pumping oil from wells.[86] Once the oil is out, the water remains behind and becomes contaminated and unusable and hence risks further contamination of the ground water feeding the regional hydrologic system. The tar sands in north eastern Alberta, the world's seconded largest oil reserve, uses large amounts of fresh water to separate the heavy bitumen oil from the sand. The water after it is used in the process becomes so contaminated that it can no longer be discharged back to its original source and must permanently be stored in tailing ponds.[87] Much of the water that is used for the tar sands comes from aquifers that do not have a significant replenishment rates in comparison to their withdrawal rate. Therefore, scientists predict that regional water shortages are expected to occur.[88]

As might be expected, naysayers of the harmful impacts of oil sands production come from the oil sands producers themselves. According to the In Situ Oil Sands Alliance (IOSA), 90% of the water used in the oil sands is non-potable before its use and

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[85] Karren Baker, "Water Security: Canada's Challenge," *Policy Options*, Vol. 30, no. 7 (July-August 2009), 18.

[86] Barlow and Clarke, *Blue Gold* …, 14.

[87] Ibid., 15.

[88] Ibid., 15.

about a half of barrel of this is used to make one barrel of bitumen.[89] In sharp contrast, the Pembina Institute, a leader in environmental research and sustainable energy solutions, calculates that it takes 10 cubic metres to develop one cubic metre of synthetic crude oil. Due to the practice of water recycling in this process, the net water used is between 2.5 to 4.5 cubic metres per cubic metre of oil (varied based on producer).[90] Additionally, approved oil sands mining has been licensed to withdraw 359 million cubic metres of freshwater from the Athabasca River of which only 10% is returned and the other 90% is pooled in tailings ponds currently covering 130 square kilometres.[91] Overall, the province apportioned 7% of total water allocations to the oil and gas industry and 37% of all ground water allocations.[92] This is a significant amount of water which is consumed and unusable for further use considering, according to Dr. David Schindler that the oil companies are lavishly using water for oil production in a region that has never had an excess or abundance of water.[93] Schindler, also states that the continued

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[89] Glen Schmidt, "Water use in bitumen recovery is minimal; Most is unfit for human consumption or irrigation," *Edmonton Journal*, 18 May 2009, A.14.

[90] Mary Griffiths, Amy Taylor and Dan Woynillowicz, "Troubling Trends: Technology and Policy Options to Reduce Water Use in Oil and Oil Sands Development in Alberta. 1st ed. The Pembina Institute (Drayton Valley: Pembina Institute, May 2006) available from http://pubs.pembina.org/reports/TroubledW_Full.pdf; Internet; accessed 6 February 2010.

[91] Mary Griffiths, Amy Taylor and Dan Woynillowicz, "Troubling Trends: Technology and Policy Options to Reduce Water Use in Oil and Oil Sands Development in Alberta …, accessed 6 February 2010.

[92] Mary Griffiths, Amy Taylor and Dan Woynillowicz, "Troubling Trends: Technology and Policy Options to Reduce Water Use in Oil and Oil Sands Development in Alberta …, accessed 6 February 2010.

[93] David Schindler, "Threats and Prospects for Canadian Freshwater: A Scientist's Perspective," McGill Institute for the Study of Canada - Canadian Water: Towards a New Strategy Conference, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 12 April 2010.

development of the oil sands coupled with climate change will jeopardize the existence of the Athabasca River and Athabasca delta – the third longest undammed river in North America.[94] This is yet another example of how Canada is not abundant with unlimited fresh water and how regional water sources are prone to overconsumption and pollution in order to meet the demands of a first world lifestyle.

Other energy production processes, like coal-bed methane production, also use significant water for production. An average of 60,000 litres is used for each well per day.[95] In Montana, over the next 10 years, there are plans to establish up to 40,000 coal-bed methane wells.[96] That equates to approximately 2.4 billion litres of water per day being used to produce coal-bed methane. Regionally, this is a significant draw on ground water reserves that will further deplete this cross border shared aquifer that can be considered a quasi non-renewable water supply. A by-product of this process, saline water, will also cause significant saline pollution once the water is discharged back into rivers and streams. Alberta, as of 2008, had over 9,339 coal-bed methane wells and future plans included an expansion of this method of extraction.[97] Energy production, although necessary, is a major consumer of Canadian water.

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[94] David Schindler, "Running out of Steam Workshop on Oil Sands Development and Water Use in the Athabasca River Watershed: Science and Market-Based solutions," Joint Study of Munk Centre and Environmental Research Studies Centre, 10 May 2007; available from http://www.powi.ca/pdfs/running_out_of_steam_final.pdf; Internet; accessed 6 February 2010.

[95] Maude Barlow and Tony Clarke, "*Blue Gold*" …, 15.

[96] Ibid., 15.

[97] Government of Alberta, "Energy – Coalbed Methane FAQs," http://www.energy.alberta.ca/naturalgas/750.asp; Internet; accessed on 9 February 2010.

The pulp and paper industry, much like the oil and gas industry, consumes significant amounts of water for the process of combining water with solvents to break wood down in order to make paper. In the discharge water from this process are "dioxins and furans, some of the deadliest known toxins in the world, and they contaminate surface water and groundwater alike."[98] In Canada, it is estimated that this industry is responsible for half of the waste dumped in Canada's water. However, water used in the paper process has been on the decline due to improved technology that can capture and recycle the chemicals and water used to bleach paper.[99] In the end, not all of the chemicals and bleach is completely removed.

Municipal Use in Canada

The second category of fresh water use in Canada is municipal. Municipal withdrawal includes all the domestic uses of water such as washing, cooking, showers, baths and cleaning. This category also includes water withdrawals to support small commercial, industrial buildings and municipal government services such as firefighting, street cleaning, swimming pools, et cetera.[100] In 2006, Canadians withdrew approximately 5700 million cubic metres of which 1300 million was consumed.[101] The remainder either was returned back to the system internally, displaced externally to another watershed or polluted and returned. Domestic use of water over the past twenty

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[98] Barlow and Clarke, *Blue Gold* …, 33.

[99] David McLaughlin, "Water and the Future of Canada's Natural Resource Sector," *Policy Options*, Vol. 30, no. 7 (July-August 2009), 70.

[100] Environment Canada, *Water: Water Uses* … Internet; accessed 19 January 2010.

[101] Environment Canada, *Water: Water Uses* … Internet; accessed 19 January 2010.

years per capita has been declining as the municipalities increase the number of water meters, implement watering bylaws and install efficiency equipment.[102] However, total use has increased yearly because of steady population increase and can be expected to increase well into the future.

Canadians, as mentioned earlier, are not individually the best conservationists of water. We use approximately 343 litres per day for domestic use (cooking, cleaning, etc). In total, municipalities, including both personal and municipal needs, use 638 litres per day per capita. Municipal requirements encompasses all community activities that require water within a municipality and is not solely related to only individual domestic use as the previous figure represents. One of the most accepted explanations as to why Canadian use a greater amount more water than the rest of the world is because it lacks water ethics.[103] Dan Shrubsole and Diane Draper, explain that Canadians have a poor water conservation culture. Often the concern is too focused on how much water is used vice on how it is used. Additionally, there is no real incentive to encourage users to conserve water in their daily lives when most undervalue the resource and overuse as a result.

When water is cheap in comparison to other resources and its quantity cannot be monitored in order to identify over-usage or cost, then there is no financial incentive to conserve it. Installing meters is one mechanism to do this. Canada, however, has the

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[102] Environment Canada, *2004 Municipal Water Use Report*, http://www.ec.ca/water-apps/en/info/pubs/sss/e_mun2001.htm; Internet; accessed 19 January 2010.

[103] Dan Shrubsole and Diane Draper, "On Guard for …, 42.

[103] Ibid., 40.

cheapest prices for water of the most developed countries.[104] In Calgary, only approximately 80% of customers are metered and the city is expecting to meter the other 20% flat rate users by 2014.[105] Surrey, B.C., on the other hand, adopts a volunteer water meter program. Regardless of quantity and use, Montreal has no water meter program and flat rate water usage continues today.[106] Studies suggest that if there is an increase in a 10% hike in water prices that it will encourage an immediate 3-7% reduction in use. In many other countries, including the US, you can't buy a 13 litre toilet but in Canada you can. Why is this the case in Canada but it is in other countries around the world who use a lot less water per capita than Canadians? This overall lack of water ethics is founded by the misconception of Canada's magical water abundance and a failing to make Canadians realize its true value.

The second municipal consumption problem, after being undervalued and taken for granted, is our water infrastructure. If we focus on how water is used, or in this case wasted, we can quickly identify one major area that needs direct and immediate attention: leaky pipes. Water that is distributed to homes and businesses in a municipality is significantly wasted as a direct result of leaks. In 2005, according to the Federation of Canadian Municipalities, between 10% and 50% of potable drinking water being

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[104] Ibid., 48.

[105] City of Calgary, "Water Meter By-law Frequently Asked Questions," http://www.calgary.ca/portal/server.pt/gateway/PTARGS_0_2_780_241_0_43/http%3B/content.calgary.ca/CCA/City+Living/Residential+Resource/Utilities+and+Services/Water+and+Wastewater/Water+Meters/Water+Meter+Bylaw+FAQ.htm; Internet; accessed 9 February 2010.

[106] CTV News, "Water Meter deal cancelled; heads roll," September 22, 2009; http://montreal.ctv.ca/servlet/an/local/CTVNews/20090922/mtl_auditor_meters090922/20090922/?hub=MontrealHome; Internet; accessed 9 February 2010.

provided to communities was lost to leaks in piping throughout the distribution system.[107] Over 40% of the municipal water service in Montreal is lost to leaks annually.[108] Many would argue that the lack of repairs to leaking water infrastructure is because it costs too much to repair. To repair Montreal's municipal water system was estimated over $600 million.[109] It is estimated that it will cost the Canadian Government almost $53 billion (US dollars) to repair the dismal water infrastructure in Canada.[110] This is a significant amount of money, but the argument is a matter of priority, although often short-sighted by public officials. In an Ontario report by a group of municipal water management experts and environmentalists, it was found that if water efficiency was increased by 20%, it would provide enough saved electricity to light up 95% of homes in Ontario.[111] This study was based on a water efficiency field trial where the Region of Durham reduced water usage by 22% resulting in 13% electricity and 10% gas reductions.[112] So

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[107] Federation of Canadian Municipalities and National Research Centre, "Infra Guide," http://gmf.fcm.ca/files/Infraguide/Case_Studies/fact_sheet_case_study_halifax_april05.pdf; Internet; accessed 9 February 2010.

[108] Fred Pearce, *When the Rivers Run Dry* …, 26.

[109] CTV News, "Water Meter deal cancelled; heads roll," http://montreal.ctv.ca/servlet/an/local/CTVNews/20090922/mtl_auditor_meters090922/20090922/?hub=MontrealHome; Internet; accessed 9 February 2010.

[110] Barlow ad Clarke, *Blue Gold* …, 98.

[111] FLOW, Polis Progect, CWWA, Alliance for Water Efficiency, "Clean Water, Green Jobs: A Stimulas Package for Sustainable Water," http://www.flowcanada.org/sites/default/files/documents/clean_green.pdf; Internet; accessed 9 February 2010.

the utility of efficient water use and management is more than just sound conservation of a limited resource.

The third problem with municipal use of water is the management of sewage waste. The unfortunate part, whether or not it is treated or untreated raw sewage, is it's not just sewage. Today, more often than not one can find a number of pollutants in it. Although proper sewage treatment can combat fecal coli-form bacteria, including the deadly E. coli, treatment cannot remove the toxins from paint thinner, motor oil or other pollutants.[113] In a Quebec study, it was found that "85% of the sewage samples from all sources contained the following: Ammonia, phosphorous, aluminum, arsenic, barium, mercury, PCBs, etc …"[114] Not to mention the possible threat to human life, the obvious impacts of these particulates, as we discussed earlier, are devastating to the environment and to the contamination of the entire water source. This can lead to the complete consumption (loss) of a supply source thus reducing the total regional supply of renewable water in Canada.

In knowing these impacts one might assume that Canadians would want to ensure that their water sources remain clean and reusable for the future. Yet, yearly, Canada deposits 1 trillion litres of untreated sewage into our lakes and rivers.[115] The amount that

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[112] FLOW, Polis Progect, CWWA, Alliance for Water Efficiency, "Clean Water, Green Jobs: A Stimulas Package for Sustainable Water,"http://www.flowcanada.org/sites/default/files/documents/clean_green.pdf; Internet; accessed 9 February 2010.

[113] Barlow ad Clarke, *Blue Gold* …, 32.

[114] Development durable, Environnement et Parcs, "Eua," http://www.mddep.gouv.qc.ca/eau/voir.htm#P; Internet ; accessed 9 February 2010.

enters the Great Lakes alone from the 20 surrounding cities is estimated to be around 90 billion litres a year.[116] The impact of this on our water quality is significant. In 2001, a lethal strain of E. coli was found in their drinking water causing the death of seven people and hospitalization of 2300 people from Walkerton, Ontario.[117] Between 20-40% of all rural wells are contaminated as a result of poor waste management and many of these exist within native communities.[118] To replace this ancient national sewage system is estimated to cost $100 billion.[119] This cost, although significantly high, is almost an unquestionable requirement if it continues to contribute to the pollution of our fixed renewable fresh water re-supply. Waste management, water and sewage infrastructure upkeep, and sustaining our fresh water resources from both domestic pollution and sewage borne disease is of great importance. Why? Because we need to preserve life and ensure Canada retains its most precious renewable resource, fresh water.

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[115] Ibid., 31.

[116] Environment Canada, "Microbial Source Tracking: New forensic approaches to identify sources of fecal pollution," http://www.ec.gc.ca/scitech/default.asp?lang=En&n=4B40916E-1&xsl=privateArticles2,viewfull&po=B2DDBB17; Internet; accessed 9 February 2010.

[117] Peter Mansbridge, " CBC News Indpeth Timeline: E coli contamination in Canada," http://www.cbc.ca/news/background/health/ecoli-timeline.html; Internet; accessed 9 February 2010.

[118] Barlow, *Blue Covenant* …, 184.

[119] Karen Bakker, "Water Security: Canada's Challenge," *Policy Options*, Vol. 30, no. 7 (July-August 2009), 16.

Agricultural Use in Canada

The last category of water consumption that must be understood in Canada is agriculture. Agriculture accounts for approximately 9% of total Canadian demand.[120] Irrigation makes up 92.4% and the remainder is used for livestock watering.[121] Overall, this category consumes the most water out of all in Canada. That is, about 75% of the water used in agriculture is consumed and not returned to the source, consequently, this amount is lost.[122] Over the past twenty years, the total withdrawals for agriculture have been increasing from 3,125 in 1981 to 4,787 million cubic metres in 2006.[123] Ironically, the largest takers of water of this amount are the Western Prairie Provinces (WPP) which tend have the lowest supply of fresh water in comparison to other provinces. About 75% of all water withdrawals supporting agriculture take place in the WPP.[124] In Alberta alone, 60% of agriculture land is irrigated.[125] According to Schindler, "in the western prairie provinces (WPP) … freshwater is scarce."[126] In addition, his studies have shown

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[120] Dan Shrubsole and Diane Draper, "On Guard for Thee? Water (Ab)uses and Management in Canada," in *Eau Canada*, ed Karen Baker (Vancouver: UBC Press, 2007), 42.

[121] Environment Canada, *Water: Water Uses* … Internet; accessed 19 January 2010.

[122] Shrubsole and Draper, "On Guard for Thee?" …, 42.

[123] Toney Clarke, *Turning on Canada's Tap,* …, 10.

[124] Environment Canada, "Threats to water availability in Canada," http://www.environment-canada.ca/INRE-NWRI/default.asp?lang=En&n=0CD66675-1&offset=12&toc=show; Internet; accessed 6 February 2010.

[125] Statistics Canada, "Chart 1 Distribution of Irrigation, by Province, 2007; http://www.statcan.gc.ca/pub/16-002-x/2009003/c-g/c-g001-eng.htm; Internet; accessed 6 February 2010.

that the South Saskatchewan, Athabasca and the Old Man Rivers are down 80%, 40% and 30% respectively.[127] Out of all farms, 89% depend on groundwater for drinking and irrigation.[128] Agriculture, therefore, is the largest consumer of water in Canada and, like the US, is consumed in regional areas where the resource is scarce.

Considering this increased demand in water withdrawal to support both western agricultural and energy industries, while meeting the needs of a growing population to support these endeavours will create future regional water shortages. In order to compensate for these deficient quantities, a natural temptation to over-pumping of ground water sources will naturally take its course, causing significant long term effects on available water supply. Over-pumping in the Ogallala aquifer, 14 times faster than the natural replenishment rate, is a prime example of such an effect occurring in this case in the High Plains area of the US where the aquifer has dropped by over 100 feet. [129]
A secondary consequence, expected increased levels of pollution, will further contaminate possible water supplies and thus jeopardize current and future sources of water.

Pollution from the agriculture industry also occurs affecting both renewable and supply water sources. Through the use of fertilizers and pesticides, ground water and

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[126] D.W. Schindler and W.F. Donahue, "An impending water crisis in Canada's western prairie province," *PNAS*, vol. 19, no. 19 (9 May 2006) 10-16; http://www.pnas.org/content/103/19/7210.full.pdf+html; Internet; accessed 6 February 2010.

[127] Schindler and Donahue, …, accessed 6 February 2010.

[128] Munk Centre for International Studies, *Groundwater: A North American Resource*: Expert Workshop on Freshwater in North America, (Toronto: University of Toronto, 2002), 3.

[129] Ibid., 4.

surface water are bombarded by additional nutrients, pathogens and pesticides that are extremely harmful. Pesticides alone contribute 25 million tons of hazardous waste that soaks into the surrounding watersheds.[130] Nitrogen and phosphates, components of fertilizer, causes hypoxia depleting oxygen levels in the water. Too great an amount of these toxins has devastating ecological impact on the survival of fresh water life. In a 2004, CBC reported that due to extensive agricultural pollution enhanced by global warming was rendering Lake Winnipeg and the St. Lawrence River on the edge of ecological collapse.[131]

However, grain farmers are not the only source of agricultural pollution. Large cattle and hog farms have also contributed to polluted ground water and streams. Manure waste from these huge operations is stored in open lagoons where the manure will release over 400 different dangerous compounds, including hormones, into the soil and the air.[132] Due to the size of these operations, there are no cost effective alternatives considering that a large hog farm will produce the same amount of human waste found in a city of 360,000 people.[133] Much of this waste infiltrates the ground, effecting ground water and potentially rendering it unusable.

If fresh water supplies are not properly managed and apportioned in the western provinces, increased use may result in using more ground water proportionately to

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[130] Barlow and Clarke, *Blue Gold*, …, 35.

[131] Canadian Broadcasting Corporation, "A Sea of Trouble: Lake Winnipeg in Crisis," (2004); available from http://www.cbc.ca/manitoba/features/lakewinnipeg; Internet; accessed 1 February 2010.

[132] Barlow and Clarke, *Blue* Gold, …, 33.

[133] Ibid., 33.

support agriculture and the oil industry. Hence, depleting ground water supplies that are either supply-limited or recharge at very slow rates. Over 40% of the population in Saskatchewan and 1 out of 4 people living in the all three western provinces are already dependent on groundwater as a primary water source.[134]

Finally, the agriculture industry loses water from the overall regional hydrologic cycle through the production of food. The loss or consumption of this water is "virtual" because "it is not contained anymore in the product, even though a great deal of it was used in the production process."[135] When the food is exported outside of the region or country it is considered to be transferred in its virtual form and thus depleted from the regional hydrologic system. Canada is the fourth largest agriculture exporter in the world.[136] Thus, we are the fourth largest virtual exporter of water that is being transferred to other hydrological regions.

According to the UN, world wide food consumption will increase 13% by 2025, and populations around the world will explode by 2.6 billion people of which 86% of this increase will occur in the developing countries where water sources are becoming growingly sparse.[137] The demands for world agricultural products, the largest consumer

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[134] Environment Canada, *Water: Groundwater, …* Internet; accessed 19 January 2010

[135] Maude Barlow, *Blue Covenant, …*,16.

[136] Agriculture and Agri-Food Canada, "An Overview of the Canadian Agriculture and Agri-Food System 2007," (Ottawa: PWGSC, 2007) http://www4.agr.gc.ca/resources/prod/doc/pol/pub/sys/pdf/sys_2007_e.pdf; Internet; accessed 7 February 2010.

of water, from agricultural producing nations like Canada will rise significantly to support this population growth further increasing demands on finite water supplies above natural replenishment rates. The future call of Canada's agriculture industry on water supplies will increase proportionally and therefore so will the amount of fresh water consumed.

All of these three major categories of water use in Canada are both necessary and unavoidable if Canada is to continue to maintain its standard of living and the social benefits that our economy provides. Fortunately, Canada is lucky to have the benefit of already being blessed with sufficient water supplies to have grown economically and socially throughout the past century. Unfortunately, however, there is a limit to our exploitation of this resource even though we are comparatively better well off then many others in the world. Pollution, overuse and over-pumping, leakage, poor water infrastructure, water transfers from one regional watershed to another, poor waste management, over pumping of aquifers, and the overall impact on the amount of water in a regional hydrologic system will all lead to insufficient regional water supplies that are often located in high density urban population centres. Canada needs to start being water smart, use water more efficiently and with better strategic goals that will conserve and preserve both the water and the benefits that our water provides. The increasing demand on water will continue well into the future. As our populations grows, there will be an increase in the amount of water used to produce food, energy, cars, plastics, lumber, paper, oil and gas drilled and refined, and water used to support day to day lives.

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[137] Siwa Msangi and Mark Rosegrant, *World Agriculture in a Dynamically-Changing Environment*, Report prepared for Food and Agriculture Organization of the United Nations; available from ftp://ftp.fao.org/docrep/fao/012/ak970e/ak970e00.pdf; Internet; accessed; 6 February 2010.

Additionally, the demand on Canadian water will also be increased by many water starving nations that no longer have sufficient quantities. Our closet neighbour and ally, the US, will be one of them.

Non-Cultural Factors

There are two external conditions that, for the foreseeable future, have a negative impact on water use and supply in Canada. The first of these affecting Canada's water supply is climate change. Climate change impacts, in varying degrees, supply of water to different areas of Canada depending on the influence of climate change to the individual geographical area. This will have a degrading effect on all three major water uses in Canada depending on the location, severity and ecological influence of the regional climate change. Industry, municipalities, and agriculture in Canada will be impacted in different ways depending on where they live, operate or grow. "Regional climate change can profoundly alter local hydrological ecosystems."[138] Increases in carbon dioxide levels act like a reflective mirror trapping heat from the sun and thus cause regional temperatures to rise, affecting the hydrologic cycle by accelerating the evaporation and precipitation rates within that region.[139] As a result, climate change caused by global warming will exaggerate dry and wet conditions by changing the rain and snowfall patterns by increasing the evaporation rates before water runoffs to various lakes and oceans.[140] Areas that are already prone to drought, such as southern Alberta, are

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[138] Marq De Villiers, *Water: The Fate of Our Most Precious Resource* …, 77.

[139] Ibid., 80.

[140] Michael Keating, *To the Last Drop* …, 142.

expected to experience extreme drought conditions when most watersheds in the area are already at or near capacity.[141] Areas that are currently wet areas of Canada will be faced with the opposite, heavier flooding. Climate change will encourage extremes between the two as it shifts the hydrological cycle in various regions of Canada. This will in turn affect both the supply of and demand for fresh water by altering quantity and runoff timing.[142] Drier regions will have less runoff, causing increased drought conditions. As icecaps melt at faster rates causing rising sea levels, salt intrusion will threaten coastal aquifers and rivers making them unsuitable for human consumption or industrial and agricultural uses. In most cases, the timing will be altered to "earlier peak flows, greater winter flows, and lower summer flows."[143] Therefore, the seasonal supply of freshwater to support water users will change and the volume of the supply will experience both extremes: too much or not enough and at varying times. Some Canadian geographic areas however will experience periodic increases in recharge rates of ground water aquifers. Some areas will not. Lakes will see increased evaporation thus depleting overall useable fresh water supplies and tightening the water budget that certain regional areas rely on for a renewable resource. In the end, the uncertainty of annual precipitation will make water management more difficult and the changing seasonal resupply of freshwater is not expected to align with historical Canadian settlements.

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[141] Dan Shrubsole and Diane Draper, "On Guard for Thee," *Eau Canada* …, 42.

[142] Heather Cooley, "Water Management in a Changing Climate," in *The World's Water 2008-2009: The Biennial Report on Freshwater Resources* (Washington: Island Press, 2009), 43.

[143] Ibid., 43.

On average, warmer temperatures are expected in the northern portion of the continent causing a greater increase in precipitation as rain vice snow.[144] It is predicted by scientists that there will be less snow melt and as a result soil moisture levels will fall leading to decreased groundwater recharge rates.[145] Consequently, many of the groundwater wells that one third of Canadians rely on will be unusable.[146]

Water, is a "thermal regulator that moderates weather extremes."[147] Global warming will change the natural balance of water held within these regional hydrologic systems resulting in very unstable and varying weather extremes which will change the overall regional supply of fresh water.

The most vulnerable industry in Canada that could experience severe shifts in water supply is agricultural, specifically within the Western Prairie Provinces (WPP). Already reliant on ground water located in a water scarce geographical area of Canada, the WPP will more than likely be faced with further shortages, drought conditions and decreasing precipitation rates. Desertification could also be the end result for the west. This process, desertification, consists of the stripping of vegetation from the land causing the surface to dry out. In turn, this causes the ground to reflect more heat from the sun back into the atmosphere thus altering the thermal dynamics of the air and eventually decreasing annual precipitation rates. Eventually, precipitation rates fall to zero, causing

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[144]Munk Centre for International Studies, "Groundwater: A North America Resource …, 7.

[145] Ibid., 7.

[146] Ibid., 7.

[147] Maude Barlow, *Blue Covenant* …, 18.

soil erosion, declining water tables, destruction of vegetation and a complete ecological disaster.[148] Desertification, caused both naturally and by human interference, is always characterized by a loss of water in the regional hydrologic cycle. In the case of the WPP, continued overuse of its groundwater combined with the misuse of other freshwater sources in an environment characterized by global warming may cause severe water shortages in the near future. This could potentially initiate the distinctive effects that desertification has on renewed fresh water for the region, thus exacerbating the situation even further. Overall, the effects of climate change will be extreme. "Some scientists say that global warming is the single greatest cause of freshwater shortage in the world."[149] Canada is no exception.

The second condition affecting overall regional water supply in Canada after desertification is urbanization. Urbanization or urban sprawl denies water that is used from being returned to various water supplies within the hydrological system. Concrete, roads, homes, stores and urban infrastructure turn ever more of the land into a big paved parking lot void of forests, meadows, rivers and natural creeks.[150] As a result, less precipitation remains in the regional wetlands, streams, or fields causing less water to be evaporated from such retentive sources and thus decreases the overall supply within the system.[151] Urban growth further compounds the pressures on surrounding rural wetlands

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[148] Marq De Villiers, *Water* …, 73.

[149] Barlow and Clarke, *Blue Gol*, …, 42.

[150] Ibid., 10.

and overwhelms the system's integrity. More and more of the water, when discharged, is sent further out from both the regional hydrologic system and watershed to the ocean where it becomes salinized and contributes in greater measure to global warming and sea level rise.[152] Urbanization, directly proportional to an increasing population, will continue to grow with the population thus increasing the overall loss of water within a particular region "compromising the long-term viability of ecosystems and threatening to eliminate the services they provide."[153]

The second-order effect of urbanization is the loss of vital wetlands. Wetlands are a critical organ to the hydrologic system. They act like "sponges, soaking up excess rain and snow melt that would otherwise cause flooding, and they function like kidneys, filtering out dirt, pesticides, and fertilizers before the unwanted runoff reaches lakes and rivers."[154] Wetlands are also storage areas for water that remain in the regional hydrological system. Urbanization and large scale farming have caused much of the destruction of Canadian wetlands. Canada has approximately 25% of the world wetlands and over the last century Canada has destroyed approximately 70% of these wetlands across the country.[155] A consequence of the destruction of these wetlands is an increased

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[151] Maude Barlow, *Blue Covenant* …, 18.

[152] Ibid., 19.

[153] Stephane Dion, "2005-2006 Report on Plans and Priorities," Environment Canada, http://tbs-sct.gc.ca/est-pre/20052006/ec-ec/ec/ecr5601_e.asp; Internet; accessed 9 February 2010.

[154] Maude Barlow and Tony Clarke, *Blue Gold* …, 36.

[155] Ibid., 38.

acceleration of regional temperatures, resulting in further desertification, and a transfer in the supply of fresh water throughout the continent as a consequence of redistribution in the essential hydrologic water supply. In the end, Canada is slowly losing its ability to regenerate its renewable freshwater production capacity.

Canada is not a water rich nation. Canada is blessed by having its fair share of the world's limited fresh water supply. However, this amount is not something that Canadians should continue to take for granted. The freshwater supplies that Canada does have are disproportionate to the majority of the population, major industrial and agricultural users. By comparison, the US has more available fresh water than Canada but Canadians continue to consume water like it's always theirs for the taking. Over 60% of Canada's fresh water share flows northward away from permanent settlements in the southern portion of the country. Although abundant, the large freshwater lakes in the north receive less than 250mm of precipitation per year resulting in a recharge rate of 100 years.[156] The useable freshwater supply that is available for all users is much less than most Canadians believe. A majority of Canadians and others around the world are misguided by the perception of the vast numbers of lakes and rivers that can be tapped. What is misunderstood is that these non-renewable fresh water supplies are critical to the hydrologic system that guarantees Canadians with annual renewed fresh water. Continuous drawing down of these by tapping into lakes, diverting rivers, and over pumping of groundwater from aquifers, either confined or unconfined, potentially reduces the hydrologic 'principal deposit' from producing annual interest in the form of

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[156] David Schindler, "The myth of abundant Canadian water," *Innovations Canada*, http://www.inovationscanada.ca/en/articles/the-myth-of-abundant-canadian-water; Internet; accessed 10 February 2010.

fresh water. The removal of water from its original water basin leads to longer recharge rates of water supplies in the region. Decreased water in the regional hydrologic system causes an increase in the proportion of water that is being pushed to the two oceans changing the balance of total water within the various hydrological systems across Canada. This imbalance of usable water leads to regional water scarcity and imbalances within the Canadian ecosystem. Coupled with these issues are the destructive, yet preventable, behaviours and consequences that we are currently allowing to occur. Extensive urbanization, climate change, energy production, escalation of agricultural irrigation, industrial pollution, hydroelectric diversions, overconsumption, poor water distribution and waste management and leakage are all threatening our freshwater. However, all these consequences are not completely avoidable.

In order to sustain Canada's standard of living, provide food, goods, services and energy to society, the better use of water must occur. The key here is an acceptable degree of water consumption relative to misuses and abuse. The current impact on Canada's fresh water supply can be reduced and minimized through the application of better governance, practices, protection measures and achieving a better awareness of the real Canadian water situation. Canada needs to take better care of itself in preventing future internal regional water scarcity. Canada has to become smarter on the current water situation, its own needs and on the demands of water management before it can properly assess whether or not it can protect or will have sufficient freshwater to meet future external demands. Only in this way will Canada enable itself to preserve its future water renewability, position itself to have a better understanding of the real regional

water supply situation and be properly situated to address and potentially assist in improving the complex future global water environment.

How the does regulate, manage and legally protect its relatively limited fresh water resource today? Knowing this is essential not only in defining the water environment within North America but, more importantly, in beginning to scope out continental water management practices that meet Canadian needs.

CHAPTER THREE – FRAGMENTED GOVERNANCE

Canada's responsibilities and authorities to manage its national water resources have been separated between the province and the federal government since Confederation. This division, as a result of the Constitution Act (s.91, s.92 and s.109), has existed between the two levels assigning the most direct responsibilities to the provinces.[157] Though, the word "water" is not specifically mentioned in the Constitution, some of its uses do fall within the federal government's jurisdiction.[158] In general, the federal government is responsible for fisheries, navigation, oceans, agriculture, federal lands, First Nations water and international waters. However, it must be noted as it relates to cross boundary water issues, bottled water or bulk water exports the federal government is also responsible for international trade and commerce, international treaties, environment (jointly with provinces) and foreign affairs. On the other hand, the provinces hold the proprietary power over all the natural resources within their respective borders and hence are responsible for both water resources and supply inferred by the Constitution.[159] The federal government, however, may intervene in areas of provincial jurisdiction through the specific legislative power called "peace, order, and good governance" (POGG).[160] POGG allows the federal government to impose its will on

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[157] Rob De Loe and Reid Kreutzwiser, "Challenging the Status Quo," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 88.

[158] David Johansen, *Bulk Water Removals, Water Exports and the NAFTA*, (Ottawa: Depository Services Canada, 2002); available from http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/prb0041-e.htm; Internet; accessed 18 March 2010.

[159] Karen Bakker, "Water Security: Canada's Challenge," *Policy Options*, Vol. 30, no. 7 (July-August 2009), 17.

areas not identified in s.92 of the Constitution when the federal government deems an issue as a national concern. Many believe that POGG should be enacted to increase federal control of water management because it has become a national concern.[161] The judicial interpretations of POGG, however, are vulnerable to a variety of conclusions and limits.

Right away, one can clearly see the problems that are embedded with managing water in Canada. Water does not adhere to either provincial boundaries or constitutional defined delineation of responsibilities in the Canadian context. The fact that the hydrologic cycle, rivers, lakes and vast aquifers cross provincial, federal and even international boundaries in their provision of freshwater throughout North America illustrates the complexity of water management and its governance. The majority of water supplies in Canada are both interprovincial and international with the U.S. Thus the federal system of government and the allocation of responsibilities in the Constitution pose significant challenges to sound water management.

The provinces, independently, exercise their authority through their assigned "jurisdiction over public lands, municipal institutions, local works and undertakings, non-renewable resources, property and civil rights and energy, and their shared jurisdiction over agriculture."[162] In doing so, the provinces, independent and often very different

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[160] Owen Saunders and Michael M. Wenig, "Whose Water?" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 123.

[161] Ibid., 123.

from each other, have developed laws, policies and guidelines affecting licensing, environmental protection, controlling waste discharges, guiding land use and drinking water standards, all of which are important to water management.[163] The degree to which each province manages or delegates these responsibilities to the municipalities and local organization is completely dependent on the will the provinces, and how it determine the best way to manage water. Interestingly, the active management of water is usually delegated to the municipality, adding to the already existing multitude of cross-government and departmental policies and regulations governing water. Public utilities are often used in the supply of water within municipalities. This additional complexity and further delegation of responsibility detracts still further from effectively managing water to ensure coordinated water quality, environment protection, efficient and effective use across Canada during a period of fiscal restraint.[164]

Making the situation even more complicated, as discussed in Chapter 1, is the reality of water as a multi-purpose resource whose supply is critical to a vast number of different industries, municipalities and users, all of which are governed differently under the Constitution. This causes multiple departments in all levels of government to be actively involved in shaping water policy as it pertains to their jurisdiction. This independent and disjointed process of water governance can have unintended second or

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[162] Rob De Loe, *Towards a Canadian National Water Strategy*, Report prepared for Canadian Water Resources Association (Guelph: Rob de Loe Consulting Services, 2008), 7.

[163] Ibid., 7.

[164] Karen Bakker, "Introduction" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 4.

third-order effects on other aspects of water management that are the responsibilities of other levels of government and departments. In the federal government alone, over 19 different departments have a responsibility for water within Canada.[165] At the provincial level, the governments have the same problem, where several departments and organizations are responsible for various statutes relating to water management.[166] Meanwhile, "different ministries at different levels control highly interlinked policy areas and policies can differ significantly between provinces."[167] For example, groundwater policies governing withdraw permits, assessment of environmental impact, public participation rights and overall groundwater laws vary significantly from province to province.[168] Consequently, interprovincial conflicts over adjoining rivers, lakes or aquifers arise and often lack any presence or willingness by the federal government to arbitrate or intervene in interprovincial resource disputes.[169] In some instances when resolution is attained, the federal government may act in a participatory role to facilitate the conclusions reached by the provinces. Yet, the federal government tends to defer to the provinces as they press their constitutional claims even when a solution escapes

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[165] Karen Bakker, "Commons or Commodity?" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 187.

[166] Rob De Loe, *Towards a Canadian National Water Strategy* …, 7.

[167] Jen Nelles, "Wet vs Dry: Theorizing a Multilevel Water Framework for Canadian Communities" (Doctorate working paper, University of British Columbia, 2008), 3.

[168] Linda Nowlan, "Out of Sight, Out of Mind," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 64.

[169] Owen Saunders and Michael M. Wenig, "Whose Water …, 130.

them.[170] Such divisions of responsibilities confined by boundaries lead to many problems, inconsistencies and misuses, as discussed in the first chapter, when dealing with water that is both mobile and trans-boundary in nature.

The past forty years in the evolution of Canada's water management has seen an increase in the role of non-government organizations (NGOs), industry associations, and conservation groups.[171] Although not federally legislated, these various stakeholders have formed to take on an active interest and participatory role in policy development, governance and carrying out monitoring and collection of data.[172] NGO involvement resulted directly from the lack of attention and priority that the federal and many provincial governments gave to water issues during the 1990's. During this period, a reduction of staff and budgets throughout various ministries dealing with water management had major effects on both water management and awareness.[173] To the extent possible, NGOs took on responsibilities which served to make the intricate water management web more complex. However, increased requirements for collaboration and coordination to ensure effective and efficient management of Canada's water resource has made the overall process not only more complex but more fragmented. All the same while, the water management bureaucracy becomes bigger and moves slower.

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[170] Ibid., 127.

[171] Rob De Loe, *Towards a Canadian National Water Strategy* …, 9.

[172] Ibid., 1.

[173] Rob De Loe and Reid Kreutzwiser, "Challenging the Status Quo" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 89.

Collaboration in Governance

One area where this has occurred in the past is with water quality and quantity. The federal and provincial government rely on various non-government organizations to test and collect data on water quantity throughout the country. The problem with this is that there is no overarching standard or enforcement to uphold a non-existent national standard. Each province establishes its own water quality standards and relies heavily on NGOs to carryout it out. Several of these NGOs within Canada are very successful in monitoring and collecting data on various watersheds and rivers throughout Canada, however, many of them are often underfunded with no enforcement authority and are unable to test all water sources due to financial restraints and manning. The federal government, in this case, establishes guidelines on water quality but the provinces are not obligated to follow suit on maintaining these standards or enforcing them.[174] As a result, poor water quality can prevail and very little knowledge is attained on overall quantity and usage of water throughout the country.

Externally, water management of international trans-boundary waters between Canada and the US are governed by the Boundary Waters Treaty (BWT) of 1909. The BWT achieves two main objectives in the management of shared waters. First, it establishes a core set of legal principles to govern with and secondly, it provides an institutional framework to oversee the effectiveness and establishment of these legal principles.[175] In doing this, it attempts to prevent, mitigate and to resolve disagreements

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[174] Karen Bakker, "Introduction" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 6.

[175] Owen Saunders and Michael M. Wenig, "Whose Water …, 131.

between the two countries over shared waters through the provision of non-binding recommendations.[176] The six person International Joint Commission (IJC) was established with this treaty, consisting of three appointed Commissioners each, to operate at arm's length from their national governments in an effort to carry out the BWT provisions. As a quasi-judicial body overseeing applications for projects various projects that would impact natural level flows of boundary water, the IJC protects the interests of both countries.[177]

The IJC has successfully managed to mitigate many disputes over the years between the two countries. This framework is naturally efficient when bilateral and cooperative efforts are more beneficial, however, the treaty and its effectiveness is not without deficiencies. The first of these deficiencies lies in the dissimilar approaches to boundary waters and tributary waters (water contributing to boundary waters) or rivers crossing national boundaries.[178] Boundary waters are treated equally and with identical rights between both countries while the tributary waters can be diverted and used as the sovereign nation sees fit without consultation to the other.[179] Any diversions from shared boundary waters that can affect water levels or flows require approval by both

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[176] Commission, *Annual Report for 2008*, http://www.ijc.org/php/publications/html/finalreport.html; Internet, accessed 19 January 2010.

[177] International Joint Commission, *Annual Report for 2008*, http://www.ijc.org/php/publications/html/finalreport.html; Internet, accessed 19 January 2010.

[178] Owen Saunders and Michael M. Wenig, "Whose Water …, 131.

[179] Ibid., 131.

federal governments. This treaty however does not ban diversions nor does it restrict any diversion from rivers, streams or lakes that flow into the boundary waters.

Secondly, in 2002, Canadian Federal Law amended the International Boundary Waters Treaty Act, Bill C-6, to ban bulk water removals from boundary waters on the Canadian side.[180] No similar law or act banning bulk water removal has occurred on the U.S. side of the border. Additionally, this ban on bulk water removal only applies to boundary waters, leaving tributary waters and inland waters susceptible to such removals as determined by the provinces. The provinces followed suit with similar legislation that banned the removal of bulk waters but only half way, leaving several loopholes in their legislation and remaining free o change their laws unilaterally.[181]

The third major deficiency to the BWT, similar to domestic water management, is its lack of governance and principles that apply to ground water and how groundwater influences trans-boundary waters and watersheds.[182]

Fourth, diversions that existed before the Treaty was signed are not governed by it. For example, the Chicago diversion, built in 1900, is exempt from the BWT. The Chicago diversion redirects water from Lake Michigan through Chicago and Illinois Rivers to the Mississippi River. It currently diverts approximately 7600 million litres per

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[180] Ministry of Natural Resources, "Enhancing Existing Great Lakes Protection Through Charter Annex Implementation Agreements," (Government of Ontario, 2005); http://www.mnr.gov.on.ca/200062.pdf; Internet; accessed 20 March 2010.

[181] Ralph Pentland, "Canadian Water Sovereignty," Speaking Notes at the Green Party Summit (Ottawa, 2007); http://greenparty.ca/en/policy/documents/deeper_look_spp/ralph_pentland; Internet; accessed 20 March 2010.

[182] Munk Centre for International Studies, *Groundwater: A North American Resource*, 10.

day (1967 established volumes), making it the largest diversion from the Great Lakes.[183] This diversion is expected to increase proportionally to an increase in population in the future leaving Canadian interests in a defenceless position considering that Lake Michigan is completely within the U.S. and is not considered boundary waters.[184]

Lastly, there are limits to each nation's cooperation in engaging in bilateral cooperation through the IJC and BWT. This can be clearly observed in either the Teck Cominco's smelting pollution of the Columbia River, near Trail B.C. that resulted in contaminating Lake Roosevelt in the U.S or in the case of the Red River contamination by diverting water from Devils Lake in North Dakota.[185] Neither of these disputes has been resolved and, in the case of Tech Cominco, the IJC never even addressed this issue in its Annual 2008 Report. When one or the other does not want a cooperative approach, the IJC is circumvented. Thus, either country can still act unilaterally when cooperation is unfavourable in achieving their goals. "To a large degree, the effectiveness of the IJC is a question of politics."[186] Hence, the IJC's success depends on mutual benefits. It must be noted though that unlike many other bilateral or international organizations that Canada has been involved in, this particular relationship makes it possible to achieve

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[183] Great Lakes United, "The Fate of the Great Lakes: Sustaining or Draining the Sweetwater Seas?"(Duluth MN, 1997); available from http://www.glu.org; Internet; accessed 20 March 2010.

[184] Great Lakes United, "The Fate of the Great Lakes: Sustaining or Draining the Sweetwater Seas?"(Duluth MN, 1997); available from http://www.glu.org; Internet; accessed 20 March 2010.

[185] Owen Saunders and Michael M. Wenig, "Whose Water …, 134.

[186] Ralph Pentland and Adele Hurley, "Thirsty Neighbours" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 177.

levels of cooperation that cannot be had by many other nations when disputes exist and mutual benefits are sought.

Independent to the BWT yet in many ways complimentary, the Council of Great Lakes Governors (CGLC), established in 1983, consists of a partnership between eight Great Lakes states and the provinces of Ontario and Quebec. The Council's primary purpose is to coordinate regional water policy, protection and management of the Great Lake region.[187] Ontario and Quebec, associate members on the Council, are committed in a series of good-faith agreements with the other U.S. member states on the Council for managing the shared Great Lakes. Although this pact is only in good-faith and hence not binding, it does strengthen Canadian protection of the Great Lakes where the IJC is unable. The CGLC extends protection to all basin waters including groundwater, streams, rivers or lakes. Also, it bans diversions (with rare exceptions) and smaller scale diversion proposals which may not affect flow or water levels immediately, but that may cause cumulative damages to the region.[188]

There have been occasions where the CGLC and IJC have contradicted each other in their actions. An example of this was in 1998 when the Province of Ontario mistakenly licensed NOVA Group to export 6 million litres per year to Asia by tanker from Lake Superior. After a public outcry criticizing this breach from various organizations and state governments, including the US Secretary of State, the license was

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[187] Council of Great Lakes Governors, "The Beginning of the Council: Environmental Stewardship," http://www.cglg.org/Overview/History.asp; Internet; accessed 17 March 2010.

[188] Ministry of Natural Resources, "Enhancing Existing Great Lakes Protection Through Charter Annex Implementation Agreements," (Government of Ontario, 2005); http://www.mnr.gov.on.ca/200062.pdf; Internet; accessed 20 March 2010.

rescinded. Shortly after, the IJC recommended a moratorium on bulk water exports or any new diversions from the Great Lake region. However, the CGLC (including the Premiers from Ontario and Quebec) signed off on amendments to its original charter that created and allowed for a process of future water removals and takings from the Great Lakes region to support the region's industrial and municipal base. Consequently, this contradicted and annulled the IJC's moratorium. Why is this of significance? A federally sanctioned organization, the IJC, was contradicted and its established moratorium was overcome by the ability of regional states and provinces to unilaterally decide on new and future diversions, all the while the Canadian federal government remaining absent and mute.[189] In short: "Jurisdictional fragmentation is an issue that touches international water management as much as it does domestic concerns."[190]

Overall, internally and externally, it can be seen how Canada's water management web is very complex and often referred to as dysfunctional due to jurisdictional fragmentation. Coupled to this is the further delegation of water management to the lowest levels of municipal governments and local non-government organizations, thereby making it more complex. Canada's current water management regime is a "patchwork" of policies between differing provinces, municipalities and the federal government.[191] Even though it is seems relatively defined in the Constitution, the reality is that there are numerous overlaps, conflicting jurisdictions and over-delegation of responsibilities,

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[189] Maude Barlow, *Blue Covenant* …, 192.

[190] Owen Saunders and Michael M. Wenig, "Whose Water …, 136.

[191] Linda Nolan, "Out of Sight, Out of Mind," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 60.

which has caused numerous "gaps in important areas of responsibility and oversight."[192] Gaps, in turn, allow for improper uses and mismanagement of water as described in the previous chapter. Consequently, this "patchwork" reduces the overall effectiveness of the current system and makes it difficult and cumbersome to respond to water challenges.

Additionally, the relationship with the U.S., although amenable and effective when mutually beneficial, relies strictly on the BWT and the GLGC, which can be used to steward, although it cannot guarantee water security of our shared boundary waters. Considering the future regional water scarcity within both the US and Canada in the coming years and the growing strategic nature of water around the world, the effectiveness of these two organizations may be in jeopardy or they may be sidelined as they have been in the past.

Most importantly, as outlined in Chapter 1, poor management of our water sources and supplies has had and can continue to have long term detrimental effects on our total water resources. Dysfunctional and overly bureaucratic management, something that we can control, can be directly attributed to the lack "of a clear governance framework to oversee the protection, conservation, and good management of Canada's water resource."[193] A central focal point of leadership to guide water management remains problematic. Who then is responsible for the ongoing mismanagement, contamination and depletion of our ground water supplies, for the poor coordination of not only the provinces but the municipalities and local non-governmental players? Why

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[192] Karen Bakker, "Introduction" in *Eau Canada* …, 7.

[193] Paul Muldoon and Theresa McClenaghan, "A Tangled Web: Reworking Canada's Water Laws" in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 245.

has not the federal government stepped in and taken the lead? What have they done to provide the guidance necessary to carry the country into the future environment of world water scarcity? Is the current jurisdictional paralysis fixable?

Historically the balance between the provincial and federal levels of involvement in water management has shifted back and forth over the years irrespective of the standing constitutional direction.[194] This shift from federal to more established provincial water management programs occurred as Canada developed during the 20th century. In the early part of the century, the federal government was directly responsible for the western provinces' provision of water services.[195] In the past thirty years, there has been a withdrawing of federal involvement in dealing with water management issues both provincially and internationally when dealing with the US. In the 1990s, as previously mentioned, both federal and some provincial governments put water management on the back burner regarding priorities and reduce relevant budgets and have lost much of their water expertise within various departments.[196] From the slashing of the Inland Water Directorate of the Mulroney government to the chopping of 70% of the budget for the Freshwater Institute, a sub-department of Fisheries and Oceans, during the Chretien government, both political parties destroyed what potential leadership and management capability the federal government had.[197] An Environment Canada report

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[194] Rob De Loe and Reid Kreutzwiser, "Challenging the Status Quo" …, 88.

[195] Ibid., 88.

[196] Ibid., 92.

accidently released in 2005 that was meant for the department minister, then Minister Stephane Dion, claimed that current federal water policies were "short-term, fragmented and inadequately informed …industries and provinces are squabbling over depleting water resources with no national leadership."[198] This lack of prioritization of water management was due in part to the fiscal restraints of the 1990s and to the emergence of an ecosystem approach in which governments' focus shifted from individual issues toward the entire system.[199] Accordingly, federal water management became a subset of the ecosystem and hence the declining funds to support it.

Another reason for the shift away from federal involvement was due to the increased capacity and maturation of the provinces to independently fulfill their constitutional responsibilities as proprietors of water. The provinces not only have the capacity but also the legal support and to independently manage their own jurisdictional waters and keep the federal government from interfering in their constitutional rights. This role has always been clearly understood by the provinces.[200] Hence, the federal government started to shy away from getting involved in the management and governance of those areas that are clearly defined provincial responsibility.

Over the years, the federal government has often stayed clear of overstepping into provincial jurisdiction even when it could be in clear breach of a federal responsibility.

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[197] Maude Barlow, *Blue Covenant* …, 185.

[198] Ibid., 185.

[199] Rob De Loe and Reid Kreutzwiser, "Challenging the Status Quo" …, 92.

[200] Owen Saunders and Michael M. Wenig, "Whose Water …, 124.

The South Saskatchewan River Basin (SSRB) where the Alberta government diminished the natural in-stream flows thus endangering fish habitat, falling under federal jurisdiction, is a good example of the hands-off approach. Instead, the federal government provided resources to the Alberta government to assist with watershed and in-stream flow studies.[201] This approach on the other hand, did not properly address the continued destruction of the fish habitat in the SSRB but rather stayed clear of impinging upon the provincial jurisdiction.

There is a balance to the relationship between the provinces and the federal government and it is not just black and white. To be sure, there are marked constitutional limits on the federal power in this domain. Still, the federal government has chosen to take a back seat and defined its role as passive, which is to say ensuring respect of the provincial jurisdiction. All along, the federal government has of course perceived that increased federal participation in water management is not welcome by some stakeholders.[202] It has therefore adopted a stance that the provinces take the lead on all domestic water issues, as the resource owners, and be significantly involved with international boundary issues as well.[203] In so doing, the federal government ignores the need to uphold the national interest front and centre while over-emphasizing the need to maintain harmonious water relationships with the provinces. The lack of oversight and refereeing over the interprovincial water disputes that fail or are indefinitely stalled is an

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[201] Ibid., 128.

[202] Karen Bakker, "Water Security: Canada's Challenge," …, 17.

[203] Owen Saunders and Michael M. Wenig, "Whose Water …, 136.

area where the federal government should uphold the national interest and do so forefully when it is endorsed by provincial incapacity to cooperate.[204] The reliance on the BWT to handle counter future bulk water removals, as sparked by the Nova Group situation, while timidly avoiding "negotiations over the controversial Great Lakes Charter (GLC) in 2001, despite repeated referrals of bulk water export issues to the federal government by provincial governments,"[205] is a prime case in point. Given that bulk water removal is a matter of national interest, perhaps the federal government could have enacted POGG with a view to ensuring a coordinated national ban on bulk water removals instead of simply having it referred to the IJC in order to protect the federal–provincial harmony. This federal approach of continued reliance on the IJC to solve trans-boundary issues with active provincial involvement while the federal government sits in the background will not set them up for success in the future. The government needs to act indefatigably when required and establish the leadership necessary to handle both interprovincial disputes and international water conflicts that are obvious challenges to national interests. Considering the fallible nature of bilateral organizations when mutual benefit is not the winning game for both players and also the fact that the number of issues will not be solved by bilateral agreement, for example the Columbia River and Devils Lake disputes, is on the rise, the federal government's involvement in the forefront and in a leadership role is essential.

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[204] Ibid., 137.

[205] Karen Bakker, "Water Security: Canada's Challenge," …, 17.

So what active strategic leadership role has the federal government played in the past outside of referring to the IJC or amending the BWT? As a result of public uproar to arrest future planning of bulk water diversion from Canada to the US during the mid-80's, Prime Minister Brian Mulroney created the 1987 Federal Water Policy. [206] The intent of the this policy was to call for federal leadership in partnership with provinces and industry, establish recommendations to protect Canada's water quantity and quality, and to call for federally controlled ban over large-scale water diversions.[207] The actual policy was very encompassing, forward looking and included sound water management strategies. It included proposals to develop procedures to deal with interprovincial and inter-jurisdictional disputes.[208] Unfortunately, this water policy was never acted upon and has not been updated. When comparing the current Federal Water Policy published by Environment Canada (found at www.ec.gc.ca) and the1987 Federal Water Policy, they are identical in a world of change.

According to David Schindler, one of Canada's top water scientists, even today under the Harper government "throughout the country, we still have a mishmash of water policies that are inconsistent with respect to the precautionary principle of the environment and to protecting the rights of Canadians."[209] It is tragic considering over

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[206] Maude Barlow, *Blue Covenant* …, 186.

[207] Ibid., 187.

[208] Environment Canada, *Federal Water Policy* (Ottawa: 1987); available from http://www.ec.gc.ca/eau-water/24F409D1-744B-4AB0-823B-4E7F807DECF4/e_fedpol.pdf; Internet; accessed 19 January 2010.

[209] Maude Barlow, *Blue Covenant* …, 185.

the past twenty years there has been absolutely no federal guidance or progress on water management in Canada despite the water disputes, issues and attempts at challenging Canada's water security have taken place.

Considering the absence of reasonably effective multi-level governance as a prime feature of Canada's water management system, is leadership the overarching need? Are the gaps and problems with Canadian waters management necessary costs since jurisdictional fragmentation is unavoidable?

Some have argued that federal involvement in water management undermines provincial independence and the rights vested in the provinces through the constitution. Additionally, it is argued that the federal government lacks the expertise, resources and organization to effectively carry out water management at both the provincial and local levels where the top-down approach to low level buy in may be ineffective.[210]

On the contrary, many argue that the federal government's involvement is necessary due to the trans-jurisdictional nature of water and the required level of authority to deal with interprovincial and international issues that the provinces do not have. Similarly, migratory waterfowl species having both national and international characteristics require the same attention that federal jurisdictional offers regardless of whether the waters they use are cross borders or not.[211]

For its part, this paper argues that a national water policy and its implementation are unavoidable. The most substantive argument for a federal-led national water

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[210] Owen Saunders and Michael M. Wenig, "Whose Water …, 121.

[211] Ibid., 120.

management system is the requirement to deal with the growing challenges in the future world water security environment. With growing global freshwater shortages, exploding populations, climate change, regional water scarcity in Canada and the US will only exacerbate both external and internal demands on our sovereign supply of freshwater. Since most freshwater sources (lakes rivers and groundwater) transverse multiple provinces and states, only the federal government will be in a position strategically, with the support of the provinces, and coordinate a national response to the multitude of growing issues that will arise out of a thirsty US and water starving world.

CHAPTER 4 - SATISFYING THE THIRST AND NAFTA

The world is rapidly becoming scarce of freshwater where it is needed the most, in populated areas. Freshwater is unevenly distributed as a result of large water diversions, consumption, virtual export, pollution and climate change. The uneven distribution is further widening as societies continue to overuse, misuse, divert and transport water to meet the demands of urban communities. Approximately 40% of the world's population live in water scarce areas where basic water needs are not being met and approximately half of these people lack access to safe water.[212] As a result of significant population growth, by the year 2025, two-thirds of the earth's population will live in moderate to severe water shortage conditions and over 6000 children daily will die due to diseases associate with unsafe drinking water.[213] Water stressed conditions around the world will continue to spread and the demand for freshwater will continue to rise. The US is no exception to this reality.

The US, although having more accessible freshwater than Canadians, continues to operate a consumption deficit of approximately 21 billion gallons a year. With a population ten times greater than Canada and an economy that makes up roughly 33% of the world's GDP, it is not surprising that the US consumes over 25% of the world's natural resources and is the largest consumer of water in the world.[214] Regional scarcity

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[212] United Nations, "International Year of Freshwater 2003," http://www.un.org/events/water/brochure.htm; Internet; accessed 3 February 2010.

[213] United Nations, "International Year of Freshwater 2003," http://www.un.org/events/water/brochure.htm; Internet; accessed 3 February 2010.

continues and is expected to continue causing further regional shortages across the country.

As the US population and industries migrate from the Northeast to Southwest Sunbelt, so does the demand for freshwater. The Southwest US is a region that is expected to double its population over the next 20 years in an area historically lacking in ample freshwater supply. The "exploding human population in the US Southwest and its shrinking clean water supply are clearly on two colliding paths."[215]

The US, plagued by similar misuses and abuses of the overall freshwater supply as Canada, have been polluting, wasting and overconsuming both surface and groundwater supplies. Pollution has contaminated over half of all the streams in the US, water infrastructure is old and in need of large amount of costly repairs, and the overall freshwater consumption per capita is over 1500 cubic metres per year.[216] There are very few new discoveries of freshwater sources and much of the current supply is from existing aquifers and diversions from surface freshwater supplies.

The Colorado River, for example, has been diverted and piped to southern California and Arizona urban centres to the point where appropriations are larger than the overall annual water flow.[217] Five other states also rely on the Colorado River as a

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[214] Frank Quinn, "Water Diversion, Export and Canada-US Relations: A Brief History," Occasional Paper prepared for the Canadian Water Issues Council (Toronto: Munk Centre for International Studies, 2007), 3.

[215] Nancy Macdonald, "Water Fights," *Maclean's Magazine*, July 6, 2009, 44.

[216] Conference Board of Canada, "Environment: Water Consumption," http://www.conferenceboard.ca/HCP/Details/Environment/water-consumption.aspx; Internet; accessed 19 January 2010.

source of freshwater supply. It is no surprise that with 20 dams controlling the Colorado River tap that the river no longer flows to Mexico as it once did in the past.

Similarly, the Ogallala aquifer, the largest aquifer in the US and a significant source of freshwater extending northward from Texas to South Dakota encompassing the High Plains states (8 states), is being rapidly depleted.[218] Approximately five times larger than Lake Erie, only 15-20% of the total aquifer is technologically accessible and water usage is as high as 40 times the recharge rate in some areas.[219] 13.6 billion cubic metres a year is overpumped from ground aquifers of which a majority, 12 billion cubic metres, is overpumped from the Ogallala aquifer and some estimate that over half of it is already gone.[220] Overall usage for irrigation from the Ogallala accounts for 30% of the US's total irrigation and supplies water to one-fifth of the total US cropland.[221] Depletion rates of the Ogallala are approximately 12 billion cubic metres a year dropping the water levels by 100 feet in most areas of the aquifer.[222] In several areas throughout

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[217] Ralph Pentland and Adele Hurley, "Thirsty Neighbours" in *Eau Canada* …, 164.

[218] Keith Schneider, "U.S. faces era of water scarcity," *Circle of Blue News*, July 9, 2008; available from http://www.circleofblue.org/waternews/2008/worold/us-faces-era-of-water-scarcity; Internet; accessed 2 February 2010.

[219] Manjula V. Guru and James E. Horne, "The Ogallala Aquifer," The Kerr Centre for Sustainable Agriculture, Inc. (July 2000); available from http://www.kerrcenter.com/RDPP/Ogallala.htm; Internet; accessed 17 March 2010.

[220] Sandra Postel, "When the World's Wells Run Dry," *World Watch Magazine*, September/October 1999, 34.

[221] Manjula V. Guru and James E. Horne, "The Ogallala Aquifer," The Kerr Centre for Sustainable Agriculture, Inc. (July 2000); available from http://www.kerrcenter.com/RDPP/Ogallala.htm; Internet; accessed 17 March 2010.

the High Plain states, complete depletion, based on historical pumping rates, will occur in less than 25 years.[223] The impact of this depletion is locally significant and alternative solutions to irrigate the American agriculture heartland are already crucial. Additionally, domestic usage will also be significantly impacted causing strife and hardship over regional scarce supplies. Kansas alone withdraws 70% of its total water requirements from the Ogallala making itself extremely dependant on the aquifer. Within 50-100 years, vast amounts of land within Kansas will have no usable ground water for irrigation.[224] Without a suitable supply of water the Midwest US and its massive agricultural industry would be devastated. The US government will be faced with no other choice but to find alternative sources external to the geographic area through imports or diversion from the other water supplies in relative close proximity. The question is from where?

A major cause of the problem is the urban water depletion in the US. Approximately 80% of the population lives in urban centres where the local watersheds or water supplies are being continuously depleted.[225] Any concentration of a population

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[222] Keith Schneider, "U.S. faces era of water scarcity," *Circle of Blue News*, July 9, 2008; available from http://www.circleofblue.org/waternews/2008/worold/us-faces-era-of-water-scarcity; Internet; accessed 2 February 2010.

[223] J.A. Schloss and R.W. Buddemeir, "Estimated Usable Lifetime," in *An Atlas of the Kansas High Plains Aquifer* (Lawrence, Kansas: Kansas Geological Survey, 2000) available at http://www.kgs.ku.edu/HighPlains/atlas/index.html#Atlas_Directory; Internet; accessed 21 March 2010.

[224]J.A. Schloss and R.W. Buddemeir, "Estimated Usable Lifetime," in *An Atlas of the Kansas High Plains Aquifer* (Lawrence, Kansas: Kansas Geological Survey, 2000) available at http://www.kgs.ku.edu/HighPlains/atlas/index.html#Atlas_Directory; Internet; accessed 21 March 2010.

[225] Tony Clarke, "Turning on Canada's Tap?" *Why we need* …, 4.

in an area that constitutes a demand above the capacity of local freshwater supplies will naturally deplete the freshwater source. Depletion inevitably continues until there is no longer any freshwater available unless either usage is lowered to match renewal rates or other supplies are found and diverted to the local area to sustain demand. In almost all cases, the latter occurs within the US or the water becomes unusable as a result of contamination from urbanization. Based on a survey conducted by the Urban Water council asking mayors of 373 US cities across the US, by 2015 it is expected that 17.3% of small cities, 24% of medium cities and 17.3% of large cities will be faced with critical water shortages.[226] By 2025, these figures will be approximately 60% on average for all three city categories.[227]

In California there are big problems. The state's continuous reliance on overpumping of local aquifers has depleted the human made surface reservoirs in the state by over 40%.[228] Over half of California's population rely on groundwater and it is predicted that if the state of California cannot find alternative freshwater supplies for 37 million people, shortfalls will be as great as the state's total consumption today by 2020.[229]

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[226] Richard Anderson, Brett Rosenberg and Judy Sheaham, *National City Water Survey 2005*, Report prepared for the United States Conference of Mayors Urban Water Council (Washington: UWC, 2005), 14.

[227] Ibid., 14.

[228] Maude Clarke and Tony Clarke, *Blue Gold*, …, 16.

[229] Department of Water Resources, *California Water Plan Update Bulletin 160-98*, (Sacramento: Department of Water Resources, 1998) available from http://www.dpla2.water.ca.gov/publications/b160/1998/esfm.pdf; Internet; accessed 27 March 2010.

Other cities in the Southwest region are also faced with a similar fate if alternative sources of water are not secured. Tucson, almost completely dependent on groundwater, has had to purchase surrounding farmland and the expense of the agriculture industry to acquire more water to meet demands.[230] If water consumption of regional aquifers continues, Phoenix, Albuquerque and most major cities in the region will go dry in the next two decades.[231]

The future freshwater deficit in the US is not just isolated to the Southwest but occurs also in other areas as regional and urban demands outstrip supply. Throughout Seattle's suburbs, even with 36 inches of annual rainfall, demand continues to outpace supply at a rate that will create water shortages within the next 10 – 15 years.[232] In Texas, by 2050, it is forecasted that the state will only be able to provide 60% of the demand unless alternative sources can be found.[233] In Chicago, according to the Urban Water Council, Chicago's water usage is expected to increase 30% by 2025 thus increasing demands to withdrawal more from the Great Lakes (90% of the US's freshwater reserve).[234] Florida's water levels have become so low that many aquifers

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[230] Maude Clarke and Tony Clarke, *Blue Gold*, …, 17.

[231] Ibid., 17.

[232] Ibid., 17.

[233] Tony Clarke, "Turning on Canada's Tap?" *Why we need* …, 4.

[234] Richard Anderson, Brett Rosenberg and Judy Sheaham, *National City Water Survey 2005*, Report prepared for the United States Conference of Mayors Urban Water Council (Washington: UWC, 2005), 14.

have been contaminated by salt intrusion, making them unsuitable for use.[235] Frenzied states are drilling everywhere hoping that they will fall on the 'water jack-pot' of aquifers to solve their water dilemma. From the depletion of Long Island's aquifer, throughout many eastern and south-eastern urban metropolises, the cities across the US continue to use more freshwater than is supplied and are coming dangerously close to running out of secure freshwater sources. Like an uncontrollable spender, the US is driving itself further and further into debt. In this case, however, you can't repay this debt when there is no water with which to repay it.

However, the US has made notable progress in water conservation over the last twenty years. In accordance with the US Geological Survey published in 2005, water usage has steadily declined to approximately 349 billion gallons per day (bgpd) from 410 bgpd since 1980.[236] Although this consumption rate is still two times greater than the OECD average, water use in the US reached a plateau since 1985 levels with the introduction of water saving incentive programs, waste water recycling, drip irrigation and conservation pricing mechanisms.[237] Over the last twenty years, water pricing and costs have slowly increased and as well the transfer of water from agricultural areas to urban supplies has encouraged more efficient crops and competition from other agriculture producers, all of which has aided in the stagnation of water demand.[238]

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[235] Maude Clarke and Tony Clarke, *Blue Gold*, …, 18.

[236] Joan Kenney, and others, "Estimated Use of Water in the United States in 2005," *United States Geological Survery 2005*, (Virginia: USGS, 2005), 1.

[237] Tony Clarke, "Turning on Canada's Tap?" *Why we need* …, 8.

Additionally, the US has invested into desalinization as a way of alleviating some of the shortage. Desalinization, a process that removes the salt from seawater or brackish water by evaporating it or filtering the water, is however still expensive and requires a significant amount of power and large initial fixed cost to construct the facility. Although there are solar powered desalination plants, the technology is still not sufficient to be economically viable in comparison to fossil fuel powered desalination plants. Furthermore, desalination discharges significant greenhouse gases and highly saline brine that if re-introduced back into salt water sources at a different temperature will contaminate marine life at the local discharge point.[239] During the reverse osmosis process, each litre of desalted water releases a byproduct of concentrated "brine mixed with the chemicals and heavy metals used in the production of freshwater to prevent salt erosion…."[240] In the US, with over 2000 desalination plants, the amount of water supplied through the desalination process amounted to a minuscule 8.1 million cubic metres per day.[241] According to the Pacific Institute, "current desalination plants have the capacity to provide for only three one-thousandths of total world freshwater use."[242]

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[238] Frederic Lasserre, "Drawers of Water: Water Diversions in Canada and Beyond," in *Eau Canada*, ed Karen Baker (Vancouver: UBC Press, 2007), 152.

[239] Ibid., 9.

[240] Maude Barlow, *Blue Covenant* …, 26.

[241] Water Webster, "Desalination Facts," http://www.waterwebster.com/Desalination.htm; Internet; accessed 26 March 2010.

[242] Peter H. Gleick, Heather Cooley and Gary Wolff, "With a Grain of Salt: An Update on Seawater Desalination," Chapter 3 in *The World's Water 2006-2007: The Biennial Report on Freshwater Resources* (Washington DC: Island Press, 2006), 55.

Peter Gleick, a world water expert from the Pacific Institute, goes on to state that the total 2005 production of desalinated water in one year was equivalent to what the world uses in about an hour and that reliance on desalination to solve our water shortages is an "elusive dream."[243] With an anticipated increase in US domestic water shortages, desalination could become economically viable depending on the cost to our wallets and to our environment, but this reality is highly unlikely in the near future. Without a significant breakthrough in technology, desalination will be a enabler in providing freshwater for certain areas but will not be the solution due to the high price of both technology and energy in an environment of decreasing oil supplies and rising oil prices.

The only other plausible option to satisfy the future water scarcity is through major water transfers or diversions. Initially, the primary and logical place to transport or divert freshwater would be from Alaska, containing a third of the US renewable freshwater supply, to the continental Southwest without having to deal with Canada.[244] However, as discussed earlier, future water shortages in the US are not just contained to the Southwest but are occurring in all regions to some degree and therefore, Canada would be the most obvious, shortest and logical source. The Great Lakes would be one of these attractive sources. Based on the misconception described in Chapter 1, Canada's abundant supply of freshwater is a matter of perspective. The US, with a rapidly growing population and necessity to maintain both its economic and military status, is attracted to the potential that Canadian waters offer to meeting their future water shortages.

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[243] Ibid., 83.

[244] Frank Quinn, "Water Diversion, Export and Canada-US Relations: A Brief History," …, 4.

Much like Canada, one of the largest diverters on the earth, the US is well versed in planning, engineering and constructing water diversions. As early as 1847 and 1900, the US built the Croton aqueduct for New York and the famous Chicago diversion respectively.[245] Soon after, the St Mary River diversion in Montana sparked a dispute between Canada triggering the creation of the BWT in order to deal with boundary waters. Internally, however, the US continued to construct several large diversions to supply the Southwest with freshwater initially for domestic consumption but over time irrigation became the main justification.[246] Soon after the US had over-diverted most of the available water in the Southwest, it became apparent that a limit had been reached. This capped ceiling on total available water triggered large diversion project planning in an attempt to increasing future water supplies.

In the 1950's, The North American Water and Power Alliance (NAWAPA), an organization sponsored by the US Army Corp of Engineers, began looking at plans to divert water from both the Yukon and Mackenzie rivers southward through the Rockies to the US through Montana. The planned route, called the Rocky Mountain Trench, included several hundred dams and canals to channel most rivers in British Columbia in hopes to satisfy the impoverished US water states, Mexico and southern Alberta.[247] This

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[245] Frederic Lasserre "Managing water diversion from Canada to the United States," *International Journal*, Vol. 62 (Winter 2006/2007): 83; http://proquest.umi.com/pqdweb?index=0&did=1262406821&SrchMode=1&sid=1&Fmt=6&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1269786078&clientId=1711; Internet; accessed 26 March 2010.

[246] Ibid., 83.

[247] Maude Barlow, *Blue Covenant* …, 186.

plan, however, was not in isolation. Several other plans across the country had also been drafted and studied to meet the future needs of the US.

Ironically designed by a Canadian engineer, the second most known and largest of these diversion proposals was the Great Recycling and Northern Development (GRAND) Canal Project. Introduced in the 60's, the GRAND project planned on capturing freshwater run-off from James Bay and diverting it through the canals, assisted by pumping stations, to the Great Lakes for future consumption by the entire US. The project never materialized due to its $100 billion price tag during a period of heavy government spending cuts and mistrust between the links between the corporate sector and the Quebec Premier Bourassa, even though in 1985, Prime Minister Brian Mulroney, was supportive of the project.[248] According to estimated transfer volumes for the GRAND Canal project, if it had been constructed, it would have supplied approximately 347 cubic km of freshwater annually.[249] That amounts to 73% of the entire US's total freshwater withdrawals from 2008. Of course, this supply would be located in the Great Lakes area and would require further diversion to satisfy other US regional needs. The other reason that the project never materialized was because the US had not come to a point where it was truly needed.[250] The US was still able to address internal water inefficiencies, encourage water conservation and use other more affordable technologies.

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[248] Frederic Lasserre, "Drawers of Water: Water Diversions …, 143.

[249] Ibid., 150.

[250] Frederic Lasserre "Managing water diversion from Canada to the United States …, 85.

Eventually the US, operating its current water deficit, will run out of alternative ways to stretch the current supplies. Faced with increasing water demand when alternative supplies are inadequate will leave the US in no other position but to transport or divert water from an external source, specifically from Canada. A significant diversion, such as the Grand Canal, when it is economically feasible or when there is no other alternative could alleviate future American water shortages well into the future.

Bulk water piping, shipping and iceberg transportation are also potential solutions to satisfying future water shortages. Although many of these alternative transportation methods are considered expensive endeavours in North America, since water is roughly 25% heavier than oil, several are actively practiced around the world in water-scarce regions. In these regions, the price to pay for survival has made it economically viable. Piping water for example, like oil, is done all over the world.[251] From Libya, South Dakota, to South Australia pipelines are economically viable means of providing water within the given region. Israel is also looking at several pipelines internally and from Turkey to meet their expected future water shortages.[252] Plastic water bag transfer costs in Cyprus amounted to approximately $0.55 (US) per cubic metre of water which is slightly cheaper than desalination without the by-product waste.[253] If water bag technology could be proven effective over long distances then it could be a viable option

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[251] Maude Barlow, *Blue Covenant* …, 23.

[252] Ibid., 24.

[253] Frederic Lasserre and Luc Descroix, *Eaux et territories*, 2nd ed. (Quebec : Presses de l'Universite du Quebec, 2005) available from http://books.google.ca/books?id=SefkYmO3VPAC&pg=PA233&lpg=PA233&dq=Lasserre+and+Descroix+2003+in+English&source; Internet ; accessed 26 March 2010.

instead of Iceberg or tanking methods. Iceberg transportation is significantly cheaper than piping or tanking at $0.55 to $0.85 per cubic metre, however the technology needs to be improved in order to ensure the provision of regular supplies. [254] Water-tankers, on the other hand, have been proven to be slightly more expensive by comparison. Tankers cost anywhere from $1.25 to $1.50 (US) per cubic metre to $2.30 per cubic metre depending on the calculations.[255] [256] With the advent of solar tanker ships it is predicted to cost approximately $0.70 per cubic metre for water transfers from Tasmania to Australia.[257] Over short distances, bulk water transfers by ships are becoming feasible. Furthermore, in three out of four case studies, long distance transport of water to non-NAFTA nations was calculated to not be financially viable, whereas shorter distances within North America coastal boundaries were.[258] In any case, water diversions and transfers have been economically viable in other parts of the world that have already been exposed to the difficulties of scarce water supplies. It would be naïve to think that when North

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[254] Frederic Lasserre, "Drawers of Water: Water Diversions …, 153.

[255] Frederic Lasserre "Managing water diversion from Canada to the United States …, 85.

[256] James McNiven and Farah El-Ayoubi, "Bulk Water Exports: Environmental Concerns and Business Realities (Halifax: Dalhousie Univeristy, 2006); available from http://www.ucowr.siu.edu/proceedings/2005%20Proceedings/Conference%20Proceedings/07-12-05%20Tuesday%20PM2/Session%2012/12.4.McNiven.pdf; Internet; accessed 2 February 2010.

[257] Richard Macey, "On the Horizon, solar-powered tankers to slake Sydney's thirst," *The Sydney Morning Herald*, 17 January 2007; available from http://www.smh.com.au/news/national/on-the-horizon-solarpowered-tankers-to-slake-sydneys-thirst/2007/01/16/1168709754693.html; Internet; accessed 26 March 2010.

[258] Policy Research Initiative, "Exporting Canada's Water I: Outside of NAFTA," http://www.policyresearch.gc.ca/doclib/SD_BN_ExportingWater_E.pdf; Internet; accessed 30 March 2010.

America faces similar problems regionally that these methods and approaches would not arise for us either.

Canada already transfers bulk water both internally and externally to the US. Canada exports large quantities of water through products such as beer, pop and bottled water.[259] British Columbia, in a multi-year contract provides bulk non-Treaty water from the Columbia River to the US and the town of Point Roberts, Washington. Furthermore, Canada is one of the largest diverters of water in the world due to its major hydroelectric generation and also exports almost all of its energy exports to the US.[260] Throughout Canada "we have built massive water storage and diversion projects to supply water for power generation …."[261] It is therefore difficult to argue that large-scale water diversions to the US would have harmful and destructive consequences to the environment when Canada alone has more large scale diversions than any other country in the world. Canada's basis for amending the BWT, influencing the provinces to follow suit and to arrest the possibility of future boundary water diversion was on the premise that bulk water removal outside of the regional watershed would cause undue environmental destruction.[262]

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[259] Marq De Villiers, *Water: The Fate of our Most Precious Resource* …, 249.

[260] U.S. Energy Information Administration, "Independent Statistics and Analysis," http://www.eia.doe.gov/cabs/Canada/Background.html; Internet; accessed 26 March 2010.

[261] Rob De Loe and Reid Kreutzwiser, "Challenging the Status Quo," in *Eau Canada*, ed. Karen Bakker (Vancouver: UBC Press, 2007), 86.

[262] David Johansen, "Bulk Water Removals, Water Exports and the NAFTA," (Ottawa: Depository Services Canada, 2002); available from http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/prb0041-e.htm; Internet; accessed 18 March 2010.

Outside of the BWT and individual provincial legislation, the only other agreement of concern to most experts in the matter of bulk water removal, water exports and the trade of water is the North American Free Trade Agreement (NAFTA). To most people's surprise, free trade discussions were initiated by Canada in the mid-1980s using water as an attractive lure to get the US to the negotiating table.[263] The Mulroney government appointed Simon Reisman as chief negotiator for free trade, Reisman being a huge advocate of water exportation considering he was also a director for the GRAND Canal Company.[264] In the early drafts of Canada-US Free Trade Agreement (CUFTA), water was specifically disclosed as not a "tradable good" however it was removed prior to the signing of the final agreement and it is speculated that Canada used this omission as a bargaining chip for other concessions.[265] As discussed earlier, the 1987 Federal Water Policy was tabled to combat the growing Canadian public distaste for potentially allowing bulk water exports from Canada. After a significant drought in the United States there was a push by several state Governors to triple the diversion flows from the Great Lakes from the Chicago diversion. At the time, the Minister of Environment submitted Bill C-156, an effort to protect Canadian freshwater supplies from being diverted and to display federal government concern to the Canadian voters before CUFTA came into effect.[266] The existing Federal Water Policy was merely a statement

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[263] Frank Quinn, "Water Diversion, Export and Canada-US Relations: A Brief History," …, 8.

[264] Ibid., 8.

[265] Michael Byers, *Intent for a Nation* (Vancouver: Douglas & McIntyre, 2007), 203.

and had no teeth to limit or restrict bulk water exports. Also known as Canada's Water Preservation Act, the new bill C-156 prohibited any export or diversion from boundary waters above the average daily rate of one cubic metre per second or annual flow of 20,000 cubic decametre and would not apply to bottled water products.[267] This allocation was substantial yet conservative and it may have well appeased the voters. However, Bill C-156 died in the House after a general election was called. The Progressive Conservatives were re-elected and Canada – US Free Trade Agreement (CUFTA) took effect January 1, 1989. NAFTA was implemented in 1992. No legislation was passed banning the exportation of Canadian freshwater until the amendment of the BWT in 2002 banning bulk water transfers from Canadian boundary waters. The reciprocal ban of exports outside of the Great Lake region was endorsed by US President George W. Bush in 2008 but the Great Lake States still can unanimously support a large diversion if these Great Lakes states decide to without consent from Canadians. The reciprocal ban by the US has not occurred concerning other boundary waters. Therefore, this implies that the US still wants the freedom to take from other shared freshwater sources without being hand tied legally with any other boundary states.

The dilemma with NAFTA is that it leaves the door wide open to future water exports without addressing the issue. Since its implementation, Canadian Governments have adamantly proclaimed that NAFTA does not apply to freshwater sources internally or shared with the US. Yet, this claim is not legally enacted by any of the three countries

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[266] Frank Quinn, "Water Diversion, Export and Canada-US Relations: A Brief History," …, 9.

[267] Ibid., 9.

since no amendment to NAFTA was signed pertaining to it. In 1993, after a resurgence of public protest, the three national leaders issued a joint statement proclaiming that there are no rights to the natural water resources of any of the NAFTA partners.[268] This however was simply political rhetoric because NAFTA or subsequent legislation was not passed or signed by any of the three countries. The Canadian government continues to reassure Canadians that our boundary waters and provincial waters are protected by sufficient laws.

These laws, such as Bill C-6 that banned bulk water removals, an amendment to the BWT, were implemented as an alternative to a complete moratorium on bulk water exports which would have ignited a NAFTA trade challenge and further forced the issue as to the validity of water being a considered a "tradable good."[269] A complete ban or moratorium on bulk water exports, such as C-156, would initiate trade discrimination under Chapter 11 of NAFTA and contradict General Agreement on Tariffs and Trade (GATT) regulations.[270] Bill C-6 circumvented the issue, satisfied Canadian voters and left the issue of bulk water exports for another time. The Bill also failed to define what

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[268] Marcel Boyer, *Freshwater exports for the development of Quebec's blue gold*, Report for the Montreal Economic Institute (Montreal: Valna Graphisme & Impression, 2008), 19.

[269] Jamie Boyd, "Canada's Position Regarding and Emerging International Fresh Water Market with Respect to the North American Free Trade Agreement," *NAFTA:Law and Business Review of the* Americas, (Spring 1999), 332. NAFTA recognizes water as a tradable good by using the definition established by General Agreement on Tariffs and Trade (GATT). In Article 201, it defines tradable good as "domestic products as these are understood in the GATT or such good as the Parties may agree." GATT defines water in a natural or artificial state including both ice and snow. An explanatory note to this categorization covers "ordinary natural water of all kinds (other than sea water).

[270] Chapter 11 of NAFTA ensures fair national treatment of foreign investments. If a nation exports any recognized tradable good, like water, it cannot restrict any foreign investment from doing the same. If such action took place, a foreign company could seek compensation for such denial. Effectively, Chapter 11gives the same rights to foreign companies as those afforded to national companies. If Canada were to initiate a law banning bulk water exports, it would trigger Chapter 11 protections.

actually "bulk water removal" is even though it was a unilateral Canadian piece of legislation.[271] The absence of such a definition leaves the door open to defining it in the future when it may better suit the political and economical relationship with the US. This may be a more flexible approach but it does not guarantee future national water security.

The provinces, less New Brunswick, under the umbrella of the Council of Environment Ministers, passed individual legislation that attempts to prohibit bulk water removals from their respective watersheds.[272] But there are defects throughout the legislation that create gaps for bulk water exports to wedge through when the need arises. The legislation varies from province to province without any standard, it is completely voluntary for the provinces to follow, and there are various loopholes and exemptions that may allow legal bulk water transfers to occur.[273] Most worrisome is the provincial ability to disregard their own legislation or to change it, to act unilaterally, and to indeed to open their jurisdictional freshwater to the international market. The moment this happens, regardless of whether or not water is defined as a "tradable good" or not, it automatically becomes a tradable good in accordance to Article 315 of the treaty, cannot be removed from commerce, and must provide a proportional share of resource in perpetuity to its signatory partners. Called the proportionality clause, Canada would be on the hook for massive bulk water transfers to the US if they required and without any

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[271] Andrew Nikiforuk, "On the Table: Water, Energy and North American Integration," prepared on behalf of the Program on Water Issues, Munk Centre for International Studies (Toronto: University of Toronto, 2007), 4.

[272] Katherine Parker, Government of New Brunswick, E-mail correspondence with author, 30 March 2010.

[273] Andrew Nikiforuk, "On the Table: Water, Energy and North American Integration …, 4.

right to turn off the tap.[274] Simultaneously under Chapter 11 of NAFTA, there would be no way for the Canadian government to discriminate corporations from signatory nations from accessing and exporting bulk water. Additionally, according Tony Clarke from the Polaris Institute, the Canadian argument that treating water in its "natural state" [275] does not constitute water as a "tradable good" is feeble.[276] Clarke goes on to say that the US and European trade laws categorize water, whether it is in its natural state or not, as a "commercial good" because it has both monetary value and can be the object of commercial transaction.[277] Therefore, from Clarke's argument Canadian water has already been allocated to commercial users and because it has been allocated to proprietary claims through the issuing of licences makes Canadian water an internationally recognized tradable good. According to David Boyd, a leading environmental lawyer, signing NAFTA disabled Canada from having control over the future of its own waters to an extent that is difficult to quantify.[278] It is just matter of time until the rest of the world starving for water forces Canada to start providing.

Contrary to this belief, Adele Hurley, a leading University of Toronto water expert, argues that the US is not currently concerned with taking Canadian water. Hurley

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[274] Tony Clarke, "Turning on Canada's Tap …, 18.

[275] Natural state is used to describe water that is found in lakes, rivers, aquifers, icebergs, etc..

[276] Ibid., 19.

[277] Tony Clarke, "Turning on Canada's Tap ..., 19.

[278] David Richard Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy* (Vancouver: UBC Press, 2003) available from http://books.google.ca/books?hl=en&lr=&id=FGJ0D2uRo-sC&oi=fnd&pg=PP10&dq=Boyd+Unnatural+Law&ots; Internet; accessed 26 March 2010.

believes that US does not want to be beholden and vulnerable to Canada for the most basic resource. She argues that the US currently can not conceive the idea of being provided water from a foreign country. This argument is valid but it does not reflect the future political perspective when water becomes scarcer in the US than it already is.

Even though the US will be ramping up major conservation efforts in the next twenty years to combat growing populations, changing climatic conditions and increased uses of water, the US, without a doubt, will be in dire need for future water supplies in the coming years. Desalination, with its harmful waste by-product, will be unable to fill the gap and energy costs associated with it will only drive the associated fixed infrastructure and variable costs up making it less attractive than most would expect. This leaves the US in a predicament for which the most logical solution is to tap into the same backyard that they do for other necessary natural resources, Canada. GRAND and NAWPA projects will get dusted off and put back on the drawing table, environmental assessments and current costs will be compared. In the worst case outcome, weak non-binding Great Lake legislation and BWT will be avoided without legal recourse and international trade agreements, NAFTA and GATT, will prevail because of they are legally binding. Canadian Provincial and absent federal law will be bypassed and water will eventually become a tradable good. Necessary diversion will get constructed, water super-tankers will be built and gargantuous plastic bags will float down both coasts providing the essential resource. But does it have to be this way?

The question to ask is whether or not Canada should now establish protective legislation or enter into proactive water export agreements by amending NAFTA and embracing economic and security integration within North America? Or do neither and

rely on current legislative measures to see if the US goes ahead and takes disproportionate amounts to meet supply their country's needs from boundary waters such as the Great Lakes, Columbia and the Chicago diversion? Canada needs to make some choices. However, does Canada really have a choice?

CHAPTER 5 - THE CANADIAN FOREIGN POLICY CONUNDRUM: WHAT NEXT?

> "By the year 2025 … 2.4 billion people will face absolute water scarcity - the point at which a lack of water threatens social and economic development … access to reliable supplies of clean water is a matter of human security. It's also a matter of national security."[279]
>
> - Hillary Clinton US Secretary of State, 22 March 2010

In the post 9/11 security environment characterized by heightened protection measures, rapid globalization, climate change, and increased competition for diminishing energy resources from emerging economic and military superpowers, the United States' national security, its hegemony, is being directly challenged. Hegemony is more difficult. The US strives to maintain its oil-thirsty economy and free-flowing trade while counterproductively increasing its domestic security in a war against global terrorism. Domestic water, essential to both life and the behemoth American economy, has become one of the most strategic resources, in parallel with oil, in the preservation of the American way of life.[280] As Sandia National Laboratories, a US Government-owned advisory corporation, reports, "Water is an energy issue, and both water and energy are issues of national security."[281]

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[279] Preeti Aroon, "Clinton: Clean water is a matter of 'human security' and 'national security'," *Foreign Policy*, March 24, 2010 available from http://hillary.foreignpolicy.com/posts/2010/03/24/clinton_clean_water_is_a_matter_of_human_security_and_national_security; Internet; accessed 27 March 2010.

[280] Maude Barlow, *Blue Covenant* …, 149.

[281] Sandia National Laboratories, "Energy-Water Nexus Overview," http://sandia.gov/energy-water/nexus_overview.htm; Internet; accessed 29 March 2010.

A pre-requisite to superpower is the US's ability to do whatever is necessary to ensure its own security.[282] Recently, Hillary Clinton reiterated the US's security focus when she said, "… our highest obligation is [to] the American people. It is to do everything we can to make sure that America is secure."[283] In the final analysis, the US will do whatever it takes, whether Canada is on board or not, to ensure that their water needs are met.

After 9/11 attacks, the US began to implement measures to close the economic gates, reduce trade and enhance their physical security. Considering that 75% of Canadian exports were to the U.S., nine of ten provinces relied on this trade as the largest percentage of their GDP, that 65% of foreign direct investment (FDI) in Canada was from the U.S. and the overall two-way trade relationship, in 2003, made up approximately 53% of Canada's GDP, the writing was on the wall.[284] At least for some, Canada was going to be left out and its economy, quality of life and influence severely reduced. The Bush Administration was preparing to unilaterally re-write US trade regulations, in order to establish a new security perimeter around the US.[285] Regardless

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[282] R.J. Sutherland, "Canada's Long Term Strategic Situation," International Journal 17, no. 3 (Summer 1962): 202.

[283] U.S. Department of State, "Clinton's Interview with George Stephanopoulos of ABC," http://www.america.gov/st/texttrans-english/2009/November ; Internet; accessed 17 November 2009.

[284] Roy Rempel, "Canada's National Interests," *In Dreamland: How Canada's Pretend Foreign Policy Has Undermined Sovereignty*, (Montreal and Kingston: McGill-Queen's University Press, 2006); 161.

[285] Maude Barlow, *Blue Covenant* …, 194.

of the legalities, the US was going to ignore Canada's preferential trading status with NAFTA.[286] Canada was being shut out, or so the story went.

In 2003, The Canadian Council of Chief Executives (CCCE), the C.D. Howe Institute and the Council of Foreign Relations established the North American Security and Prosperity Initiative and began lobbying their respective governments. The intent was to set the conditions for a completely integrated North American powerhouse. In this scenario, the US was not going to take unilateral action against Canada. On the contrary, Canada was to join voluntarily in its own undoing. Initially, developed by Robert Pastor in 2000, the concept's aim was to establish a North American trade and security union that synchronized policies on immigration, continental security, defense, trade, commerce, and a resource pact.[287]

By 2005, without approving legislation or public involvement, they were successful and all three national leaders signed the Security and Prosperity Partnership for North America (SPP), thereby legitimizing the most ambitious coalition since NAFTA with a view to completely integrating the three economies, resources and security. This was one of many steps for the US in securing access to Canada's vast energy resources and freshwater. It was Canada's way of maintaining its economic future.

Shortly thereafter, three national security private advisory institutes formed a task force, at the request of the SPP, consisting of the Centre for Strategic and International

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[286] Ibid., 194.

[287] Andrew Nikiforuk, "On the Table: Water, Energy and North American Integration," …, 3.

Studies (CSIS), Centro de Investigacion y Docencia Economicas (CIDE) and Conferences Board of Canada, called North American Future 2025 (NAF2025).[288] The task force, consisting of former politician John Manley, previously finance minister, Thomas D'Aquino, president of the CCCE, Pedro Aspe, Mexico's former finance minister, and Wendy Dobson, University of Toronto academic and former associate deputy minister of finance, set the political pathway to the SPP. The aim of NAF2025 was to analyze and recommend integration options for the SPP on labour mobility, energy, security, competitiveness, border infrastructure and energy (including water). From the NAF2025 backgrounder:

> "Freshwater is running out in many regions of the world … because water availability, quality, and allocation are likely to undergo profound changes between 2006 and 2025, policy makers will benefit from a more proactive approach to exploring different creative solutions … the three nations will have to overcome the bureaucratic challenges posed by their different political systems and legal regimes, particularly if the overriding future goal of North America is to achieve joint optimum utilization of the available water and to implement procedures that will help avoid or resolve differences over water in the face of ever increasing pressures over this priceless resource."[289]

The focus on integrating water amoung the three countries suggested that the US and Mexico were both setting conditions for future bulk water exports. Shortly after a closed-door meeting in 2007, the NAF2025 director, Armand B. Peschard-Sverdrup, said "It's no secret that the US is going to need water. … It's no secret that Canada is going to have an overabundance of water…. At the end of the day, there may have to be

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[288] Ibid., 8.

[289] Armand Peschard-Sverdrup, "North American Future 2025," (Washington: Centre for Strategic and International Studies, 2006), 6, available from http://www.canadians.org/water/documents/NA_Future_2025.pdf; Internet; accessed 29 March 2010.

arrangements."[290] The fact that the NAF2025 was even looking at this issue seemed to confirm that the Canadian government was planning for the reality of water-sharing with its closest ally, even though the politician of the day denied it.

Just prior to the 2007 meeting, the agenda for the NAF2025 session was leaked to the media. It included an option for North American water to include new agreements on transfers, diversions, artificial diversions, conservation technologies for agriculture and consumption.[291] Considering the water shortages already discussed in the US and the poor water status in Mexico, it was obvious to some that Canada's water was on the table already on the table for trade and export.

In August 2009, the SPP was dead. After a change in the US Administration and as a result of growing public distaste for the SPP, it was declared to be no longer to be an acceptable venue.[292] The termination of the SPP, itself not subject to legislative oversight was good news from the standpoint of democratic process. Still it underlined the difficulty Canada faces in voicing its concerns on resources and water issues. The SPP episode is evidence of Canada's need to widen the avenues for national water policy including international consultation and negotiation.

Besides the fact that water is most essential resource to sustain life south of the border, securing Canadian water is essential in responding to the growing US energy

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[290] Kelly Patterson, "Selling water on thee agenda at 3-way talks; Canada, U.S., Mexico to discuss future trade in precious resource," *Ottawa Citizen*, 13 April 2007.

[291] Armand B Peschard-Sverdrup, "North American Future 2025 …, 6.

[292] Stewart Trew, "The SPP Is Dead, So Where's the Champagne?" *Canadian Perspective* (August 2009) [Journal on-line]; available from http://www.canadians.org/publications/CP/2009/autumn/SPP.pdf; Internet; accessed 13 April 2010.

crisis. By the year 2030, energy demand is expected to increase by 50%.[293] North America produces over a quarter of the world's energy, which it then consumes with the US consuming the vast majority of that amount.[294] The US has also decreased its reliance on the Middle East and doubled its energy dependency on Canada.[295] However, water is required to produce energy, as has already been made clear. In short, "The United States can't get to energy independence, but North America can."[296]

The answer to the initial question: Does Canada really have a choice? The obvious yet unfortunate answer is not really because the US is facing a crisis. Canada could say no, but the US would eventually set aside the BWT on the basis of national security and ignore the IJC. The US has done this in the past with other boundary water issues, like Devil's Lake, and when clearly faced with a situation that degrades their economy and hegemony, it can be expected that they will take what they need. It is the view here that this is the way of a great power. If post 9/11, the US was going to disregard NAFTA on the basis of national security, what would make the BWT or any other treaty any more immune. The US has used NAFTA's Chapter 11 to gain access and ownership over non-boundary Mexican water.[297] In a controversial battle between

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[293] Ibid., 4.

[294]Ibid., 4.

[295] Maude Barlow, *Blue Covenant* …, 200.

[296] Anton Dammer, "Hill Seminar touts virtues of tapping unconventional sources," *Greenwire*, 21 June 2007.

Texas farmers and Mexico, the Texan farmers are suing Mexico under NAFTA Chapter 11 because of Mexican overuse of the Rio Grande. Water in this case is being considered property that Mexico has illegally appropriated. Perhaps, this is setting the stage for things to come. On the other hand, the Chicago diversion, not constrained by the BWT, would be an easy avenue for tapping into North America's strategic water reserve without breaking the rules.

Obviously, the next question is: what can Canada do about the US taking and depleting our freshwater sources? As will now be shown, it is contrary to our national interest to oppose North American water integration. Prominent Canadian strategist, R.J. Sutherland, who published *Canada's Long Term Strategic Situation* in 1962, stated that Canada's foreign policy is founded on three invariants: geography, economic strength and natural alliances.[298] The three invariants clearly define those areas for which Canadian foreign policy cannot be decisive regardless of policy-maker's beliefs.[299] Inherently, due to the limitations placed on Canada by the three invariants, Canada's domestic policy cannot be radically misaligned or run counter to the critical foreign policy requirements of the US, as this would be counterproductive to Canada's national interests and quality of life. Sutherland assessed that these invariants would be as applicable to the future as they were in 1962. He was right on this. Unfortunately for

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[297] Bernard Thompson, "New Attacks and Counterattacks in US-Mexico Water War," http://mexidata.info/id1720.html; Internet; accessed 13 April 2010.

[298] R.J. Sutherland, "Canada's Long Term Strategic Situation," International Journal 17, no. 3 (Summer 1962): 201.

[299] Sutherland, *Canada's Long Term Strategic Situation*…, 201. An invariant is defined as "a quantity or expression that is constant throughout a certain range of conditions.

Canadian sovereignty, these three invariants continue to operate, to dictate Canadian foreign policy and, more importantly, to guide domestic policy, or the lack thereof, as it relates to our natural resources, more specifically to Canadian water.

Geography, the first invariant, is a fixed characteristic that is unlikely to change between the US and Canada. Inherently, the US, is obligated, through what Sutherland describes as an "involuntary guarantee," to protect Canada in order to ensure its own security. Accordingly, it is compelled to provide security to Canada whenever Canada cannot.[300]

Today, in a post-911 security environment, this security provision clearly includes the physical security of North America and also extends to the protection of strategic natural resources. Strategic resources such as oil, natural gas, uranium and water necessary to sustain American power and standard of living are essential to US security. Canada's subordination to US security needs in emergency conditions is as it was in the past. It is for this reason, to guard against adverse outcomes of emergency that Canada continues to have little choice but to ensure its domestic, foreign and defence policy requirements are not contrary to the security requirements of its closest ally. North America, by virtue of globalization and global terrorism, has become smaller and, as a result of the underlying invariant relationship, more closely knit.

To deny US access to Canadian freshwater when the need arises would be like denying oil or natural gas to the US. It would be bring on disaster. It would pose a direct threat to the US and would defy Canada's inherent need to ensure that there are no direct

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[300] Ibid., 202.

threats to the U.S. originating from Canada.[301] As summed up by a leading US water authority, "Safe and adequate fresh water resources are central to the economy, foreign policy, and security of the United States."[302]

Considering that the Canadian economy is almost completely dependent on the US economy, without the US market our standard of living would plummet. As well, our political status on the world stage would drop. Canada's GDP is ranked 13th in the world but it is still a member of the G8. Some would argue this is because Canada is rich in resources. However, it is ranked second in the world for oil reserves and three of the four largest oil producing countries are not part of the G8. Canada's relationship and role as major resource provider to the US is what places us at the G8 table. Through the denial of water transfers to the US, we would jeopardize our political status in the world, as well as greatly damaging our economic strength. Sutherland claimed that "…the community of interests between Canada and the US is much more than a matter of geography. Geography has been the predisposing factor; but economics has forged and even more powerful bond."[303] This is a bond that we are unable to sever.

The last of Sutherland's invariants is natural alliances. As a consequence of the previous two, coupled with globalization and global terrorism, the alliance with the US has become so close that any attempt at going it alone will be difficult if not impossible.

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[301] Ibid., 202.

[302] Peter H. Gleick, "Water: Threats and Opportunities – Recommendations for the Next President," *Pacific Institute* (Oakland: Pacific Institute, 2008), 1; www.pacinst.org; Internet; accessed 17 January 2010.

[303] Ibid., 204.

A consequence of this is that the US is free to adopt policies and measures within North America that place Canada second while potentially jeopardizing Canada's sovereignty. The exportation of freshwater to the US will be one of these issues.

Once one gets over the issue of the US having their hand in Canadian water and that the future water environment is continental rather than national, then what options are left for the government of Canada to take? There are really three options. First, fight the US when the situation arises and ultimately lose to the US's needs, suffering an abrupt loss of sovereignty and control. Nor would this option stop the US from overdrawing boundary freshwater. As well, it could end up costing Canada in other areas in retaliation to what Sutherland saw as Canada's responsibility to ensure that no threat originates from north of the border. It is a lose-lose situation for Canada, we are considering here.

The second option is to continue to do nothing and let the invisible hand of a renewed or born-again SPP and corporate profit-mongers take care of future planning, exporting and diverting of Canada's freshwater. The obvious disadvantage to this solution is that Canada's most precious resource is left to the corporate world. Resources would sorely be depleted beyond recovery and the environment beyond repair. However, this solution does offer an opportunity for discussion of the complexities and interdependence of energy, water, security, climate and economy within North America.

More importantly, both options fail to address the many water management problems and the misuse and abuse that Canada is already faced with. Furthermore, they do not proactively mitigate or look to minimize the future impact of the forecasted US needs, or of Canada's needs for that matter. Both options are short-sighted. Too often,

society waits for a wake-up call where damages have been done that require countervailing action. In many cases, it is too late to fix. But too late is not an option. Action is needed.

The last option and only choice is for Canada to take a proactive and realistic approach. Solve the problem now. The search for solutions to our freshwater problems is not new. Several freshwater, ecology and hydrology experts have been proposing various water management solutions for several years now. One of Canada's top water security experts, Rob de Loe, proposes a Canadian National Water Strategy (CNWS) "…that could address a lot of the governance challenges that relate to what we have now … fragmented and adhockery."[304] Canada must establish a framework and overarching policy to deal with the challenges of water governance. Specifically, according to de Loe, a CNWS would ensure a nationally coordinated approach when it is appropriate and needed. Leadership of the federal and provincial governments in developing such a strategy is paramount but obviously in a facilitative rather than a dictatorial manner. Rob de Loe argues that a CNWS developed through consultation with the stakeholders, including First Nations, local governments, water users, civil society groups and other organizations "closest to the ground" is critical. In order to have an effective and encompassing national water strategy that reflects Canadian ideals and builds support through participation, it needs to be collaboratively developed.

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[304] Rob de Loe, "Governance from a National Perspective," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

In order to kickstart the process, de Loe proposes a 'Leadership Team" that has representation and participation from all stakeholders.[305] He argues that the various levels of governments cannot build water governance on their own. The complexity of the demands of water management and the lack of capacity within government require all stakeholders and users to assist and participate in action on this responsibility.[306] The key, de Loe explains, is that the federal and provincial governments must be full and active players with leadership being initiated by the provinces and territories. In addition, the team must operate from a set of principles and values while understanding the diversity of interests amoung the stakeholders.[307] This cooperative and inclusive approach is necessary to coordinate and ensure the sustainability of freshwater, meet the needs of the various stakeholders and to avoid inefficiencies and misuses.

Another key aspect to de Loe's proposed CNWS team is that new governance structures do not need to be formed. The team, represented by all stakeholders would coordinate its actions on the basis commonly accepted goals and targets.[308] This would negate the need for a top-down dictated approach by the federal government that some

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[305] Rob de Loe, *Toward a National Water Strategy*, Final Report. Report prepared for Canadian Water Resources Association (Guelph, ON: Rob de Loe Consulting Services, 2008), 24.

[306] Rob de Loe, "Governance from a National Perspective," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

[307] Rob de Loe, "Governance from a National Perspective," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

[308] Rob de Loe, *Toward a National Water Strategy*, Final Report…, 24.

believe is needed. In situations that require urgent national action, the CNWS would require the various stakeholders to take action within their respective jurisdictions.[309]

An example that Rob de Loe uses in proposing this cooperative water governance strategy is New Zealand. New Zealand has a national freshwater strategy with open and cooperative dialogue, has established set of water principles and has integrated joint action across different levels and amoung different users.[310] Although New Zealand has a smaller population and economy, the concept can still apply to Canada if it's understood that the complexity and leadership required are proportionally greater.

Similarly, the director of University of British Columbia's Program on Water Governance, Karen Bakker, recommends five key strategies for solving the Canadian freshwater crisis. First, the federal government should start fulfilling its fiduciary water responsibilities.[311] The revision and implementation of Canada's Federal Water Policy should be one of the top priorities. Secondly, similar to de Loe, she recommends a new framework to facilitate cooperation between the federal and provincial governments. A collaborative and integrated approach would assist in the reorganization and development of legislation, guidelines and policies. [312] Thirdly, a national water strategy should be based on sustainable water management, promoting conservation and environmental

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[309] Ibid., 24.

[310] Rob de Loe, "Governance from a National Perspective," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

[311] Karen Bakker, "Water Security: Canada's Challenge," *Policy Options*, Vol. 30, no. 7 (July-August 2009), 20.

[312] Ibid., 20.

protection. Fourth, a lessons-learned platform should be put in place amoung the provinces and territories to ensure that lessons are not learned multiple times across the country. Last, Bakker recommends that the federal government reinvestigate the recognition of water as a human right. Although a similar cooperative approach, Bakker focuses more on integration of various government organizations and the coordination of government jurisdiction and associated legislation then de Loe.

A third proposed solution from environmental lawyer Linda Nowlan, takes a slightly different approach to water governance. Nowlan, focuses on the legal capacity of the Canada Water Act and shared water governance. She argues that there is plenty of authority in the Canada Water Act for the federal government to exercise the necessary powers to implement the needed stewardship.[313]

Secondly, Nowlan argues that we need to capitalize on the current integrated watershed governance organizations (water councils, watershed agencies, water boards, etc). In most provinces there are over 20 laws from all levels of government that pertain to a body of water.[314] Nowlan argues that shared water governance, based on watershed rather than political boundaries, is an effective means of managing the complexity of water use in Canada while sustaining and preserving freshwater. The organizations in question can make the various trade-offs between competing water users and, if required, produce recommendations on water allocation to the government. Watershed committees

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[313] Linda Nowlan, "Shared Water Governance," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

[314] Linda Nowlan, "Shared Water Governance," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

are normally delegated sufficient authority by provincial governments, include very considerable representation from non-government stakeholders and use consensual decision making.[315]

Some provinces have legislated consensus based decision making for laws governing watershed management. Provinces also promote balanced representation, including provincial health and public representation amoung the various stakeholders, to ensure collaboration and equality. Unfortunately, not all provinces have the same standard of legislation or concern for ensuring equal representation in water board decision making. Alberta and B.C. do not specify representation and therefore participation is discretionary, defeating the purpose of shared governance and needed collaborative planning. In addition, Nowlan argues, many provinces do not enforce the requirement for shared water governance through water boards. In the Athabasca region there is no water board established governing the use of the Athabasca River Basin and consequently there is no representation for stakeholders outside of the big oil companies. In the last 30 years, the Athabasca River flow has decreased by 30%.[316] Not surprisingly, the oil sands extraction only returns 8% of the water withdrawn from the Athabasca River Basin.[317] Nowlan argues that provincial governments could legislate to ensure that all

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[315] Ibid.

[316] David, Schindler and W.F. Donahue. "An impending water crisis in Canada's western prairie province," *PNAS*, vol. 19, no. 19 (9 May 2006). [journal on-line]; available from http://www.pnas.org/content/103/19/7210.full.pdf+html; Internet; accessed 6 February 2010.

[317] David Schindler, "Threats and Prospects for Canadian Freshwater: A Scientist's Perspective," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010.

watershed regions have a watershed governing body. To see to it that efficient, effective water management and proper representation are established.

Finally, Nowlan suggests that Canada could make use of the precedent in the EU Water Framework Directive. The EU Water Framework Directive established and enforces high environmental water standards that are complied by all member nations. Each nation forms several shared governance organizations that are not restricted to national boarders but aligned by watershed and aquifers.[318] [319] Nowlan concludes that if the EU can create sound water governance despite multiple cultural, legal and political differences, then Canada should be able to do the same internally to deal with the current and future challenges of water governance.

Common amoung most water experts is the need for water science to be re-introduced into policy development. Returning water monitoring and research capabilities to levels once enjoyed by Canada is critical. This is because the establishment of an effective national water strategy, demands a full understanding of problems in all their details. A second commonality is the requirement to shift the way Canada as a society makes decisions about water. Water needs to be integrated in our day-to-day decision making so that we minimize the misuses previously discussed.

A deficiency in many of these proposed solutions is their avoidance of issues concerning future bulk water exports and diversion to the US, and potentially the world.

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[318] Linda Nowlan, "Shared Water Governance," McGill Institute for the Study of Canada Conference: Canadian Water: Toward a New Strategy, March 25, 2010. http://bcooltv.mcgill.ca/ListRecordings.aspx?CourseID=3653; Internet; accessed 14 April 2010. .

[319] For more information on EU Water Directive visit http://ec.europa.eu/environment/water/water-framework/index_en.html.

One academic however, Tony Clarke, does address this issue. Clarke recommends a five-step agenda in which the following specifically address these issues.[320] The first of his recommendations is to establish a federal ban on bulk water exports. He argues that the amendment to the BWT and the ensuing provincial agreement to implement bulk water removal legislation were weak and offer little assurance. The key to the effectiveness of a federal ban rests in its ecological justification, he argues: ecological protection offers a legal justification for restricting on the export of water as a tradable good due to the environmental impact of diversions and sale.

His second step is the removal of the various water protections clauses in existing trade agreements. According to his logic, if the restriction did not exist then it would be difficult for international trade rules to define water as a tradable good and NAFTA proportionality clause, national treatment clause and Chapter 11 in NAFTA would not apply.

Lastly, Clarke recommends utilizing the International Joint Commission (IJC) as an effective medium to manage the various surface water problems between the two nations. Clarke suggests increased funding for the IJC, utilizing it more heavily for policy and legal research into water exports and relying on its historical effectiveness as an established body in solving future water challenges.[321]

Unfortunately, however, the reliance on an ecological argument to circumvent NAFTA and WTO in order to protect freshwater sources from exportation would be

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[320] Tony Clarke, *Turning on Canada's Tap* …, 22.

[321] Ibid., 22.

attacked as hypocritical. In an interview with Jim Prentice, Minister of the Environment, the Minister states that Canada has the "capacity to bring on-stream as much as 25,000 megawatts of new hydroelectricity over the next 25 years."[322] This equates to almost a 66% increase in Hydro Quebec's current capacity.[323] Currently, there are 48 proposed large hydro projects being developed, of which almost half are to be in Quebec.[324] Considering the ecological impact of hydroelectricity, Canada's future plans do not seem too concerned with the issue and therefore, this argument does not hold much water.

Secondly, it assumes that our own legislation will prevent the US from using existing international trade law to legally gain access to Canada's water. Unfortunately, this approach also assumes Canadian legislation will prevent US diversion on their side of the border with respect to shared boundary waters. As discussed earlier, this is highly unlikely. This proposal does not look to a cooperative approach outside of the IJC and it does not deal with the outstanding issue of shared groundwater and its effects on shared boundary waters. The IJC, as discussed, has its obvious limits and as an organization is often a matter of politics when the medium is utilized. It is effective when it wants to be and Clarke's recommendation to continue to support its function is valid and one of many actions that Canada needs to take.

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[322] Ian MacDonald, "A Conversation with Jim Prentice," *Policy Options*, Vol. 30, no. 7 (July-August 2009), 8.

[323] Ibid., 8.

[324] P. Lee, M. Hanneman and R. Cheng, *Report #1 Hydropower Developments in Canada: Number, Area and Jurisdictional and Ecological Distribution*, Global Forest Watch Canada (Edmonton, AB: Global Forest Watch, 2010), 3.

For the most part, Canadian experts have a very sound understanding of the domestic solutions to water governance and dealing with the on-going misuses and abuses. However, what is lacking is a realistic stance on future water sharing and potential continental water governance solutions. Considering this, take Linda Nowlan's proposed shared water governance proposal, supported by federal leadership and legislation, one step further. Beyond the integration of provinces and watershed councils, not confined by borders, and apply the approach with the US. In doing this, much like the EU, Canada could establish itself as a leader in proposing continental solutions that serve Canada two-fold. First, it would better position Canada to shape its future water security. By creating bi-national watershed policies, based on common principles and ecological protection, a continental collaborative approach would enhance mutual respect over shared water responsibilities and stewardship. Through integration, Canada could further the cause of protection. Cooperatively developing solutions will minimize the potential for massive diversions, establish legislation over shared groundwater sources, exports and promote more sound solutions that are mutually beneficial in meeting the growing continental demands.

Secondly, it allows Canada to take sit at the table and contribute to the discussion and solutions on the future continental water security situation and other interrelated security concerns (energy, climate, etc). As discussed, water is essential to continental security. Recognizing the reality here should allow Canada to better understand and speak to the needs of the US, and to express Canada's needs with a view to sustainability. By being part of the discussions, part of the solutions, Canada can better influence the situation than it can by going it alone.

Coordination of shared, boundaryless watershed governance solution will be complex and initially difficult. For this reason, the federal government has to lead. To establish national common standards amoung Canadian watershed organizations, in conjunction with the US, to create cross-border waterboards with legal authority, the federal government must in the forefront. It is the only entity that has the required level of legislative authority and centrality needed to bring about these discussions, coordinate standards and ensure representation from the community of stakeholders. No way does this imply that all those involved outside of government in water management today are excluded from the process. On the contrary, the federal government is best positioned to initiate and offer guidance in what must be a complex consensual negotiations. As Rob de Loe points out, the government cannot do it alone and the role of NGOs is bound to increase as Canada faces up to its future water challenges.

With a federally led national water strategy, Canada can collectively focus on conservation, water infrastructure improvements, water technology research and development, and also on treating water as a strategic resource. The federal government should be shifting Canada's focus and governance from the dysfunctional developed levels to the strategic, federal level where needed. In doing so, it would allow the federal government to obtain new situational awareness over our national water situation and to be in a better position to address US demands when they materialize.

A complex problem is often solved by a complex solution. In this case, given the severity of future water demands, limited timeframe, the on-going misuses and abuses of it's freshwater, Canada has no choice but to develop and act on a national water strategy. Many will argue that this is to diminish the level of provincial autonomy enjoyed under

Canadian federalism. However, the situation has changed and with that change, Canadians must look beyond the past and look toward what makes sense and what is right when it comes to water. All of the previously considered approaches also fail to address two critical issues: water refugees and the ethical dilemma of protecting our critical water supplies while the rest of the world is parched. In less than 10 years, half the world's population will be living in water scarcity.[325] What will Canada do with water supplies that are viewed by many as ample? What will Canada do when water refugees are fleeing to Canada in desperation? Will our gates and taps be closed? Even today, water refugees in Africa, northern parts of Afghanistan, Pakistan and China are packing up and moving in search of life's basic requirement.[326] How will Canada develop a plan to deal with these issues? Without a national water strategy and legislated by the federal government, none of these questions will be properly addressed. Now is the time to start setting Canada's water policies on the right track nationally, at continental level and in anticipation of severe global shortages.

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[325] Chris Amodeo, "Water fight is looming," *Geographical*, Vol. 74, no. 4 (April 2002), 10. http://proquest.umi.com; Internet; accessed 18 January 2010.

[326] Maude Barlow, *Blue Covenant*…, 147.

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