Turning on Canada's Tap?

Why we need a Pan-Canadian Policy and Strategy Now
on Bulk Water Exports to the U.S.

by

Tony Clarke

A Polaris Institute Report

April, 2008

Issued in collaboration with the following organizations:

- Canadian Centre for Policy Alternatives
- Canadian Labour Congress
- Sierra Club of Canada

Introduction

In the Throne Speech of October 21, 2007, Stephen Harper's government announced that it would be bringing forth a 'national water strategy' during this parliamentary session. The Throne Speech did not specify any details as to what the government has in mind when it talks of the need for a national water strategy. Yet, of all the water policy issues that might be covered, the one with considerable geo-political implications that cannot be ignored is the prospect of mounting pressure for bulk water exports from Canada to the U.S. As the former Conservative Premier of Alberta, Peter Lougheed, warned in a *Globe and Mail* commentary on November 11, 2005: "the United States will be coming after our freshwater in three to five years." Subsequent events now confirm Lougheed's warning.

In April 2007, Canadians awoke to news reports that "water transfers" to the U.S. were on the agenda of a closed door meeting in Calgary of the North American Future 2025 Project. The Project is an officially sanctioned body of high level business personnel established to advise the political leaders of Canada, Mexico and the U.S. on agenda items to be dealt with under the trilateral plan called the Security and Prosperity Partnership [SPP]. The business advisors highlighted the emerging problems of water scarcity in the U.S. and also Mexico, indicating that Canada was well endowed with 20 percent of the world's water, and proposed the option of developing regional agreements "on issues such as water consumption, water transfers, artificial divisions of freshwater …" [Trew, 2007].

By the close of the parliamentary session in June 2007, it was also clear that bulk water exports had surfaced once again as a major public policy issue in this country. Previously, an acrimonious three hour debate had broken out in the Standing Committee on International Trade over a motion to re-open the North American Free Trade Agreement [NAFTA] to ensure that governments could not be sued by U.S. corporations under NAFTA if they placed a ban on bulk water exports. And, on June 4th, the House of Commons voted 134 to 108 to pass the Standing Committee's resolution calling on the federal government to "quickly begin talks with its American and Mexican counterparts to exclude water from the scope of NAFTA" [House of Commons, 2007a/b].

Historically speaking, there is, of course, nothing new about this public policy debate. For half a century or more, Canadian citizens and politicians have expressed fears that the U.S. is coming after 'our water.' In the early 1960's, public opposition to large scale water exports to the U.S. erupted when it became known that private companies were developing plans for massive water diversion projects like the North American Water and Power Authority and the GRAND Canal. Two decades later, public anxiety about bulk water exports surfaced again during the Inquiry on a National Water Policy which, in 1985, stopped short of calling for a complete ban on water exports but instead advocated being better prepared to respond to requests for cross border water transfers. And, ironically, when the Canada Water Preservation Bill was introduced in 1987 effectively banning bulk water exports, it died on the order paper with the dissolution of Parliament for the 1988 election on free trade.

During the latter part of the 1990's, provincial governments, which have constitutional jurisdiction over water resources in this country, became the focal point of the debate over bulk water exports. Ontario came close to allowing a company called the Nova Group to extract 600 million litres of water a year from Lake Superior for sale while Newfoundland entertained granting permission to another company, the McCurdy Group, to export up to 62 billion litres from Lake Gisborne. Both projects were scuttled by public and political pressure. In 2004, the Quebec government publicly expressed its desire to

explore the prospects for bulk water exports and the government of Newfoundland has also made it clear that it's not closing the door on this issue. Indeed, there are signs that some cash strapped provincial governments may well see bulk water exports as a new kind of cash cow for resource revenues in the future.

Under the U.S. presidency of George W. Bush, the issue has taken on a unique twist of its own. Shortly after he was sworn into office, President Bush spoke to reporters about the growing problems of water scarcity in his home state of Texas and announced he would take up the issue with then Prime Minister Jean Chretien. While Canadian officials were quick to publicly reject Bush's overture, the signal had been given. Throughout the Bush administration, this signal has been kept alive, notably by the previous U.S. Ambassador to Canada, Paul Celucci, who gently but constantly chided Canadians in speeches about their public attitudes towards water which, from his perspective, should be viewed as another commodity like oil to be sold and exported. Coincidentally, in early 2007, a Washington based company proposed the construction of a pipeline to transport fresh water from Manitoba to Texas.

Although the current Harper government has now pledged to develop a 'national water strategy,' it may be starting from close to ground zero. For almost 20 years, little or nothing has been done in Ottawa to develop clear policy guidelines let alone legislative tools to deal with the contemporary challenges of bulk water exports. What's more, the federal government's expertise in water management and governance has declined substantially in recent years. The Department of the Environment, which used to pride itself in having a high level team of water policy experts, has been under-funded to the point where it no longer has the resources it needs to perform this role effectively. Nor is water policy and governance the priority it once was in the Department of the Environment. As a consequence, the Harper government is not starting from the position of having the capacities it need to deal with what is could well become an explosive public issue again and perhaps even a policy crisis in the near future.

It is doubtful whether the Harper government or, for that matter any federal government, is going to take leadership on this issue without a great deal of public pressure from citizens across the country. For several years now, civil society organizations the Council of Canadians have issued repeated alerts and warnings about the American takeover of our water. In so doing, they have tapped into a groundswell of strongly held attitudes and beliefs of Canadians about the need to protect our freshwater sources in this country. The Council has also consistently called for a national water policy that would include a ban on bulk water exports. However, much of the public discussion and debate about these issues lately has been somewhat piecemeal and fragmented. What seems to be missing is a cogent analysis of the issue that citizens can grasp along with a roadmap of what needs to be done to develop an effective policy and strategy on bulk water exports.

For these and related reasons, the Polaris Institute has prepared this report as a rationale and framework for developing a pan Canadian policy on bulk water exports. In so doing, we have drawn upon the work of various academic and policy activists, many of whom contributed to the recently published volume, *Eau Canada: The Future of Canada's Water* [Bakker, 2007]. In collaboration with other civil society organizations, we now offer the following report as a tool for citizen education and action in developing a water security agenda for Canada's future.

We also wish to acknowledge the recent contribution of the Gordon Water Group of concerned scientist and citizens, *Changing the Flow: A Blueprint for Federal Action on Freshwater,* which outlines a more broad based water policy agenda for Canada. Indeed, the pan Canadian policy on bulk water exports that we are presenting here needs to be understood as an integral part of a more comprehensive water policy agenda for the country.

The **Polaris Institute** assists citizen groups in developing new tools and strategies for democratic social change on major public policy issues in Canada and internationally.

Tony Clarke, founder and executive director of Polaris Institute, is the author of several books on water issues including *Blue Gold: The Battle Against the Corporate Theft of the World's Water* [with Maude Barlow] and *Inside the Bottle: Exposing the Bottled Water Industry.*

1. America's Water Crisis

In Canada these days, there tends to be a fair amount of loose talk about the U.S. water crisis. While no doubt water shortages do exist here and there across the U.S., in some cases very serious ones, it's important to probe a little deeper into the nature of these water scarcities, map out where they exist and then assess to what extent our powerful neighbour to the south is heading for a full blown crisis in terms of freshwater supplies.

It may appear as a surprise to many Canadians to know that, when it comes to water supplies, the U.S. is one of the most endowed countries on the planet. Here, we are not talking about lakes, which have a limited storage capacity and whose total volume represents a relatively small percentage of the water required on a year-by-year basis. Indeed, lakes are standing water and once they start to be consumed they eventually dry up. Instead, we are referring to capacities for renewable water supplies in the U.S. [Sprague, 2007]. According to studies and estimates prepared by the World Resources Institute, the U.S. is in a tie for fourth place among all the countries of the world in terms of renewable water supply resources.

When we refer to renewable water supplies, we are talking about the amount of water flows and groundwater recharge that exist within the borders of a given country. In measuring renewable water supplies, the World Resources Institute calculates the amount of precipitation that falls within the country's borders which, in effect, recharges the water flows in rivers and in groundwater systems. The largest renewable water supplies are found in Brazil at 12.4 percent of the world's total, followed by Russia at 10 percent. Canada comes in third at 6.5 percent, immediately followed by the U.S., China and Indonesia at 6.4 percent [Sprague, 2007]. In other words, the U.S. is virtually in a tie with Canada and three other countries for third place in terms of renewable water supplies in the world.

So, the U.S. problem is not really a lack of renewable water supply. To understand the looming U.S. water crisis, however, we need to look more closely at the demand side of the equation. More specifically, we need to look at how urban demands for water are outstripping local sources and supplies in the U.S.; how the disequilibrium of demand and supply is manifesting itself in certain regions of the U.S.; and how the demand for water is growing exponentially in key industrial sectors that lie at the heart of the U.S. economy. What's more, we need to take a critical look at what options the U.S. has for securing access to other freshwater sources within its own borders.

Urban Water Depletion

In the U.S. today, the vast majority of the population ---almost 80 percent--- live in cities and the watersheds of the American city are depleting [US Census Bureau, 2000]. Surveys are showing that in an increasing number of cities, there are signs that the traditional water sources which urban areas depend on are either drying up or becoming so contaminated that new water sources have to be found. In 2005, the Urban Water Council asked the mayors of 373 cities in the U.S. to identify, out of a list of 24 water resource issues, which were their top priorities now and in the future. The survey

included 150 small cities, 125 medium sized cities and 98 large cities [including New York, Chicago, and Los Angeles].

From the list of 24 issues, 'water supply availability' was their third highest priority or problem to be addressed, behind 'aging infrastructure' and 'water system security.' Of all the cities surveyed, 46.4 percent identified water supply availability as a problem ranging from an 'every day' concern to a potentially 'catastrophic event.' Moreover, the survey showed that the mayors identified other issues among their top ten priorities that relate to water supply availability such as 'drought management,' 'regional conflict over water use,' and 'water rights.' As well, the 11th and 13th priority issues identified were related to water supply concerns, namely, ground water depletion and inter-basin transfers. In effect, water supply issues emerge from this survey as being one of, if not, the top priority in regards to water problems facing U.S. cities now and in the not so distant future.

The survey findings also suggest that a critical water shortage could occur nationwide for many cities by 2025. Of all the surveyed cities, 35 percent reported that they have an adequate water supply for less than 20 years. The problem becomes particularly acute among medium and large sized cities [see Table below]. By 2025, 43.2 percent of all the medium sized cities surveyed are expecting to face water shortages while 39.7 percent of the country's large cities will encounter this predicament. Only just over half o the U.S. cities [55.6 percent] indicated that they have sufficient water supply for more than 20 years.

Water Supply Adequacy	**% of Small Cities**	**%of Medium Cities**	**% of Large Cities**
10 years or less	19.3	24.0	17.3
20 years or less	15.3	19.2	22.4
Greater than 2o years	65.3	56.8	60.2
Number of Cities [not %]	150	125	98

But, the problem of urban water shortages in the U.S. could become even more urgent within a decade. Of the cities surveyed, 20.2 percent indicated they have sufficient water supplies for only 10 years or less. These survey results become even more disturbing when they are broken down in terms of large, medium and small size cities in the U.S. By 2015, 24 percent of medium sized cities and 17.3 percent of America's large cities will face potentially serious water shortages [Anderson et al, 2007].

Regional Water Shortages

As other observers note, it's important to emphasize that water shortages are more regional than national in scope within the U.S. today. Although as many as 36 U.S. states expect to experience water shortages in one form or another in parts of their state within the next decade, the U.S, Geological Survey [USGS] reports that overall water use in that country has stabilized since 1985 [Pentland and Hurley, 2007]. Rather than there being an absolute water scarcity across the country, the pattern of water shortages is more regional. And, most of the water shortages are due to the over-pumping of ground water, which is up by 14 percent [Mehan, 2005]. Indeed, according to the USGS report of 2003, nearly half of the US population [140 million people] depends on groundwater for their domestic supply, which is rapidly depleting in many parts of the country. In Houston, for example, local aquifers have reportedly dropped by 400 feet while in Chicago, the groundwater that sustains over 8 million people, has fallen by 900 feet [USGS, 2003].

The southwestern U.S. states have certainly been among the fastest growing regions in the entire country during the past quarter century. Along with the shift of industries, jobs and political power to the southwest during this period, water resources have been exploited to the limit. The great Colorado River system, for example, where twenty dams now exist to turn the rivers flows on and off like a faucet, transferring water through inter basin canals and pipelines to California cities and irrigation

districts plus urban centres in Arizona, has seriously damaged the river's ecosystem. With the Colorado River being 'over-appropriated,' the water table under California's San Joaquin Valley has dropped nearly ten metres in some areas in the past fifty years while overuse of ground water in the Central Valley has resulted in a loss of over 40 percent of the storage capacity in California's reservoirs.

The desert regions of the American southwest, which are largely water barren, have been expanding rapidly [Barlow, 1999; Barlow and Clarke, 2002]. In Arizona, the city of Tucson has part of its water supplies pumped in from the Colorado while in the city of Phoenix, which is growing at a rate of one acre per hour, water tables have reportedly dropped by as much as 120 metres in the eastern section. In New Mexico, ground water takings have increased to the point where water tables are expected to drop another 20 metres by 2020, thereby causing severe water shortages in many cities and towns throughout the state. Meanwhile, in Bush's own home state of Texas, all current water sources for the city of El Paso are predicted to be dry by 2030 and the Texas Water Development Board predicts it will only be able to meet 60 percent of the state's water needs by 2050 without finding new sources. And, in Nevada and Utah, there are plans to pump water out of rural aquifers and build a multi-billion dollar pipeline to transport this water to Las Vegas Valley, now the fastest growing urban region in the U.S., which could cause serious water shortages for ranchers and farmers of the Grand Basin.

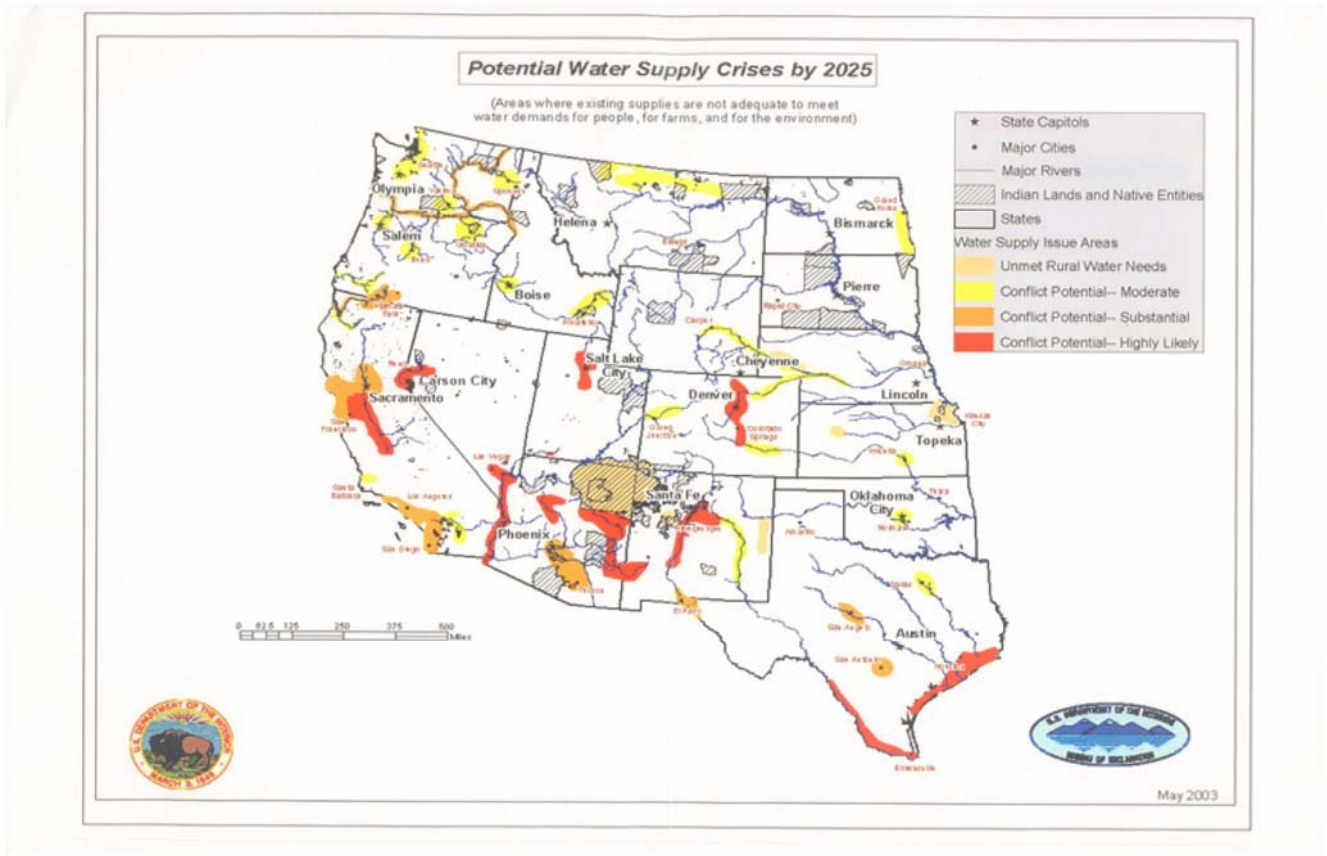
Moving into the farm belt states of the American Midwest, a lethal combination of droughts and dried up wells threatens the region. Here, the Ogallala [or High Plains] aquifer, which is located under portions of some 8 states, is the prime source for irrigating 27 percent of all US farmland. It covers a million and a half square kilometres and is the largest single subsurface water bearing resource in all of North America [Barlow and Clarke, 2002]. Yet, today the Ogallala aquifer is being drained by over 200,000 wells irrigating 8.2 million acres of farmland. Every minute of every hour, 13 million U.S. gallons of water are being pumped out of Ogallala, a rate that is 14 times faster than nature can restore it. As a result, the water level in the aquifer has dropped over 150 feet, with almost half of the water gone.

Elsewhere in the Midwest, water shortages are becoming acute in northeast Kansas to the point where state officials are considering the construction of a pipeline to bring water, largely for irrigation purposes, from the Missouri River, which is already over-tapped. The level of groundwater withdrawals by Chicago and Milwaukee is rapidly depleting the sandstone aquifer which supplies both cities with a portion of their water, say scientists. Moreover, a recent report [Urban Water Council, 2005] by Southern Illinois University warns that water demands in metro Chicago are expected to rise another 30 percent by 2025, thereby requiring a major escalation of bulk water exports from Lake Michigan [Barlow, 2005]. And, in 2004, more than half of Kentucky's 120 counties either encountered water shortages or came close to it.

Similarly, the southeast states continue to encounter growing water shortages. The Florida aquifer system, which covers some 200,000 square kilometers, is currently being mined at a rate that is far faster than it can be naturally replenished. Every minute, 6.6 million litres is being pumped out of this aquifer alone. What's more, the water table has dropped so low in Florida that seawater is now said to be invading its aquifers. The states of Arkansas, Georgia, Alabama, Tennessee and the Carolinas have also been plagued by periodic droughts in recent years. A 'water war' is emerging in the region as Florida, Alabama and Georgia struggle for access to, and control over, limited water supplies. As the city of Atlanta runs out of drinking water and turns to sources like the Tennessee River to solve its problems, neigbouring states are vigorously objecting to these kinds of inter-basin transfers.

The U.S. Bureau of the Interior, which is responsible for water supply management in western half of the country has, through its Bureau of Reclamation, identified 'hot spots' of potential water conflicts in the western states leading up to 2025. Assessing data on water supplies, hydrologic conditions, weather patterns, endangered species locations, and population growth trends, the Bureau observed where these trends converged. As a result, they were able to identify potential water conflict zones as

being moderate, substantial or highly likely. The following map illustrates the water conflict zones identified.



Industrial Water Takings

No picture of the water crisis in the U.S. today would be complete without taking a look at water takings by industry. When we talk about industrial water use, we are referring some of the major industrial sectors of the U.S. economy, including agriculture, manufacturing, mining, petroleum, pulp and paper, plus thermo-electric power. Perhaps the most comprehensive tracking of industrial water takings is conducted by the U.S. Geological Survey [USGS] every five years. In their last published report entitled, 'Estimated Use of Water in the United States in 2000,' the USGS provide a breakdown of the major water users in the U.S. on a state-by-state basis [Hutson et al, 2005].

The largest water user in the U.S. is thermoelectric power whereby water is used to generate electricity through steam-driven turbine generators. According to the USGS, the total quantity of water withdrawn for thermoelectric power for 2000 was an estimated 219,000 thousand acre-feet per year. In that year, water withdrawals to generate electricity "accounted for 39 percent of total freshwater withdrawals for all categories, and 52 percent of fresh surface-water withdrawals." The 5 leading states in water withdrawals for thermoelectric power are Texas, California, Florida, Illinois and North Carolina.

State	Freshwater	Saline Water	Total Water Withdrawals
1. Texas	11,000	3,860	14,900
2. California	395	14,100	14,500

3.	Florida	738	13,400	14,100
4.	Illinois	12,600	0	12,600
5.	North Carolina	8,800	1,810	10,600

* Figures used here for water withdrawals are in thousand acre feet per year

The second largest water user in the U.S. is irrigation mainly for large agricultural enterprises. In 2000, 153,000 acre feet of water was used for irrigation, accounting for 34 percent of total freshwater withdrawals. Of this, 58 percent came from surface water sources. A total of 75 percent of all the irrigated acres in the U.S. are located in seventeen coterminous western states where precipitation is less than 20 inches which is insufficient to sustain crop production. California, Colorado, Idaho and Nebraska alone accounted for half of the irrigated areas. In comparison with 1995, the number of irrigated acres had increased by 7 percent and the withdrawals from groundwater sources had risen by 16 percent.

The third largest U.S. water user are the public water supply systems which serve household, industrial and commercial needs. Public-supply withdrawals account for 13 percent of freshwater withdrawals, most of which [63%] is taken from surface water sources. In addition to public water supplies, manufacturing industries account for another 5 percent of total freshwater withdrawals in the U.S. In manufacturing production, water is used for such purposes as fabricating, processing, washing, diluting, cooling or transporting a product. It is used to integrate water into the making of products as well as for sanitation needs within industrial plants. And some industries, in particular, use a great deal of water to produce commodities ranging from all kinds of food, to paper and chemicals, plus petroleum and metals. Secondary manufacturing industries that produce autos and computers, for instance, also use considerable volumes of water.

It should be noted that water withdrawals for manufacturing uses as a whole have been steadily declining since 1985. The reason, says the USGS, is that there was a noticeable drop in U.S. manufacturing plants during the 1990s and that some water-intensive industries like petroleum and coal production are said to have substantially reduced their water usage. In addition, U.S. environmental laws and regulations have encouraged more efficient water use by manufacturing industries in recent years. Meanwhile, the mining industry continues to use significant amounts of water for extracting minerals [e.g. copper], liquids [e.g. petroleum] and gases [e.g, natural gas]. According to the USGS, 58 percent of water use for mining was freshwater taken from groundwater sources [Hutson et al, 2005].

Nevertheless, the United States has made significant progress in water conservation practices. Over the last 25 years, many US states and cities have begun to introduce programs and measures designed to encourage conservation pricing, conjunctive use of ground and surface water, waste water recycling, rainwater harvesting, drip irrigation, low flow appliances and leak reduction methods. The City of San Antonia Texas, for example, has lowered per capita water consumption by 40 percent by providing homeowners with rebates for a variety of water conservation practices. Moreover, the state of California, in an effort to reduce its overuse of the Colorado River, has reapportioned a significant amount of water volume from its irrigated farm districts to its cities.

Yet, the question remains as to what other domestic options are available for increasing freshwater supplies in the U.S. While there are no magic silver bullets, there is always the urge to find the great technological fix. In the US today, desalination, which involves the processing and distilling of sea water, has become a potential techno-fix. There are now over 20 desalination plants in operation along the California coast and cities like Tampa Bay, Florida, and Houston Texas, have been investing in desalination plants to keep from going dry. But, not only is current desalination technology highly expensive, it also utilizes large amounts of fossil fuels, thereby increasing greenhouse gas emissions that cause global warming. In addition, desalination processes discharge a highly saline

brine which, if dumped back into the sea at warmer temperatures, becomes a major source of marine life contamination.

Beyond desalination as a domestic solution, there is also the prospect of mega water diversions from Alaska, the Columbia River, and the Great Lakes which will be discussed in section three of this report.
.

2. Canada's Water Sources

Canada's image as a water-rich nation is often misleading [Sprague, 2007]. In 1985, *Maclean's* magazine, for example, told us that "Canada contains as much as 25 per cent of the global supply of freshwater." Almost fifteen years later, the *Globe & Mail* published an article claiming that "Canada is home to roughly 40 per cent of the Earth's store" of freshwater [1999]. At the same time, the West Coast Environmental Law Association reported that "Canada has one of the most abundant supplies of fresh water in the world, exceeding the volume of US water sources by a factor of 10" [Shrybman, 1999].

In the eyes of most Americans, there is little doubt that Canada is seen as that "great, green sponge" up-North. Most maps of Canada are dotted with blotches of blue marking numerous interconnected lakes and rivers. Indeed, the topography of this country is such that we have a few very large lakes combined with a great many small lakes and, given a relatively cool climate, there is also a low rate of evaporation. But, even being endowed with many lakes and rivers does not mean that Canada has a rich abundant supply of available fresh water.

Water Supply

In order to assess Canada's available water sources, it is essential that a distinction be made between the *volume supplies* of freshwater located in lakes and the *renewable supplies* of freshwater. In 2005, Environment Canada estimated that Canadian lakes contained 20 percent of the water to be found in all of the world's lakes. But, as noted above, lake water is not the same as renewable supplies of water [Sprague, 2007].

Water located in standing lakes or aquifers is a static volume supply of water that cannot be automatically renewed or replaced. If water is continuously drained from a lake, it will eventually dry up. The International Joint Commission [IJC] calls this 'ecological capital' --- the amount of water Canada inherited from the ancient glaciers which is essentially non-renewable. That's why there has been a constant resistance to draining water from the Great Lakes because 99 percent of the Great lakes water is a glacial inheritance and non-renewable. The same goes for aquifers. If water is drained from these underground bodies of water at a rate that is faster than nature can replenish them, they too will dry up.

Renewable supply, on the other hand, is water that falls from the sky in the form of rain and snow, runs off in rivers, streams and underground aquifers. It also includes groundwater because, as rainfall water seeps into the ground filling up aquifers, the excess water is drained through springs which run into streams. Since all of these water flows are renewable on a yearly basis through precipitation, they constitute available water supply of a given country or region. This is what the IJC calls 'ecological interest' --- the amount of water which is replaced by annual precipitation and is available for use.

From this perspective, Canada is ranked lower than many might expect, when it comes to renewable water supply. As we saw in the previous section, Canada virtually finds itself tied with three other countries [Indonesia, the U.S. and China] for third place among all the nations of the world with 6.5 percent of renewable water supply. The methodology used by the World Resources Institute

measures the surface water flows and the ground water recharge that takes place within a given country in a given year. In effect, these estimates account for the total amount of precipitation that falls within a country's borders on a yearly basis. As a result, Canada's annual renewable volume of fresh water is estimated to be 2,850 cubic kilometers, which is 6.5 percent of the world's total, which is 43,773 cubic kilometers. Brazil has 5,418 cubic kilometers of renewable freshwater supplies, almost twice that of Canada [Sprague, 2007].

Yet, Canada's 6.5 percent of renewable water supplies is also somewhat misleading. According to Environment Canada's 2005 report, some 60 percent of this country's water flows northward into the Arctic and northern territories. In effect, this water is unavailable for use by the vast majority of Canada's population which lives and works in the southern part of the country. As a result, Canada's portion of the world's freshwater supplies available for use is reduced from 6.5 to 2.6 percent [Sprague, 2007] which, in turn, amounts to one tenth of the figure normally cited for Canada's share.

These revised figures also put Canada's available freshwater supplies in relation to the U.S. in a different perspective. The total U.S. portion of 6.4 percent of the world's renewable freshwater supplies amounts to almost 2 ½ times the amount available to the vast majority of Canadians. Even if one were to exclude the Alaskan portion of the total U.S. water supply, the 48 contiguous states of the mainland account for an estimated 3.7 percent of the world's renewable freshwater supplies, or nearly 1 ½ times that of the southern half of Canada. Moreover, water supplies should not be calculated for human use alone since Canada has extensive forests, animal and vegetation that depend on freshwater sources for their survival as well.

Domestic Usage

Given our relatively small population, however, Canada's portion of usable freshwater supplies is more than sufficient to cover our needs in this country. Yet, Canadians are second only to Americans as the highest per capita water users in the world. According to Environment Canada's own analysis of domestic water use for selected countries, the U.S. leads with 382 liters of water used per person daily followed by Canada at 343 liters of water per person per day. By way of comparison, Italy's daily water use per person is 250 liters, Sweden uses 200 liters, France 150 liters, and Israel 135 liters [Shrubsole and Draper, 2007].

Over the past two decades, Canada's total water withdrawals have been rising steadily. In 1981, Canada's total water withdrawals amounted to 36,717 million cubic meters of water [MCM]. By 1996, total water withdrawals had jumped to 44,873 million cubic meters [Environment Canada, 2002]. Most of this increase in water withdrawals has come through the thermal power industry for the generation of electricity. Water withdrawals by the thermal electric industry grew from 18,166 MCM in 1981 to 28,288 MCM in 1996. This accounted for 64 percent of the total water withdrawals in the country that year.

The next largest water withdrawals come from manufacturing industries including pulp and paper products, primary metals and chemicals. The production of a single car in Canada requires 250,000 liters of water while 33,000 liters is needed for manufacturing a computer and its component parts. [Environment Canada, 2004]. Between 1981 and 1996, however, the water withdrawals for manufacturing declined from 11,042 MCM to 7,508 million cubic meters [MCM]. In effect, the manufacturing sector has been taking steps towards a more efficient use of water, including the use of water saving technologies and water recycling in their plants. It should also be noted that there was a decline in manufacturing production in Canada during much of this period.

Meanwhile, water withdrawals for agriculture irrigation purposes have been steadily increasing from 3,125 in 1981 to 4,098 million cubic meters in 1996. Approximately 85 percent of agricultural takings are for irrigation purposes and the remaining 15 percent for the watering of livestock. Three quarters

of all agricultural water takings occur in the prairie provinces, primarily Alberta. Yet, agricultural water use has the lowest rate of efficiency. Of the 4,098 MCM withdrawn for agriculture in 1996, only 1062 MCM was returned to the source. In other words, 75 percent of the water used is never recycled.

The fourth largest water withdrawals are for municipal water systems. In 1996, some 3,922 million cubic meters of water were taken to provide water services for residences plus small commercial and industrial needs. In 1999, the average per capita water use through municipal systems was 638 liters a day, which included 343 liters for residential purposes and the remaining 295 liters for small commercial and industrial facilities. Although these per capita water withdrawals vary widely from municipality to municipality across Canada, the Canadian average far outstrips most other countries, as noted above. Moreover, very little of municipal water use in Canada is recycled. And, as some observers point out [Brandes et al, 2005], residential water use in the 1990s increased at a faster rate [21 percent] than the general population growth rate.

Despite Canada's renewable supplies, these rising water use patterns have put considerable pressure on this country's water sources. Between 1994 and 1999, report Shrubsole and Draper, one out of every four municipalities in Canada encountered water shortages due either to heavy usage, drought conditions or infrastructure problems. In 2001, the federal government's Commissioner of the Environment concluded that a significant number of freshwater sources in southern Canada were being overstretched. Those cited included the Great Lakes, the Assiniboine-Red River Basin, the South Saskatchewan River Basin and the Okanagan Valley in British Columbia. And a 2004 CBC report showed that Lake Winnipeg and the St. Lawrence River are on the verge of ecological collapse due to extensive agricultural pollution coupled with global warming impacts [CBC, 2004].

Canada's increasing water stress, say Shrubsole and Draper, is revealed by a number of factors including falling groundwater tables, lower surface water levels, and reduced water quality. In addition, other environmental problems are created when "water is not returned to its original source but transferred to another water body." Through these water transfers, the ecosystems in different bio regions may be altered by the inflows from another water body and the outflows that diminish water needed in the original source [Brookes et al, 2004].

Climate Change

One of Canada's foremost water scientists, David Schindler of the University of Alberta, has been warning Canadians of an impending freshwater crisis in this country for years. One of the major causal factors, says Schindler, has to do with climate change and global warming [Schindler, 2001]. The steady rise in average temperatures will have adverse effects on both water quality and water quantity in Canada, says Schindler. Significant changes, he says, will be taking place in the "the magnitude and timing of river flows and lake levels and water renewal times."

In particular, Schindler's research has been focused on how water sources on the Prairies are threatened and the potential impacts of climate warming. He warns that the major river systems across the food producing Prairies are drying-up. During the last century [between 1910 and 2002], Schindler's studies show that the South Saskatchewan River has declined 80 percent. The Old Man and Peace Rivers is down 40 percent while the Athabaska River has dropped by 30 percent.

At the same time, several lakes have dried up, including lake Maglore near Grand Prairie, Alberta. Based on his biological research, Schindler concludes that the 20th century was unusually wet and that drought has been the norm for the Prairies. Add global warming to the mix and Prairie drought patterns are likely to intensify. Already, the glacier that feeds the Bow River in Alberta is melting so quickly that there may be no water left in it 50 years from now.

Meanwhile, Canada's wetlands are vanishing at an alarming rate. Like a sponge, the wetlands soak up excess rain and snow and help prevent flooding. The wetlands also function like the Earth's kidneys, filtering out dirt, pesticides and fertilizers before water runs off into lakes and rivers. As well, the marshes in the wetlands serve as a storage house for purified water. In short, wetlands are a vital part of eco-system for the regeneration of water. Under conditions of increased climate warming, says Schindler, many of Canada's wetlands will disappear and water tables will decline.

In a study prepared for the Canadian Wildlife Federation, water specialist Jamie Linton documents how Canada's wetlands, which have traditionally covered only 14 percent of this country's land mass, has mostly been destroyed by urban sprawl and large-scale farming. Atlantic Canada, for example, has lost 65 percent of its wetlands and southern Ontario has destroyed 70 percent of its wetlands, while the Prairies have lost 71 percent and a staggering 80 percent of the wetlands have vanished in the Fraser River Delta of southern British Columbia [1997].

Warmer temperatures will also bring changes to water quality and habitat. In small lakes, says Schindler, habitats for cold stenothermic organisms will be reduced and fish migration in some regions will be dramatically affected. The effects of acid precipitation will be exacerbated, particularly in lakes and steams that have weak buffers. As well, the combination of climate warming and acidification will decrease the amount of organic carbon that is dissolved, thereby causing increased penetration of ultraviolet radiation in freshwater systems. As a result, the structure of aquatic life will be considerably altered by the changing life cycles of many organisms plus the invasions of non-native species.

For Schindler, mega energy developments like the Alberta tar sands pose a serious challenge to Canada's water future. Using current technologies, up to 4.5 barrels of water are used to produce one barrel of oil from the tar sands. Today, it is estimated that crude oil production from the tar sands uses as much freshwater as needed to sustain a city of two million people [Schindler, 2007]. If there is a five-fold increase in crude oil production from the tar sands over the next fifteen years, the water stress in the Athabasca River region and the Aboriginal peoples in the Mackenzie River Basin to the North, could be astronomical.

At the same time, Schindler maintains that Canada's own water security will also be impacted by acute water shortages in the U.S. The increased water stresses, already influenced by climate warming in the southwestern region of the U.S., will be felt here in Canada as well. Indeed, there are signs that the dynamics of climate change will interact with the construction of dams for massive water diversions, creating multiple forms of water stress and decreasing opportunities for water renewal [Schindler, 2001].

3. Water Export Corridors

The idea of selling Canadian water to the U.S. is certainly not new. As Frederic Lasserre of Laval University points out, the call for bulk water exports from Canada to the U.S. dates back to the 1960s [Lasserre, 2003]. Indeed, it is often forgotten that the precedent for bulk water exports was set back then with the signing of the Columbia River Treaty between Canada and the U.S in 1969. For almost forty years now, the Columbia River, which originates in British Columbia and is fed by water run-offs from the Rocky Mountains, has been providing the American southwest with a steady supply of water from Canada.

The origins of the Columbia River Treaty date back to a conflict between Arizona and California over water takings from the Colorado River which, in turn, prompted the U.S. Supreme Court put a limit on the volume of water withdrawals from the Colorado. At that time, California was already withdrawing

volumes from the Colorado in excess of the Supreme Court's limits. After searching for other sources to replace its water takings from the Colorado, California focused its sites on the Columbia River. However, four western states [Washington, Oregon, Utah and Montana] were opposed to California taking water from the Columbia River, because the Columbia crossed over their jurisdiction and they depended on this source for their own water needs in the future. In 1969, the U.S. and Canadian governments signed the Columbia River Treaty to buy Canadian water which would be transferred to the Colorado basin via the Columbia River.

Meanwhile, according to Canadian water specialist Richard Bocking, there have also been a number of other major bulk water diversion projects in the Pacific northwest of the U.S. to address pressing regional water shortages, notably California and Arizona. [Bocking, 1972]. Before the Columbia River treaty, three canals were built to divert water in California, namely, the Los Angeles Aqueduct in 1913, the All American Canal in 1940 and the Colorado River Aqueduct in 1941. Since the Columbia River Treaty, three more bulk water diversion projects have been built in this region, namely, the California Aqueduct in 1970 covering Sacramento and the central part of the state, the second Los Angeles Aqueduct in 1970, and the Central Arizona Project in 1993 to divert water from the Colorado to Tucson. The largest bulk water diversion in the region is the Central Valley Project involving the Joaquin and Sacramento river systems.

Elsewhere in the U.S. the Great Lakes have been tapped for bulk water diversion, namely, the Chicago Diversion Plan. Every day, Illinois is allowed to divert 2.1 billion gallons of water from Lake Michigan, largely to serve the water needs in metropolitan Chicago with a population of over 8 million. The Chicago Diversion Plan is, of course, an exemption which was grandfathered into the Boundary Waters Treaty between Canada and the U.S. Today, the International Joint Commission which oversees the Great Lakes, is now opposed to any more bulk water diversions. Yet, as recent as 1998, the Ontario government went so far as to approve a plan by a Canadian export company [Nova group] to extract millions of liters of water from lake Superior for export by tankers to Asia. The approval, however, was promptly rescinded after an outcry from the International Joint Commission, which oversees the Great Lakes on behalf of both the U.S. and Canadian governments. Moreover, Madeleine Albright, then U.S. Secretary of State, issued a declaration to the effect that since the U.S. held joint jurisdiction over the Great Lakes, no decision on bulk water exports from Lake Superior could be made without U.S. approval.

The state of Alaska in the far northwestern region of the continent provides the US with another option. Alaska's potential for bulk water transfers is reported to be staggering. According to the *Alaska Business Monthly,* a one million-gallon tanker in Sitka could be filled every day and it would still represent less than 10 percent of the regions current water usage. In Eklutna, Alaska, it is estimated that the bulk water potential could be as high as 30 million gallons [113 million liters] per day. Moreover, the political authorities in Alaska are committed to selling bulk water, becoming the first jurisdiction in the world to permit bulk water sales. Yet, there are constraints. Bulk water shipment by supertankers down the Pacific Northwest coast may not prove to be cost efficient, since they would have to operate year around on tight schedules, moving through very treacherous seas and tortuous coastal waterways. A more ambitious option would be to construct an undersea pipeline along the Pacific shoreline [Hickel, 2007].

The implication of 1963 U.S. Supreme Court decision to restrict water takings from the Colorado meant that massive bulk water imports from Canada would increasingly become the preferred option [Lasserre, 2003]. In 1968, the American Association for the Advancement of the Sciences concluded that mass transfers from water-rich and water-poor regions was inevitable and that Canada was the only real possible source. By 1970, the U.S. Secretary of the Interior, Roger Morton, declared that the U.S. must make plans to import water from Canada and the Arctic. Between the 1960's and the 1980's, a series of mega diversion schemes were planned for massive bulk water transfers from Canada to the U.S. [Lasserre, 2003; Barlow and Clarke, 2002]. In retrospect, these mega projects can be categorized in terms of three major water corridors.

Western Corridor: The centerpiece of the western water corridor flowing from Canada to the U.S. is the North American Water and Power Alliance. Originally conceived in 1964 by a Los Angeles engineering firm, Ralph M. Parsons Co., NAWAPA was designed to bring bulk water from Alaska and northern British Columbia for delivery to 35 U.S. States. By building a series of large dams, the northward flow of the Yukon, Peace, Liard and a host of other rivers [Tanana, Copper, Skeena, Bella Coola, Dean, Chilcotin, and Fraser] would be reversed to move southward and pumped into the Rocky Mountain Trench where the water would be trapped in a giant reservoir approximately 500 miles long [or about eight hundred kilometers]. A canal would then be built to take the water southward into Washington State where it would be channeled through existing canals and pipelines to supply freshwater for customers in 35 states. The annual volume of water to be diverted through the NAWAPA project is estimated to be roughly equivalent to the average total yearly discharge of the entire St. Lawrence River system in Canada.

Although the NAWAPA plan lay dormant for over 15 years, it has been revived again in the early 1980s. Still, the prohibitive costs of the project [estimated to be between $100 billion and $300 billion] put the project back on ice. Meanwhile, other less ambitious schemes, like the Western States Water Augmentation Concept, were proposed in 1968. Like NAWAPA, this mega project was designed to divert water from the Liard river basin south into the Rocky Mountain Trench where it would then be transferred through tunnels and canals into the Fraser, Columbia and Kootenay rivers and from there flow directly into the U.S. During his period, however, neither of these mega projects was publicly promoted for water exports to the U.S. Instead, Canadians were repeatedly told that the damming and diversion of so many rivers was needed to augment hydroelectric power at Niagara, provide irrigation for the Canadian prairies, and establish something called the Canadian Great Lakes Waterway.

Central Corridor: Another water corridor consists of a series water diversion schemes proposed from the North West Territories [NWT] through the Prairies into the U.S. In 1968, the Washington State Resource Center developed plans for the Central North American Water Project [CeNAWAP]. The plan calls for a series of canals and pumping stations linking Great Bear Lake and Great Slave Lake in the NWT to Lake Athabaska and Lake Winnipeg and then the Great Lakes for bulk water exports to the U.S. A variation on the CeNAWAP is the Kuiper Diversion Scheme which proposes to link the major western rivers into a mega water diversion scheme involving the Mackenzie, the Peace, the Athabasca, North Saskatchewan, Nelson and Churchill river systems. Both the Kuiper and the CeNAWAP are designed to transport water for export to the U.S.

The central water corridor includes other diversion projects. The Magnum Diversion Project, for example, proposes to divert water from the Peace River Basin in northern British Columbia through the Athabasca, North Saskatchewan, Battle, South Saskatchewan and the Qu'Appelle rivers into the Souris River which flows naturally into the United States. Another proposal coming out of the Western States Augmentation Concept calls for diverting waters from the Smokey, Athabasca, and Saskatchewan rivers through the Qu'Appelle River to Lake Winnipeg where they would flow south into the U.S. And, then there is Saskatchewan–Nelson Basin project of the Prairie Provinces water Board which proposes to divert water from the Mackenzie River into the Churchill River and the Saskatchewan River for storage in Cedar Lake where it will be delivered south through canals into Lake Manitoba and then pumped into the Assiniboine River and the Souris River into the U.S.

Eastern Corridor: the centerpiece of the eastern water corridor is known as the GRAND Canal --- the Great Recycling And Northern Development Canal. As originally conceived, the GRAND Canal plans called for the damming and rerouting of northern river systems in Quebec in order to bring freshwater through canals down into the Great Lakes where it would be flushed into the American Midwest. A dike would be built across James Bay at the mouth of Hudson Bay [whose natural flow is northward], thereby turning the bay into a giant fresh water reservoir of about thirty thousand square miles from James Bay and the 20 rivers that flow into it. Through a system of dikes, canals, dams, power plants and locks, the water would then be diverted from the reservoir and rerouted southward down a 167

mile canal, at a rate of 62,000 imperial gallons a second [about 282,000 liters] into two of the Great Lakes --- Lake Superior and Lake Huron. From there, the water would be flushed through canals into markets in both the American Midwest and U.S. Sun Belt.

From the outset, the GRAND Canal enjoyed considerable political clout in Canada. It was widely promoted in the mid-1980's by then Quebec Premier Robert Bourassa, who also presided over the construction of the massive James Bay hydro project in the 1970s, and by Simon Reisman, Canada's chief negotiator for the US-Canada Free Trade Agreement in the late 1980s. Both were backed by then Prime Minister, Brian Mulroney. A very key player and partner in the GRAND Canal scheme was the Bechtel Corporation, the U.S. construction and engineering giant, which had close ties with the administration of President Ronald Reagan through Secretary of State, George Shultz, who served on the Bechtel board of directors. Bechtel still owns the project's blueprints. Yet, the GRAND Canal project did not go ahead, largely because the U.S. demand for bulk water imports was not as acute back then and the estimated 100 billion dollar price tag made it economically unfeasible at the time.

It should be noted that all of these proposed schemes for bulk water exports were met with strong and even fierce public opposition at the time, with public opinion polls recording more than 70 percent opposed. Beyond this, however, there are multiple reasons why none of these massive water corridors have been built in the intervening decades since they were first proposed.

The first reason is *economic* feasibility. Cost benefit studies conducted by the U.S. Army Corps of Engineers in the 1980s, for example, raised doubts about the economic viability of either bulk water diversions from the Great Lakes or the Grand Canal scheme [i.e. the eastern corridor]. However, the track records of governments with regards to subsidizing water needs for irrigating agricultural crop production suggests that this may not be the major deterrent. In California's Central Valley, governments subsidized crop irrigation in the 1980s at a rate of some 58 times more for thousand cubic meter of water than what farmers paid themselves [Pentland and Hurley, 2007]. It is, of course, less likely that governments today would engage in "pork barrel" politics to subsidize major water diversion projects that are considered uneconomical, but a great deal depends on how acute the real water demands and needs are in certain regions of the U.S.

The second reason has to do with *political* jurisdictions. In the U.S., the federal government has been sensitive to the primacy of state jurisdictions when it comes to bulk water diversions and transfers [Pentland and Hurley, 2007]. To date, most interbasin water diversion projects have been able to overcome physical boundaries [e.g. mountains, deserts] but have only rarely been designed to cross over state boundaries. In the case of the Great Lakes, for example, the 1986 Resources Development Act in the U.S. banned federal studies of bulk water transfers from the Great Lakes Basin without the approval of all of the eight contiguous state governments. Similarly, Congress imposed a moratorium on studies of interbasin water transfers between 1968 and 1978 in recognition of state jurisdictions. So, one would expect that when it comes to the question of bulk water diversions and transfers from another nation state like Canada, political jurisdiction would be a major factor. Again, however, a lot depends on how acute the demands are.

The third and most recent reason concerns the adverse *environmental* impacts of bulk water diversions and transfers. There are mounting concerns about the ecological dangers of large-scale extractions from water basins. While more comprehensive independent studies are needed, there is sufficient evidence that draining massive amounts of water from lake and river basins disrupts local ecosystems, damages natural habitat, reduces biodiversity, and dries up aquifers and underground water systems. During inter-basin transfers, parasites, bacteria, viruses, fish and plants from one water body would be carried into another. Mercury contamination from the flooding required for water diversions would bio-accumulate in the tissues of mammals, thereby having a potentially damaging effect along the food chain. Large-scale structures required for the storage of exported water would also disrupt ecosystems in remote areas. And, in the case of both the western and eastern corridors,

reversing the natural flows of northern river systems through dams, is likely to have untold ecological consequences.

However, this does not mean that the U.S. is without domestic solutions. It is possible that the U.S. may attempt to resolve its growing demand for freshwater supplies through bulk water diversions from the Columbia River, Alaska and the Great Lakes [Quinn, 2007]. The Colorado basin states such as California and Arizona could divert more water from the lower Columbia River through overland pipeline. The western states could bring water down from Alaska through either tankers or an undersea pipeline or perhaps water bags. And, both the Midwest and southern states could target the great lakes for water diversions via the Mississippi River. Yet, each of these domestic options contains major economic, political and environmental obstacles of their own. In turn, therefore, the costs of these domestic options will no doubt be weighed against those associated with bulk water export schemes from Canada.

At the same time, these domestic solutions would have impacts on Canada. Take, for example, more bulk water diversions from the Great Lakes for Midwest and southern states. Here, the Chicago Diversion remains Canada's "Achilles heel" [Quinn, 2007]. Of all the Great lakes, Lake Michigan does not pass through an international boundary and is thereby not considered 'boundary water' under the terms of the Boundary Waters Treaty. It is therefore conceivable that the U.S. government could authorize more substantial bulk water diversions from Lake Michigan into the Mississippi River despite consistent opposition from Canada and from citizens in the states that border the Great Lakes. If Washington took this unilateral decision, then Canadian officials would be compelled to increase diversions from river systems in northern Ontario in order to replace the water lost from the Great Lakes. In turn, this would cause considerable environmental and social problems in northern Ontario. Moreover, this drainage of water from the Great Lakes would be happening at a time when climate scientists are already warning of lower water levels due to greater evaporation caused by global warming.

Recently, other problems associated with cross border bulk water diversions have surfaced in the recent decision by the state of North Dakota's to drain Devils Lake. To prevent flooding, the project is designed to drain Devils Lake into the Sheyenne River, which is a tributary of the Red River that flows northward into Canada. Devil's Lake, however, has become a pothole of toxic chemicals from industrial runoffs and is now so polluted that it has become unsuitable for irrigating agricultural crops. The Devils lake diversion has been strongly resisted by the people of Manitoba who fear that it will destroy the Red River system, including Lake Winnipeg. Although a last minute deal was struck between the Martin and Bush governments in August 2005, requiring the construction of a rock and gravel filter, the non-binding agreement is not sufficient to prevent chemical contaminants from spewing into the Red River system.

4. Water Policy Quagmire

If a company or consortium of companies were to come forward now with a plan to extract and transport water in bulk form from a Canadian lake, river or aquifer, to the U.S., it is not at all clear that Canada has in place the kind of water governance plan needed to deal with such an issue. Indeed, this is a serious policy gap and vacuum. And, even if Ottawa and the provinces were to develop an effective water governance strategy now regarding bulk water exports to the U.S., they would have to start by disentangling a thorny web of political and policy issues.

At the outset, there is of course the constitutional division of powers to contend with in water policy making in this country. Under the Canadian Constitution, the provinces have the authority and powers to govern natural resources, including water, that lie within their jurisdiction whereas the federal

government has responsibility for governing matters of international trade and foreign policy. A Canadian plan for governing water exports would, therefore, require the cooperation and concerted action on the part of both federal and provincial governments.

Historically speaking, the bedrock of water policy relations between Canada and the U.S. is rooted in the Boundary Waters Treaty of 1909. For almost a century now, this treaty has governed the water flows from lakes, rivers and waterways along the border areas between the two countries. Under the Treaty, the International Joint Commission was established to approve any new uses and diversions of these waters, giving special attention to the interference or obstruction of their natural levels and flows.

Indeed, the Boundary Waters Treaty could, along with the references and studies of the International Joint Commission, provide the basic framework for the development of Canadian water resource policy. Here, it is useful to keep in mind three distinct phases in the evolution of Canadian water policies regarding the U.S. outlined by Bob Halliday and Ralph Pentland [Halliday and Pentland, 2004].

The first phase is the 'cooperative development period' [1945 to 1965] in which there was considerable collaboration between Canada and the U.S. on major water related projects of mutual advantage like the St. Lawrence Seaway and the Columbia River hydroelectric development. Although there was no formal water export policy in Canada, strong public opposition was expressed to the idea of large scale water exports during this period.

The second phase is the 'comprehensive management period' [1965 to 1985] which included the development of the Inland Waters Directorate of Environment Canada that provided the federal government with the expertise to negotiate cross border water issues such as acid rain with the U.S. During this period, the government's position against water exports was maintained but the 1985 Inquiry on a National Water Policy report did not rule out the possibility of allowing water exports.

The third phase is the 'sustainable development period' [1985 to the present] is characterized by the globalization of the world economy, the development of free trade regimes and the emergence of the U.S. as the world's only superpower. It was during this period that water governance become more decentralized in Canada. Instead of 'prohibiting' the bulk export of water from this country, emphasis was put on 'prohibiting' the bulk removal of water from major basis which, as we shall see, amounts to a default position taken once the new free trade regimes were in place [Pentland and Hurley, 2007].

Throughout the first two phases, the federal government appeared to take a clear stance against bulk water exports to the U.S. As one senior Environment Canada official from the comprehensive management period, Bob Clark, put it: "Our land and resources are the birthright of all Canadians. We do not sell water---even to Canadians---we only give a right to use it. A water right can be cancelled. But, if Canada were to grant a right to the United States for the use of Canadian water we would never again regain its use unless a suitable alternative to water is found … there is no substitute for water" [Clark, 2001].

Yet, by the end of this second phase, there were signs of equivocation in Canada's position on water exports [Pentland and Hurley, 2007]. After traveling across the country holding public hearings, the Mulroney government's Inquiry on a National Water Policy [Pearse Commision] heard widespread opposition from Canadians to large scale water exports. Yet, the Pearse Commission did not recommend a outright ban on water exports but took a more cautious approach in calling on the federal government to be better prepared to deal with U.S. requests for Canada's water when they come in the future. The main priority, said the Commission, was to manage water better in Canada for Canadians and the debate over water diversions for export tended to be a distraction from this goal. Based on these and other findings of the Inquiry, the government developed its 1987 Federal Water policy.

Nevertheless, when the Mulroney government tabled its Canada Water Preservation Bill in the House of Commons in 1987, it contained a more clear-cut position on water exports. “The federal government,” the bill stated, “will take all possible measures within the limits of its constitutional authority to prohibit the export of Canadian water by interbasin diversions and strengthen federal legislation to the extent necessary to fully implement this policy” [House of Commons, 1987; Pentland and Hurley, 2007]. In retrospect, however, this turned out to be more of a political ploy to dampen mounting resistance to the Mulroney government’s proposed free trade deal with the U.S.

Subsequently, the Canada Water Preservation Bill was allowed to die on the order paper as the writs were dropped for the 1988 election on free trade. Nor was the bill reintroduced in Parliament after the ’88 election which had, in effect, given the Mulroney government the mandate to sign the Canada-US Free Trade Agreement [CUSFTA]. Indeed, the bill contradicted key elements of the CUSFTA and if it had become law, the U.S. would have had sufficient grounds to strike it down as a violation of the new agreement. After all, CUSFTA, and its successor, the North American Free Trade Agreement [NAFTA], put strict limits on what Canada can and cannot do in regulating the export of its natural resources like water to the U.S.

The vulnerabilities in the Federal Water Policy became evident in 1995 when a Saulte Ste. Marie company by the name of Nova Corp applied to the Ontario Ministry of the Environment to extract water from Lake Superior for bulk water exports. The Ontario government granted the permit but later rescinded it after there was a public outcry. Although Nova appealed the decision to rescind, they lost the appeal and the permit was never granted. But, the incident provoked a debate about water export policy at provincial as well as national levels. It was clear that there was little understanding on the part of companies and governments about the trade implications of granting such a permit, let alone the ecological implications of transporting water by pipelines and ships.

According to various legal opinions by trade lawyers [Shrybman,1999; Boyd, 2003], Canada could not put a ban or quota on the export of water which is defined as a ”tradable good” under today’s global trade rules. Canada’s obligations under both the WTO and the NAFTA impose strict limits on our abilities to exercise sovereignty over water exports. Under Article 11 of the GATT [now the WTO rules] the use of quantitative export controls, such as a ban or embargo, on any product ‘destined for the territory of any other contracting party’ is prohibited. While Canada could impose a tax or duty for water conservation purposes under the WTO, it surrendered this option in regards to exports of natural resources to the US under NAFTA [see NAFTA, Articles 302, 309.2 and 314].

What’s more, Canada is also entitled to provide the US with a proportional share of its water resources in perpetuity. Article 315, called the ‘proportionality clause’ of NAFTA, makes it clear that once Canada starts to export water it cannot reduce its exports below the average of the previous three years. In other words, once the water tap has been turned on --- which would have been the case if Nova Corp had gotten its permit --- it stays on, and flows can only be reduced if Canada’s water is being rationed to Canadian consumers and companies at the same time. Furthermore, Article 301 of NAFTA would require Canada to apply the ‘national treatment’ rules to water as an export commodity in that water bound for export would have to be treated in precisely the same way as water used for domestic consumption.

Taken together, the new trade regimes impose severe limitations on what Canada can and cannot do when it comes to regulating the export of our water to the US or elsewhere. In effect, they operate as a set of hand cuffs on water policy making. Rather than negotiating ironclad exemptions in the NAFTA text [as was done for raw logs and unprocessed fish], both conservative and liberal governments allowed the water export issue to languish in ambiguity. And, when public outcry against the lack of water protection in NAFTA grew more intense before the deal was finally ratified, Prime Minister Chretien’s office issued a press release in the fall of 1993 saying the three governments agree that there is nothing in NAFTA obligating any of the three parties to export the water it possesses in its

natural state. Since the statement was not signed, it's unclear what legal status it would have in the adjudication of a dispute brought before a NAFTA trade panel.

In effect, Canada's official policy concerning bulk water exports has been in a quandary for the past two decades. Instead of pursuing the policy orientation and legislative agenda outlined in the Canada Water Preservation Bill of 1987, the federal government's position on water exports to the U.S. continues to dangle on a rope, twisting and turning in the wind. This became particularly evident in the wake of the Nova incident. In response to the public uproar over the prospects of private schemes for bulk water exports from Lake Ontario, the House of Commons passed a motion in February1999 calling on the federal government to ban the export of water. Afterwards, the Chretien cabinet approved Foreign Affairs Minister Lloyd Axworthy's recommendation that there be a ban on all forms of bulk water exports.

However, in consultation with trade lawyers and policy experts, the government and department officials were apparently shocked to hear that issuing a federal ban on bulk water exports would be viewed as a violation of international trade rules under both NAFTA and the World Trade Organization. [Quinn, 2007] At the same time, federal and provincial governments experienced the chill of possibly being sued by a water corporation under chapter 11 of NAFTA. The U.S. owner of the Sunbelt Corporation, which planned to ship water from coastal streams in British Columbia to markets in California by tankers, filed a suit against the B.C. Government for placing a moratorium on new or expanded licenses for bulk water removals. Although Sunbelt's 10 billion dollar suit was eventually withdrawn, the message was clear.

Handcuffed by NAFTA and the new international trade rules, the Chretien government decided to shift strategy and abandon its call for an outright ban on bulk water exports. Instead, Ottawa began to develop an environmental approach to the issue of water sovereignty by asserting its right to protect 'water in its natural state' and prevent the 'bulk removal of water' from major water basins.

Bulk removal of water, the government argued, causes environmental damage to water basins. Preserving our natural waters is "the most comprehensive and environmentally sound way to protect our water basins from environmental damage that can be caused by bulk removals." In other words, water is protected in its natural basin before the issue of its export arises. For these reasons, the government maintained that prohibiting bulk water removal from water basins is a better approach than an export ban because it is "consistent with Canada's international trade obligations," is "more comprehensive and environmentally sound," and "respects constitutional responsibilities"[DFAIT, 2001].

Based on these environmental foundations, the Chretien government developed its strategy on water exports. Instead of introducing federal legislation to prevent bulk water exports, the government's strategy shifted to developing a political accord with the provinces and territories. In November 1999, the federal Minister of the Environment announced a Canada-Wide Water Accord designed to prohibit bulk water removals from all major Canadian water basins [Anderson, 1999]. The accord had been endorsed by the environment ministers of the provinces and territories. In turn, the provinces were expected to put in place legislation and/or regulations to accomplish this goal with their respective jurisdictions.

According to one legal opinion [Shrybman, 1999], the argument that Canada's water strategy can avoid becoming vulnerable under its international trade obligations by treating water in its 'natural state' rather than as a "tradable good" is weak on several grounds. Under both US and European law, water in its natural state [e.g. ground water] is considered to be a 'commercial good' because it is capable of monetary valuation and of being the object of commercial transaction. Even if one accepts the dubious proposition that water becomes a 'tradable good' once it has 'entered into commerce,' a very large proportion of Canadian water resources are already considered subject to commercial use either because it has been allocated to various users or because it is subject to proprietary claims

through licenses --- to be used for public consumption, agricultural irrigation, industrial production, hydro- electric power, and bottled water.

Although all provinces except Nova Scotia actually passed legislation prohibiting bulk water exports from their territories, this would have little or no effect without federal legislation [Shrybman,1999]. While jurisdiction over Canada's water resources are shared between various governments, only the federal government has the constitutional authority to regulate exports. Nor is the accord legally binding on the provinces, meaning that a subsequent change in political administration could result in an abandonment of the obligations in the Accord. Moreover, the fact that the Accord allows provinces to develop their own approach to achieve the Accord's goals means that the stage is set for "a patchwork of policies and regulations across the country" [Shrybman, 1999]. For example, the Provinces of Quebec and Newfoundland have already expressed their interests as resource owners to ship water in bulk form once global prices are sufficiently high [Quinn, 2007].

The federal government did, however, take more concrete action to prohibit bulk water removals from boundary waters, notably the Great Lakes. In February 2001, the Boundary Waters Treaty was amended to grant the Minister of Foreign Affairs the authority to prohibit bulk removals from boundary waters, principally the Great Lakes, within Canada's jurisdiction. At the same time, Ottawa called on the International Joint Commission to study the effects of water consumption, diversion and removal from boundary waters [including for export], especially from the Great Lakes. While these measures are important, they do not address the policy issue of prohibiting bulk water exports from this country.

Indeed, the new era of free trade regimes has created a diversion from developing a clear policy position and policy tools for dealing with bulk water exports. The federal government no longer speaks about prohibiting the bulk export of water from the country. Instead, it speaks about prohibiting "the bulk removal of water from all five major drainage basins in Canada" [Pentland & Hurley, 2007]. To be sure, it is important for the federal government to develop a solid environmental foundation for its position. But, as Pentland and Hurley have argued, this environmental rationale is essentially "a default position." It was primarily adopted by federal government officials once it became clear that their hands were tied by the new trade rules and disciplines when it came to developing and implementing a national policy on bulk water exports.

It is also questionable whether the economic losses due to large scale bulk water exports have been taken into account by policy makers in Ottawa. Currently, Canada's trade economy is deeply dependent on water. As Andrew Nikiforuk points out, just about every product Canada exports abroad --- automobiles, electricity, aluminum, grain, cattle, hogs, wood and oil --- makes use of enormous volumes of water which economists call "virtual water." [Nikiforuk, 2007]. In addition to these virtual water exports already embedded in our trade economy, bulk water exports would surely put a severe strain on our available water sources, leaving less water at home to produce products and ensure jobs, let alone to sustain ecological services.

Even more troubling is the fact that the Canadian government lacks the capacity to effectively monitor the country's water sources and enforce its own water laws. Since 1971, Environment Canada has produced reports every five years on national estimates of water use. But, in 2001, Environment Canada failed to deliver its five year report due to financial cutbacks. Funding for federal and provincial research on water issues has also declined dramatically. Natural Resource Canada documents, released under the *Freedom of Information Act* by Ken Rubin, show that by January 2006, this government department was warning that "… Canadians are currently facing serious groundwater quality and availability issues" and that "…there is no visible water policy agenda nor a common agenda for the whole country." [NRCan, 2006]. Although a third of all Canadians depend on ground water as their primary source of drinking water, only three out of eight of the country's major regional aquifers have actually been mapped.

5. Water Security Agenda

The time has certainly come, if not overdue, for Canada to develop a clear policy and strategy on bulk water exports. Before the U.S. demands for water reach a crisis point, it's imperative that the Canadian government be in solid position to respond with effectiveness. Public opinion polls indicate that most Canadians are expecting action from their governments on the issue of selling water to the U.S. In a 2002 survey, for example, conducted by the Centre for Research and Information on Canada, 69 percent were opposed to bulk water exports. Nor has this level of public opinion wavered much in the past 40 years. Yet, little has been done since the Canada Water Preservation Bill twenty years ago to put together a cogent plan of action that reflects this kind of public support. What seems to be missing is the political will to provide firm leadership on this issue.

Indeed, the Canadian government and peoples seem to have been on divergent trajectories for the past two decades. While the public has been vigilant in wanting to protect Canada's sovereignty over water, Ottawa has been willing to use this country's water as a lever to gain and maintain access to the huge U.S. market for Canadian exporters [Quinn, 2007]. Certainly, Canada's energy, notably Alberta's oil and gas, was used in this way to strike a deal in the Canada-U.S. Free Trade Agreement and the same rationale explains why Ottawa kept refusing to negotiate an exemption for water in both CUSFTA and NAFTA. Negotiating an ironclad water exemption would have meant risking the ultimate prize for Canada's trade negotiators.

As noted in the Introduction, the current Harper government has signaled in its recent Throne Speech the intent to develop a national water strategy. To date, it is not at all clear whether this means the Prime Minister has instructed his Environment Minister or any other ministry in his government to develop a comprehensive water export policy and strategy for the country. As long as the quagmire [described in the last section] in water export policy exists, Ottawa will be in a weakened position to respond to the U.S. when its impending water crisis erupts. At the same time, the steady deterioration in the capacities and expertise of the federal environment and natural resource departments with regards to water issues and policies is also troubling. In short, it does not appear that Ottawa is prepared to measure up to the geo-political challenges over water that lay around the corner.

To be sure, the pressure is mounting. Over the past six years, a variety of policy think tanks and government reports have consistently advocated cross border sale of water and bulk water export policies. They include leading U.S. bodies like the Brookings Institute and the Council on Foreign Relations, as well as the C.D. Howe Institute, Global Water and Energy strategy Team, Policy Research Initiative and Industry Canada in this country. [Nikiforuk, 2007]. Wendy Dobson of the C.D. Howe Institute, for example, proposes that Canada's increasing energy trade with the U.S. be used as a model for dealing with "demand pressures on other politically sensitive natural resources such as water." And, University of Calgary's Dixon Thompson, writing for the Policy Research Initiative, argues it's likely "the United States will demand access to what it thinks of as a continental resource" and then outlines a series of conditions for permitting water exports.

Meanwhile, the North American Future 2025 Project is proposing an agenda of advanced work be undertaken by business and academic representatives to ensure that water is on the table in forthcoming negotiations. The NAF 2025 Project has been mandated by the Canadian, Mexican and U.S. governments to identify and research agenda priorities for forthcoming negotiations under the Security and Prosperity Partnership [SPP], which was established in April 2005 to breathe new life into NAFTA and the agenda for deeper North American integration. In addition to emphasizing that Canada has "lots of water" and calling for "regional agreements" on "water transfers and "artificial diversions of freshwater," the NAF 2025 Project will outline a plan for overcoming the bureaucratic and legal obstacles necessary "to achieve joint optimum utilization of the available water" [Nikiforuk, 2007].

When it comes to protecting water and exercising sovereignty over this national strategic resource, it is certainly the obligation of the federal government to provide leadership. Although the provincial governments have constitutional responsibilities for water management, Ottawa is responsible for both international trade and foreign policy and therefore has jurisdiction over matters pertaining to bulk water exports. As noted above, the federal government did make amendments to the International Boundary Waters Treaty Act in 2002 which, in effect, prohibit the bulk removal of water from boundary water basins like the Great lakes and the St. Lawrence River. But, with the exception of the amendments to this Act affecting boundary waters, no federal legislative action has been taken to ban bulk water exports.

While Canada certainly has the right to exercise sovereignty over its water basins, it should be recognized that some of our rivers and lakes are located in bio-regions that transcend the Canada-U.S. border. In other words, it's an ecological fact of life that nature's rivers and lakes do not necessarily abide by human made borders. This is certainly the case with boundary lakes and rivers which are shared by populations on both sides of the Canada-U.S. border. But some other Canadian lakes and rivers are also part of a bio-region linked to rivers and lakes located in the U.S. In developing policy and strategies on water exports, therefore, serious attention must be given to the bio-regions that transcend national borders.

The following is a five step agenda for clarifying and strengthening Canada's policy and strategy concerning bulk water exports:

> ***1. <u>Rebuild Canada's Water Protection Capacities:</u>*** The lead federal government agency for water protection is Environment Canada. However, according to the Auditor General's Report of 2001, Canada's water protection has been diminishing due, in large part, to under funding [Pentland & Hurley, 2007]. In the Environment Department, severe cuts in water science which, in turn, has undermined government capacities to analyze and assess cross border water issues. In the early 1990's, the Inland Waters Directorate was dismantled and later replaced by a freshwater division with much less capacity. Similarly, funding support for work on water diversions and related issues under the Canada Water Act, both within the country and between Canada and the U.S., has diminished. As a consequence, Environment Canada is not well equipped to respond to the increasing demands for water protection as a strategic national resource.
>
> If Canada is going to develop and implement an effective water export policy and strategy, the water protection capacities of Environment Canada and related departments must be strengthened considerably. This includes the capacity to analyze both our existing surface and groundwater sources across the country; assess water stress areas and water diversion schemes that may emerge; develop a rapid response mechanism with provincial counterparts to deal with hot spot issues; negotiate firmly with Washington and U.S. states over demands for bulk water exports; and lobby other governments and political jurisdictions as needed to ensure water protection. To move in this direction, the federal government needs to establish water protection as a high priority and to earmark substantial new funds for government capacity building purposes in the next and succeeding federal budgets.
>
> ***2. <u>Establish a Federal Ban on Bulk Water Exports:</u>*** As outlined in the previous section, the federal government has not issued a ban on bulk water exports despite a 1999 parliamentary motion calling on Ottawa to do so. To be sure, Ottawa has made amendments in the Boundary Waters Treaty, but this pertains only to boundary waters between the two countries and does not affect exports from non-boundary waters within Canada. Although the federal government sought and obtained a cross-Canada consensus opposing bulk water exports from the provinces, and nine of the ten provinces have passed legislation to this effect, these initiatives carry little weight in dealing with potential legal challenges over issues of water

exports under international trade rules. After all, bulk water exports are a matter of international trade which, in turn, is the constitutional jurisdiction of the federal government.

It is therefore incumbent on the federal government to formally institute a ban on bulk water exports from Canada through legislative action by Parliament. To be effective, the basic rationale for the ban should be rooted in sound ecological arguments. The objective of 'protecting water in its natural state' and preventing environmental damage being done to water basins through bulk water removals, are sound environmental grounds for banning water exports. Under international trade law, these objectives are recognized by Article XX of the World Trade Organization as grounds for exemption from global trade rules for environmental reasons. A federal ban on bulk water exports would also prevent any succeeding provincial governments from changing the policies and laws enacted by previous governments. Finally, the proposed federal legislation should also include a clause prohibiting the construction of bulk water export corridors and infrastructure.

3. Remove Water Protection Restrictions in Trade Regimes: As long as water is defined as a tradable "good" it is subject to international trade rules under NAFTA and the WTO. Although exemptions for environmental reasons are allowable under NAFTA, a total ban on bulk water exports would not be admissible under the current rules [Boyd, 2003]. Under the 'national treatment clause' of NAFTA, U.S. corporations requiring water for agricultural and /or industrial needs, could claim 'equal treatment' with their Canadian counterparts in terms of access to Canadian supplies. Also, 'once the tap is turned on, it cannot be turned off' because of the proportionality clause in NAFTA. Under Article 315, once a country begins exporting bulk water, it is obligated to continue doing so at the same level unless it is prepared to reduce its own domestic consumption of water proportionately at the same time. And, finally, chapter 11 of NAFTA allows company's to sue governments directly for violation of trade rules, claiming monetary compensation for alleged damages. As the Sun Belt case against the Government of British Columbia shows, a federal ban on bulk water exports could be vulnerable to a multi-billion dollar suit under NAFTA.

In short, the NAFTA rules provide the U.S. government and corporations with a powerful set of tools that could potentially be used to strike down a Canadian law prohibiting bulk water exports. For this reason, any plan to prohibit bulk water exports from Canada must be accompanied by strategy to remove restrictions from NAFTA. The federal government would have to use the provisions available in the Agreement to call for a renegotiation of relevant portions of the NAFTA. The objective here would be to obtain guarantees that governments have the right and obligation to protect their water basins which would include an exemption allowing for bans or quotas on bulk water exports. If such negotiations proved to be unsuccessful, then the federal government would have the option of exercising the abrogation clause to withdraw from NAFTA.

4.Utilize Bi-National Water Treaty Mechanisms: As previously noted, there are potentially viable and effective mechanisms already in place for governing water issues between Canada and the U.S., namely, the Boundary Waters Treaty of 1909 and the International Joint Commission. The BWT deals with various boundary and transboundary surface waters between the two countries. It's mandate includes the undertaking of studies and outlines the requirements for granting approval of specific uses, obstructions and diversions of the waters in one country affecting the levels and flows in another. The IJC is composed of six commissioners, three from Canada and three from the U.S. who are obliged to deliberate in the common interest of both countries. One of the two major functions of the IJC is to investigate questions or disputes referred to it by either or both countries and to make recommendations for follow-up action [Pentland & Hurley, 2007].

The federal government should make much more creative use of these two bi-national mechanisms in implementing its water export strategy. Ottawa should be ready, for example, to call upon the IJC to investigate certain questions pertaining to its water export policy and to make use of its dispute settlement procedures for dealing with contentious issues arising out of the implementation of this policy. To do so, however, the federal government needs to substantially increase its support for the IJC, including financial support. According to the Auditor General's Report of 2001, Ottawa is not funding the IJC at the level it needs to undertake its mandate. Similarly, Canada's Commissioner of the Environment and Sustainable Development cited several instances in its 2001 Report where the Canadian government had undermined the effectiveness of the IJC. Concerted steps, therefore, need to be taken by Ottawa to strengthen the IJC and to make more creative use of this mechanism in the future.

5. Implement Bold Water Conservation Measures: As indicated earlier, Canada has a poor track record when it comes to water use and consumption. According to the OECD's per capita water use ratings, Canada ranks 28th out of 29 countries. Indeed, Canada's water policies have been largely designed to encourage greater water use rather than conservation. During the 1990's, the residential water sector in this country experienced a 21 percent growth rate, many times more than the rate of population increase. With very few exceptions, municipal water is not recycled by industries for multiple uses. With this kind of poor track record of water use and consumption, Canada is hardly in a credible position to introduce a viable water export policy and strategy. Without a determined and effective water conservation plan in operation, Canada would be in a weakened position to defend a ban on bulk water exports based on environmental priorities. A viable water conservation program and strategy must go hand-in-hand with a water export ban.

The federal government must, therefore, take the lead in developing a bold and effective water conservation program as part of an overall strategy on bulk water exports. This calls for the promotion of a new water conservation ethic that puts an emphasis on demand management rather than the assumption of a limitless supply of water in this country [Brookes, 2005]. Here, the federal government could work more closely with the provinces in developing water consumption standards and/or targets for residential, agricultural and industrial use. An incentives program could be introduced to stimulate the development and application of new water saving technologies [including the soft path approaches wherein water use is replaced by air for cooling and diluting services]. At the same time, a water conservation plan must include strategies for managing water supply [e.g. balancing withdrawal and in-stream uses] that is based on sound science.

Indeed, it should be emphasized that developing a water export policy and plan along these lines cannot be done in isolation from other components required for a national water strategy. The urgent needs, for example, to completely map the groundwater sources in this country provides and essential base of knowledge for developing a water export policy that ensures and maintains Canada's water security priorities. In short, it is essential that the five prong strategy outlined here be developed in concert with other key components of an overall national water policy as an integrated whole.

In implementing this five prong water export policy and strategy, emphasis also needs to be put on the importance of public management and citizen accountability. If bulk water export schemes were to become operational, they would be driven by corporations on a for-profit basis. Yet, if water is considered to be a national strategic resource and an ecological trust, it is imperative that it be managed and controlled for universal benefit through the public system. Similarly, since water is a basic human right and essential for life itself, then it is also imperative that there be a significant level of citizen participation in the management of such a water export policy. A democratic mechanism for citizen participation and accountability would need to be developed, perhaps through elected

representatives on regional watershed boards with a clear mandate for water protection and conservation, that would report to provincial and federal governments annually.

At the same time, Canada's water export policy and strategy should include provisions for emergency purposes. If, a region of the U.S. were to suddenly encounter water scarcities of a life threatening nature that could not be redressed by domestic water sources, then Canada would have a moral obligation to consider whether it could best respond to such a crisis by providing bulk water supplies on an emergency and temporary basis. However, such a policy would have to be based on certain conditions. First, there needs to be a set of criteria and procedures developed which must be met or followed before a water stressed region could qualify for emergency bulk water assistance. Secondly, this bulk water assistance must be publicly managed and distributed on an emergency basis rather than be sold through the market system by private companies. Thirdly, such bulk water assistance must be provided as a short term measure for temporary relief only and must not be considered a substitute for reviving and restoring local water basins which is essential for any long term solution.

Finally, some of the core principles underlying the water export and strategy outlined here were recently articulated by Adele M. Hurley, Director of the Program on Water Issues at the University of Toronto's Munk Centre for International Issues:

… wise management, prudent conservation and responsible stewardship of water are absolutely necessary for the long-term environmental health and economic prosperity of both countries. This principle can be paraphrased as *"Keep water within its natural basin, treat it with respect, and use it efficiently."*

We hope that citizen groups across the country will take up the challenge to promote public discussion and debate on the issues and proposals outlined in this report, thereby generating a groundswell of popular, grassroots support for a pan-Canadian policy and strategy on bulk water exports to the United States. Only then will we be able to build a water security agenda for future generations in this country and the continent as a whole.

References

Anderson, Hon. David (Minister of the Environmennt). 1999. Speech at closing of the Canadian

Council of the Ministers of Environment meeting, Kananaskis, Alberta. Nov 30. https://www.ec.gc.ca/minister/speeches/ccme_s_e.htm.

Anderson, F. Richard, Brett Rosenberg and Judy Sheaham. 2005. *National City Water Survey 2005*. United States Conference of Mayors Urban Water Council. http://www.usmayors.org/uscm/urbanwater/publications.asp.

Bakker, Karen [ed.], *Eau Canada: The Future of Canada's Water.* Vancouver, UBC Press, 2007.

Barlow, Maude. 1999. *Blue Gold: The Global Water Crisis and the Commodification of the World's Water Supply*. International Forum on Globalization. http://www.thirdworldtraveler.com/Water/Blue_Gold.html.

Barlow, Maude. 2005. *Too Close for Comfort: Canada's Future Within Fortress North America*. Toronto: McClelland & Stewart.

Barlow, Maude and Tony Clarke. 2002. *Blue Gold: The Battle Against Corporate Theft of the World's Water*. Toronto: Stoddart.

Brandes, Oliver, David Brooks and Michael M'Gonigle. 2007. "Moving Water Conservation to Centre Stage." In *Eau Canada: The Futue of Canada's Water*, ed. Karen Bakker. Vancouver: UBC Press, 281-300.

Brands, O., K. Fergusn, M. M'Ginigle, and C. Sandborn. 2005. In *At a Watershed: Ecological Governance and Sustainable Water Management in Canada*. Victoria: POLIS Project on Ecological Governance. http://polisproject.org/polis2/PDFs/FlushingFuture.pdf.

Bocking, R.C. 1972. *Canada's Water: for Sale?* Toronto: James Lewis and Samual, Publishers.

Boyd, David. 2003. *Unnatural Law: Rethinking Canadian Environmental Law and Policy*. Vancouver: UBC Press.

Brookes, D. 2005. "Beyond Greater Efficiency: The Concept of Water Soft Paths." *Canadian Water Resources Journal* 30 (1): 83-92.

Brookes, D., L. Nowlan, O. Brands, and A Hurley. 2004. In *Controlling Our Thirst: Managing Water Demands and Allocations in Canada*. Edmonton: Walter and Duncan Gordon Foundation.

Canadian Broadcasting Corporation. 2004. "A Sea of Troubles: Lake Winnipeg in Crisis."

Centre for Research and Information on Canada. 2002. http://www.cric.ca.

Clark, Bob. 2001. "Concerns about Water Export." Unpublished paper (July).

Clarke, Tony. 2006. "Turning on the Tap: Water Exports to the United States," *Living With Uncle: Canada- US Relations in an Age of Empire,* ed. Bruce Campbell and Ed Finn, Toronto, James Lorimer Co., 2006.

Clarke, Tony. 2007. *Inside the Bottle: Exposing the Bottled Water Industry.* Ottawa: CCPA & Polaris Publication, 2007.

Clarke, Tony. 2007. "Corporate Canada: Washington's Empire Loyalists," *Whose Canada?* ed. Ricardo Grinspun and Yasmine Shamsie, Montreal, McGill-Queens' University Press, 2007.

Department of Foreign Affairs and International Trade (DFAIT). 2001. An Act to Amend the International Boundary Waters Treaty Act: Questions and Answers, February.

Dobson, Wendy. 2002. "Shaping the Future of the North American Economic Space," 26.

Environment Canada. 2002. *Urban Water Indicators: Municipal Water Use and Wastewater Treatment*. http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O.

Environment Canada. 2004. *Minicipal Water Use, 2001 Statistics*. http://www.ec.gc/water/en/info/pubs/sss/e_mun2001.htm.

Foreign Affairs and International Trade Canada. 1994. North American Free Trade Agreement (NAFTA). http://www.dfait-maeci.gc.ca/nafta-alena/agree-en.asp.

Globe and Mail. 1999. "Weirdness about Water." Editorial, 13 February.

Gordon Water Group, 2007. *Changing The Flow: A Blueprint for Federal Action on Freshwater.* The Gordon Water group of Concerned Scientists and Citizens. Morris T.J., D.R. Boyd, O.M. Brandes, J.P. Bruce, M. Hudson, B. Lucas, T. Maas, L. Nowlan, R. Pentland, and M. Phare.

Halliday, Bob and Ralph Pentland. 2004. *An Assessment of Modelling Needs and Opportunities*. Consultant report prepared for Environment Canada (March).

House of Commons. 1987. *Federal Water Policy*. Report tabled in the House of Commons by the Honurable Thomas McMillan.

House of Commons. 2007a. Committees of the the House. International Trade. Edited Hansard, 161 (May 31). http://www2.parl.gc.ca/HousePublications/Publication.aspx?Language=E&Mode=1&Parl=39&Pub=hansard&Ses=1&DocId=2989762&File=0#SOBQ-2114767.

House of Commons. 2007b. Committees of the House. International Trade. Edited Hansard, 163 (June 4). http://www2.parl.gc.ca/HousePublications/Publication.aspx?Language=E&Mode=1&Parl=39&Pub=hansard&Ses=1&DocId=3000499&File=0#SOB-2122343.

Hickel, Walter [2007]. "Time to Revisit a Water Pipeline South," *Anchorage Daily News,* Comment, August 6.

Hutson, Susan S., Nancy L. Barber, Joan F. Kenny, Kristin S. Linsey, Deborah S. Lumia, and Molly A. Maupin. 2005. "Estimated use of Water in the United States in 2000." United States Geological Survey (USGS). http://pubs.usgs.gov/circ/2004/circ1268/.

International Joint Commission. 2000. "Protection of the waters of the Great lakes --- Final Report To the Governments of Canada and the United States. [February 2000].

Linton, Jamie. 1997. *Beneath the Surface: The State of Water in Canada*. Ottawa: Canadian Wildlife Federation.

Lasserre, Frédéric. "Drawers of Water: Water Diversions in Canada and Beyond." In *Eau Canada: The Futue of Canada's Water*, ed. Karen Bakker. Vancouver: UBC Press, 143-162.

Maclean's. 1985. "The Crisis over Water." 26 August, 34.

Mehan, III, Tracy. 2005. “A Symphonic Approach to Watershed Management.” Straddling the Divide Conference, Chicago (15-16 February).

Natural Resources Canada, “Freshwater Issues and the Natural Resource Sectors,” January 2006. Obtained under the Access to Information Act by Ken Rubin. Cited in Nikiforuk, 2007.

Natural Resources Canada, “Federal water Strategy: Groundwater, November 2006. Obtained under the Access to information Act by Ken Rubin. Cited in Nikiforuk, 2007.

Nikiforuk, Andrew. 2007. “On the Table: Water, Energy and North American Integration.” University of Toronto, Munk Centre for International Studies.

Quinn, Frank. 2007. “Water Diversion, Export and Canada-US Relations: A Brief History. University of Toronto. Munk Centre for International Studies.

Pentland, Ralph and Adèle Hurley. 2007. “Thirsty Neighbours: A Century of Canada-US Transboundary Water Governance.” in *Eau Canada: The Future of Canada’s Water*, ed. Karen Bakker. Vancouver: UBC Press, 163-182.

Reisner, Mark. 1986. *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin Books, 1986, p.506]. Cited in Aruni de Silva. 1997.

Schindler, D. W. 2001. “The Cumulative Efffects of Climate Warming and Other Human Stresses on Canadian Freshwaters in the New Millennium.” *Canadian Journal of Fisheries and Aquatic Sciences* 58: 18-29.

Schindler, D.W. and Donahue, W.F. 2006.: “An Impending Water Crisis in Canada’s Western Prairie Provinces” PROC. National Academy of Sciences, USA, 2006: 103: 7210-7216.

Schindler, D.W., Donahue, W.F. and Thompson, J.P. 2007: “Future Water Flows and Human Withdrawals in the Athabasca River, Running Out of Steam? Munk Centre for International Studies, University of Toronto, and Environmental Research and Studies Centre, University of Alberta, May 2007.

Shrubsole, Dan and Dianne Draper. 2007. “On Guard for Thee? Water (Ab)uses and Management in Canada.” In *Eau Canada: The Future of Canada’s Water*, ed. Karen Bakker. Vancouver: UBC Press, 37-54.

Shrybman, S. 1999. “The Once and future MAI: International Investor Rights, the Environment, and Your Community.” Vancouver: West Coast Environmental Law. http://www.wcel.org/wcelpub/1998/125601.html.

Shrybman, S. 1999. “A Legal Opinion Concerning Water Export Controls and Canadian Obligations Under NAFTA and the WTO.” West Coast Environmental Law Association, September 15, 1999.

Sprague, John B. 2007. “Great Wet North? Canada’s Myth of Water Abundance.” In *Eau Canada: The Future of Canada’s Water*, ed. Karen Bakker. Vancouver: UBC Press, 23-35.

Thompson, Dixon. 2006. “Water for Sale? A Look at the Complex Issue of Bulk Water Export,” *Horizons,* Public research Institute, May 2006.

Trew, Stuart. 2007. *Behind Closed Doors: What they’re not telling us about the Security and*

Prosperity Partnership. Ottawa: Council of Canadians. http://www.canadians.org/integratethis/backgrounders/guide/index.html.

Urban Water Council, 2005. National City Water Survey, 2005, Washington, D.C., November 15, 2005. http://www.usmayors.org/74theWinterMeeting/National CityWaterSurvey2005.pd

US Census Bureau. 2000. “United States—Urban/Rural and Inside/Outside Metropolitan and Micropolitan Area.” Census 2000. http://factfinder.census.gov.

US Geological Survey, “Ground-water Depletion Across the Nation: Fact Sheet 103-303, November, 2003.