Canada-U.S. Water Issues: Supply Management

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Background

Water is increasingly a major political issue as scarcity of the resource grips several societies, mainly in developing countries. However, western nations are not immune to water tensions, for instance in Greece, Spain, Italy, or the western United States, where the available water is being exploited to the limit : the Colorado no longer reaches the sea, and growing debates are emerging as to whether water should be allocated to thirsty cities or to agriculture; as to whether public funds should be invested again to increase the resource, or if demand management should be implemented; as to whether water could be imported from far away.

These questions are all the more relevant as the consumption patterns of water in the West are clearly not sustainable. Given the technology available today, massive water transfers could only come from Canada. There have been several projects in this vein, mostly in the 1960s and 1970s. Should Canadians worry about water exports to the United Sates, especially in the frame of NAFTA ? Or are there more pressing concerns to be tackled with as far as our water is concerned ?

1. Massive water transfer projects were once considered

Water is a key ingredient in the fabric of the Western American society, as well studied by Donald Worster.[1] The West is not that water-scarce, for several mighty rivers flow in the region; but it definitely is semi-arid, compelling any society living there to adapt. The XXth century American society, empowered by the industrial age, decided to harness rivers and aquifers. When exploited resources began to show signs of exhaustion, engineering firms started to design huge transfer projects from Canada. Let us mention a few of them :

[1] Donald Worster, *Rivers of Empire. Water, Aridity, and the Growth of the American West*. Oxford University Press, New York, 1985.

Table 1. Water Exportation Projects from Canada

Project	Year	Source	Annual transfer volume (km^3)	Cost of construction (billion current $)
North American Water & Power Alliance (NAWAPA)	1952	Transfer from Pacific and Arctic watersheds to the Great Lakes, the Mississippi and California.	310	100
Great Lakes Transfer Project	1963	Skeena, Nechako and Fraser in British Columbia; Athabasca and Saskatchewan in the Prairies, towards the Great Lakes	142	n.a.
Magnum Plan	1965	Peace River, Athabasca and North Saskatchewan-in Alberta	31	n.a.
Kuiper Plan	1967	Peace River, Athabasca, North Saskatchewan, Nelson and Churchill	185	50
Central North American Water Project (CENAWP)	1967	Mackenzie, Peace River, Athabasca, North Saskatchewan, Nelson and Churchill	185	30 to 50
Western State Water Augmentation	1968	Liard and Mackenzie	49	90
NAWAPA-MUSCHEC (Mexican United States Commission for Hydroelectricity)	1968	Sources for NAWAPA, plus lower Mississippi and Sierra Madre rivers	354	n.a.
North American Waters	1968	Yukon and Mackenzie, Hudson's Bay watershed	1 850	n.a.
GRAND Canal	1983	James Bay watershed. Derivation towards the Great Lakes and the Western United States	347	100

Source : Marc Reisner, *Cadillac Desert*, Viking, New York, 1993, p.489; J.C. Day et Frank Quinn, *Water Diversion and Export : Learning from the Canadian Experience*, Geography Department, University of Waterloo number 36, Waterloo (Ontario), 1992, pp.36-37.; Jean-Louis Sasseville, «L'exportation des eaux de surface : incertitudes et potentialités», communication at the Symposium on Water management in Quebec, 10-12 December 1997.

The sheer size of these projects could make us smile today, but one only has to remember that the then Prime ministers Mulroney and Bourassa had endorsed the GRAND Canal proposal in 1984 to realize they did not deter politicians. In fact, the GRAND Canal is still advocated by its designer, Tom Kierans, to no avail so far because of its price tag, at least 100 billion $, and because of the unpopularity of such an endeavor.

2. They were never close to being implemented

2.1. Costly projects

The main reason why such giant schemes never came to reality is that demand was not really present in the United States for Canadian water. Vocal militants have well underlined the potential for such a possibility, but the economics of the projects have so far worked against them and will do so for several more years.

Water transported by aqueducts over long distances is costly, because is it expensive to operate these infrastructures, and mainly because the capital requirement is huge :

Table 2. Estimation of cost of water transported by several different means, 2002.

	Production Cost ($US/m^3) – according to various estimations	Level of technology control	Advantages	Shortcoming
Transfer Canal (500 km)	0,8 to 3	High	Capacity to deliver large volumes	- Huge investments - environmental impact to be assessed
Plastic Bags	0,55 (Cyprus) to 1,35 (Greek Islands)	Average	Enables isolated islands or coastal communities to be supplied	- Technology to be improved - Small volumes
Water-carrying ships	1,25 to 1,5	High	Simple technology	- Small volumes – Relatively high costs
Iceberg transportation	0,5 to 0,85	Very low	- Immense resource to be tapped - Acceptable cost for urban markets	Technology to be perfected for a regular supply
Desalination	From sea water : 0,75 for 40 000 m³/d (Abu Dhabi) 0,85 for 40 000 m³/d (Cyprus) 0,55 for 100 000 m³/j (Tampa Bay) *From brackish water* : 0,6 for 4 000 m³/d 0,25 for 40 000 m³/d	High	- - Immense resource to be tapped - Acceptable cost for urban markets - Fast decreasing operating costs	- Large initial investment - Environmental impacts of salt residue
Water recyclings	0,07 à 1,80	Average to high	- Increases resource without developing new sources	- The required investments and operating costs are all the higher as the water is more polluted - rarely acceptable for drinking water

Source : Lasserre, Frédéric and Descroix, Luc. *Eaux et territoires: tensions, coopérations et géopolitique de l'eau.* Presses de l'Université du Québec, Québec, 2003.

Sea water desalting technology, in particular, improved so fast between 1985 and now, that operation costs were dramatically reduced and nearly divided by 6. Desalting is now a very affordable water-producing technology for urban and industrial consumers, enjoying an inexhaustible source. However, the water it produces cannot be considered for irrigation purposes, given its cost, its distance from the interior, and the sheer volumes of water irrigation demands.

2.2. A stabilizing demand in the United States

In Florida, or in the Western part of the United States, water conflicts that emerged because of the large share of available water that agriculture consumes (about 80%) are usually evolving towards water being transferred from the latter to the former, without it being necessary to develop new resources. Water pricing; competition from other regions, mainly Asia; cost incentives that lure American producers to Mexico, are among the factors that explain why water use in agriculture remain roughly stable between 1990 and 2000 throughout the country. If the federal government does agree, during the Doha Round of trade negotiations, to reduce agricultural subsidies, water prices for farmers could increase markedly, thus giving financial incentives to consume less, or water demand for irrigation could decrease because of several farmers getting out of business. As a whole, water withdrawals in the US increase slowly, much more slowly now than population, and could even begin a downward trend should competition from foreign fruits and vegetables producers increase against local farmers.

Table 3. Evolution of water use in the United States, 1970-2000

	1970	1975	1980	1985	1990	1995	2000
Population, in millions	205,9	216,4	229,6	242,4	252,3	267,1	285,3
Variation, %	6,2	5,1	6,1	5,6	4,1	5,9	7
Total withdrawals, Billion m^3/d	1,4	1,6	1,67	1,52	1,55	1,53	1,55
Variation, %	19,4	13,5	4,8	-9,3	2,3	-1,5	1,5
Of which :							
Thermoelectric	0,65	0,76	0,80	0,71	0,74	0,72	0,74
Industrial	0,18	0,17	0,17	0,12	0,11	0,11	0,08
Irrigation	0,49	0,53	0,57	0,52	0,52	0,51	0,52
Public supply	0,1	0,11	0,13	0,139	0,146	0,15	0,165

Source : adapted from USGS, *Water Use in the United States*, 1998, 2004

Besides, although there still is room for improvement, water use per person is showing signs of stabilization, probably thanks to the dual tariff and education policies. Urban consumers begin to value water conservation.

Therefore, although water is still used at an unsustainable rate in the Western part of the country, importing water from Canada is not as urgent as it could appear to be to some politicians a few years ago, such as former senator Paul Simon. A stabilizing trend in water withdrawals and the availability of cheaper sources with desalting plants led the public planners to forget about massive water transfers from Canada.

2.3. Opposition from within the United States

Moreover, there also is opposition from within. Governmental archives from the early 1980s attest to the Western United States lobbying for the diversion of Great Lakes water to quench their lack of water. The International Joint Commission, created to prevent and resolve disputes between the United States and Canada under the 1909 Boundary Waters Treaty, explicitly warned against water diversions from the Great Lakes basin in its *Final Report on Protection of the Waters of the Great Lakes* (2000).

Great Lakes States wanted to resist these projects, both for environmental and political reasons : why would the Great Lakes States give to California an added value at a time when so many firms were leaving the area and moved away to the West Coast ?[2] The Council of Great Lakes Governors (CGLG), created in 1983, is a partnership of the Governors of the eight Great Lakes states and the two Canadian provinces of Ontario and Québec. The Great Lakes Charter stemmed from this growing concern that Great Lakes water could be diverted to water-scarce regions of the United States. The Great Lakes Charter, signed in 1985 by the CGLG members, created a notice and consultation process for Great Lakes diversions. The signatories agreed that no Great Lakes State or Province would proceed with any new or increased diversion or consumptive use of Great Lakes water over five million gallons per day without notifying, consulting and seeking the consent of all affected Great Lakes States and Provinces. This text was further strengthened with the Great Lakes Charter Annex signed in June 2001. The Annex outlines a series of principles for reviewing water withdrawals from the Great Lakes Basin that is grounded in protecting, conserving, restoring, and improving the Great Lakes ecosystem. To be sure, these agreements have no legal force and are enforced so long as the respective member states respect their pledge, but they do show a political will to thwart water export projects to the West.

3. Massive transfers already exist... in Canada !

The Canadian public developed a fear for American water transfer schemes, but largely forgot that large-scale water transfers already exist throughout the world, and especially in Canada !

Table 4. Major existing large-scale water transfer schemes in Canada, 2004

Scheme	From - to	Location	Beginning of operation	Transfer Volume
James Bay - La Grande	Caniapiscau River – La Grande R.	Québec	1985	795 m^3/s
James Bay - La Grande	Eastmain R. – La Grande R.	Québec	1985	835 m^3/s

[2] F. Lasserre. « L'Amérique a soif. Les besoins en eau de l'Ouest des États-Unis conduiront-ils Ottawa à céder l'eau du Canada ? », *Revue internationale d'Études canadiennes/International Journal of Canadian Studies*, 24, 196-214 (2001).

Kemano	Nechako R. (Fraser basin) – Kemano R.	British Columbia	1954	115 m^3/s
Kemano 2	Bridge R. – Kemano R.	British Columbia	1954	92 m^3/s
Churchill	Churchill - Nelson	Manitoba	1976	775 m^3/s
Great Lakes Basin	Long Lake – Lake Superior	Ontario	1939	42 m^3/s
Great Lakes Basin	R. Okogi (Albany R. basin) – Great Lakes	Ontario	1943	113 m^3/s
Churchill Falls	Jultan - Churchill	Newfoundland	1971	196 m^3/s
Churchill Falls	Naskaupi - Churchill	Newfoundland	1971	200 m^3/s
Churchill Falls	Kanairktok - Churchill	Newfoundland	1971	130 m^3/s

Source : J.C. Day and Frank Quinn, *Water diversion and export : learning from Canadian experience*; University of Waterloo, Dept. of Geography, 1992.

All of these transfer schemes were built for hydroelectric development purposes, and none for urban consumption or irrigation. There are projects to divert the Peace River in northern Alberta to meet growing agricultural and urban water needs, but the project is far from being accepted. However, the effective channels are certainly massive transfers with impacts on the environment – whether very negative or not, which remains to be asserted, the concept of minimum ecological flow being controversial among biologists. The water does remain in Canada in each of these diversions, but this is not the point : we collectively forget that our very daily comfort and economic activity rest, to a certain extent, on major river diversions. It is therefore difficult to defend the argument that water transfers to the United States would weaken our environment, if we do not consider that transfers within Canada should be phased out.

4. There are more pressing issues facing Canadian water

4.1. Municipal water

Besides massive transfers being a Canadian problem as much as an international issue, other water issues seem more pressing than water exports to the United States. Domestic water distribution systems are aging throughout Canada. Moreover, Canadians do consume large quantities of water for domestic use, with an average of 327 liters/person/day in 1996, compared to 128, 130 and 149 liters in Germany, the Netherlands and the UK, respectively.[3] "According to the National Round Table on the Environment and Economy, unmet water and wastewater infrastructure needs in Canada were $38-49 billion in 1996, and capital costs for the following 20 years would be in the order of $70-90 billion. At the same time, only 50% of the cost of maintaining and operating water infrastructure was actually being met through cost recovery from users of

[3] OECD, 1999.

the systems".[4] Ageing aqueducts and a growing use are putting a huge financial pressure on municipal governments that could be faced with the need to both renew and greatly expand their sources of water, bringing about capital requirements they cannot meet. Municipal water issues are not about availability of the resource in Canada – most of the time : they are about how to share the fiscal burden of who pays for what use. One of the main reasons of this situation is that there is no appropriate price signal to consumers, no fiscal or economic incentive to reduce use; this is all the more urgent as residential use made up for 52% of municipal use in 1999. That year, a full 44% of Canadian residences served by municipal water systems were not metered. Also, 55% of Canadians faced residential water use charges that discouraged water conservation, because these charges were either a flat rate or a declining block rate.

Metering and water pricing, of course, are only one way of serving this purpose of having domestic users restrain their consumption. Education, municipal regulation also can be used to this purpose; but it is not sure whether they can be as effective as monetary incentives; and they do not solve at all the issue of the investment needed to replace the aqueducts.

4.2. Climate change

Climate change is another key issue that is more challenging than the possibility of water exports to the United States. The possibility that climate change could affect Canada's water quality and quantity is serious enough that Environment Canada decided to spend several million dollars on scientific studies to try and assess the risk.[5] Competing uses in regions where water could become scarcer, like agricultural, urban and oil mining in Alberta, could lead to conflicts between these various groups that would have authorities intervene with either water pricing or regulation that would prove very unpopular. Precipitation could remain the same on an annual basis, but a change in the pattern of how it falls throughout the year, coupled with changes in temperature, could very much alter its availability, resulting in seasonal but dramatic supply reduction, as happened in Quebec in August 2002. Given the risk, several municipal governments have already begun to assess the risks in their territory and have considered adopting demand management approaches toward water distribution, a radical change that could entail drastic changes in the way we consume our water.

5. Climate change : the real issue ?

However, climate change is not merely affecting Canada, but the United States as well. It is still extremely difficult to build accurate models, at the regional scale, of both precipitation and temperature that could give a true picture of available runoff in the future. What we now have are educated guesses sustained by general trends. But these trends do show several regions in the United States, especially in the dry West, could be faced with critical water shortages given the present demand. This could prove to be a

[4] "Municipal Water Pricing", Environment Canada.

[5] *Threats to water availability in Canada*, Environment Canada, Ottawa, 2004; consider also the Climate Change Impacts and Adaptation Program.

scenario in which the United States could become interested again in Canadian water : prevent a social crisis that would be triggered by conflicts between agriculture and cities for dwindling water resources. The equation for the American federal government would be the perceived financial, social and political costs of finding new water resources as against arbitrating, very likely, against agricultural water needs. No one can predict what choice officials would then make if this scenario came true.

Choices for Canadians:

- *Do not consider water export options as risks, but as mere possibilities. It is paradoxical to allow water diversions in Canada, but to dread diversions to the United States. Fear or prejudice are not proper conditions to consider all scenarios : there are also potential benefits that must be valued against political and environmental costs.*
- *What are the legal risks under NAFTA, if diversion were to take place, that the "water tap" could not be closed ? Several contradictory assessments have been published.*
- *What are the environmental risks if a diversion were to be built and operated without possibly being turned off ?*
- *At what price could this water be sold ? In other words, what could be the benefits, for all Canadians, of the sale of our natural resource, for debt reduction for instance ?*

Options/Recommendations:

- *Assess realistically a price for water export that would take into account all costs, direct and indirect, environmental, social, financial, so as to give the United States a true picture of water price. It is likely that too high a bill would discourage buyers.*
- *Assess environmental impacts of water abstraction in rivers and lakes : scientists still disagree on the threshold beyond which these impacts are damaging.*
- *Invest in research in desalination processes.*
- *If Canadians disapprove of American agriculture overconsuming water, adapt consuming behaviors : do not buy vegetables or fruits from California, but from developing countries or from Canada. Policy, in a democracy, is not just to be government-led.*