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Quebec's Northern Waters: Export Opportunity Or Illusion?

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Patrick Forest is a SSHRC Postdoctoral researcher in the Department of Geography at McGill University where he is working on water-related issues (transboundary cooperation, continental water transfer schemes). He is also the editor of a book on legal geography (*Géographie du droit*, Presses de l'Université Laval, 2009) and has recently published academic articles in *Cahiers de droit*, *Études internationales* and *Canadian Geographer*. Dr. Forest may be reached at patrick.forest.1@gmail.com.

Frank Quinn is the former Water Policy Adviser to Environment Canada, Ottawa. Frank Quinn received his BA (1962) from the University of Toronto, and his MA(1965) and PhD (1970) in Geography from the University of Washington, Seattle. Aside from over three decades of water planning and policy experience with the Government of Canada, he has taught university classes at Arizona, Washington, Victoria, Queen's, and Ottawa, and served as a regional director of both the Canadian and American water resources associations. In 1984, Frank was seconded from Environment Canada to assume the duties of Director of Research for the Inquiry on Federal Water Policy. In 1999–2000, he became Special Advisor to the International Joint Commission, which had received a Reference from Canada and the United States to investigate the consumption, diversion, and removal of Great Lakes waters. At its 2001 meeting, the Canadian Association of Geographers presented him with its award for Geography in the Service of Government or Business. He has published almost 50 articles and monographs in his major areas of interest, which are federal water policy, interbasin water diversion and export, and Canada-United States boundary water issues.

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Quebec's Northern Waters: Export Opportunity Or Illusion?

Patrick Forest and Frank Quinn

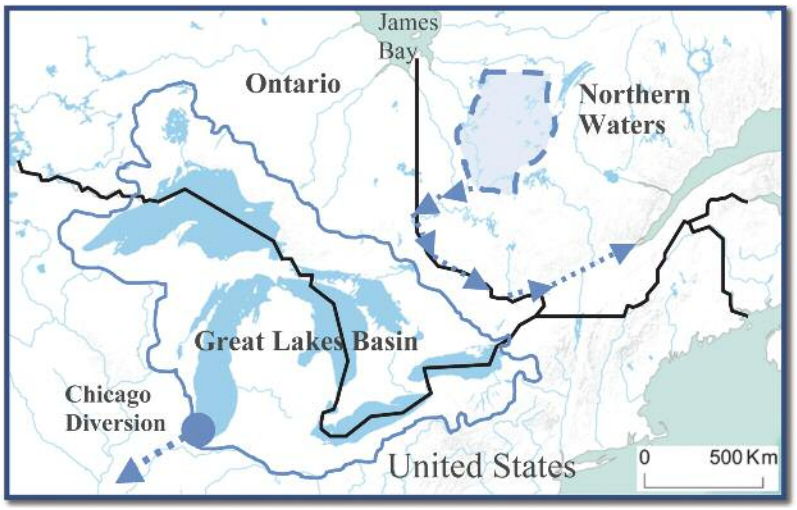
INTRODUCTION

From its early history to its present economy, Quebec has relied heavily on its freshwater resources. Today Quebec leads all other provinces in hydroelectric power exports (including power it buys from the Churchill Falls project in Labrador). Former premier Robert Bourassa (1985) authored a book which looked back with pride at the completion of the first phase of his James Bay hydro project, opening the way for further hydro developments in the north, but he also included a chapter anticipating the export of water itself, influenced by the "GRAND Canal" model developed by Thomas Kierans in 1959. Many years later, large-scale, long-distance water diversion schemes promoted by the private sector continue to challenge Canadians and their governments, but they are invariably dismissed. Now, another plan has emerged in Quebec for diverting freshwaters, at least indirectly, into the heart of the continent.

MEI'S NORTHERN WATERS PROPOSAL

In 2008, the Montréal Economic Institute announced a plan to develop Quebec's "blue gold" based upon a "surplus" of northern waters, with marketing opportunities identified by economist Marcel Boyer, and a plan for water export via the Great Lakes by retired engineer Pierre Gingras (Fig.1).

Fig. 1 The Northern Waters diversion plan



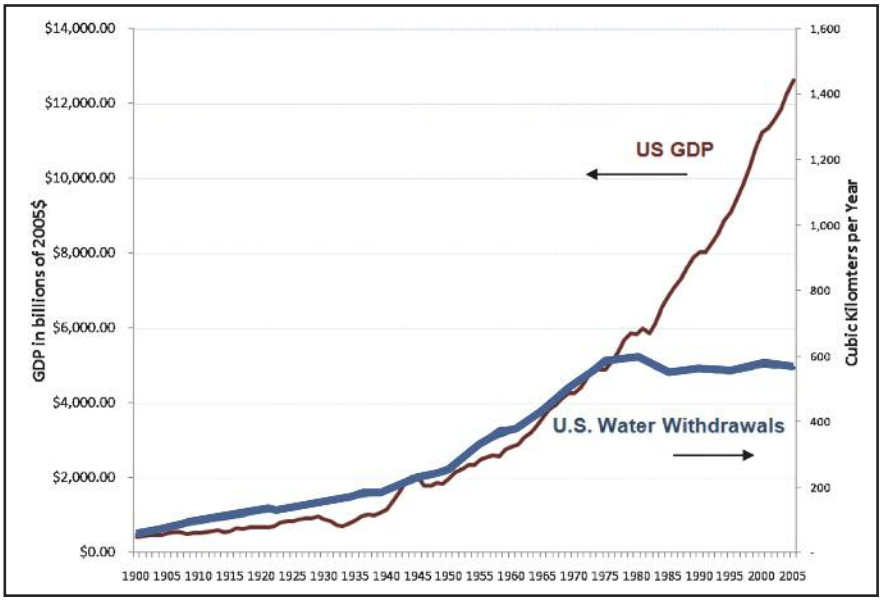
Source: adapted from Gingras (2009)

Professor Boyer (2008) has not helped his cause by exaggerating the volume of Canada's renewable freshwater resources, declaring them the largest in the world. In fact, Canada has 7% of the world's renewable freshwater supplies, behind Brazil (20%) and Russia (11%), and slightly ahead of the United States (6.5%) and China (6%) (FAO 2007, Gleick 2009).

He also argues that the commercial value of water internationally will be determined by the cost of desalinating seawater as the most realistic alternative to long-distance imports. That may be the case in some distant parts of the world, but hardly in developed countries like the United States where, even with a growing population and economy, water use has actually been falling for the past three decades (Fig.2). This

is remarkable, indicating a strong trend toward greater efficiency of water use, on the farm, in the city, and in industry ... conservation pricing, wastewater recycling, conjunctive use of surface and ground water, drip irrigation, low-flow appliances, leak reductions, xeriscaping, rainwater harvesting … the possibilities keep expanding. And the potential remains to conserve more water in the future, especially in the highly-subsidized irrigation economies of the western states. So, the Americans will not be desperate for Canada's freshwater anytime soon; it would be an expensive alternative to continued reallocation, recycling and reuse of their own water. (By contrast, such trends toward conservation and greater efficiency are only slowly being introduced in Canada, making comparisons of water uses and trends between the two countries impractical at this time.)

Fig. 2 US GDP in 2005 dollars and U.S. total water withdrawals from 1900 to 2005



Source: Adapted from Gleick (2010)

For his part, Mr. Gingras (2009) has put together a plan which some might consider imaginative. He would export water south of the border "without one drop of it having to leave Quebec." This magical outcome would appear to result as follows: Water available from seasonal flooding of the Broadback, Waswanipi and Bell rivers which flow into James Bay, and which have not yet been captured for hydroelectric power development, would be collected and diverted southward by pumps at an average annual rate of 800 cubic metres per second (m^3/s) into the upper Ottawa River, just before the Ottawa reaches and flows along the Ontario – Quebec boundary. New generating plants would be added to existing dams, and the Ottawa would flow at this increased rate all year long, heedless of nature's rhythms. This inflow would double the volume of flows entering the interprovincial boundary reach and would increase flows currently discharging downstream toward the St. Lawrence River at Carillon dam above Montréal, from 1,925 m^3/s to 2,725 m^3/s on an average annual basis. But how would this plan lead to an export of water from Canada?

Adding 800 m^3/s to the discharge of the Ottawa River would spell flood disaster in the Montréal region (not to mention similar problems in Ottawa-Gatineau and elsewhere on a smaller scale). To avoid this fate for Montréal, Gingras anticipates that Ontario and the eight states which share the Great Lakes and upper St. Lawrence River would cooperate by removing an equivalent 800 m^3/s from their own combined flows before these reach Montréal. And they would remove this volume of water by expanding a small historic diversion at Chicago from Lake Michigan into the Mississippi River basin. Unfortunately, this would at the same time result in 800 m^3/s *less* water to continue flowing downstream through Lakes Michigan, Huron, St. Clair, Erie and Ontario and the upper St. Lawrence River all the way between Chicago and Montréal (where the lost

water would be made up by the increased Ottawa River discharge), with devastating consequences for existing hydroelectric, shipping, shore property, recreational and environmental interests in this intervening reach in both countries.

Another problem of which Mr. Gingras seems unaware is that the governments of Canada and the United States, the provinces of Ontario and Quebec and the eight Great Lakes states have already moved during the past decade in precisely the opposite direction, toward prohibiting diversion of water out of the Great Lakes basin in any direction. The International Joint Commission (2000) reported to the two federal governments that it found little reason to believe that further Great Lakes diversion projects would become economically, socially or environmentally acceptable. Shortly afterward the Great Lakes premiers and governors followed up this issue and negotiated two agreements, one (non-binding legally) among the provinces and states sharing the basin, and the other an interstate compact to prohibit substantial or permanent water removal from the Great Lakes, the latter ratified by Congress and signed by the President (P.L. 110-342, 2008). Mr. Gingras shrugs off these developments as being somehow irrelevant or negotiable.

Nevertheless, he suggests a partial alternative: the threat of climate change and its likely future effect of lowering Great Lakes levels can be resolved by keeping some portion of the 800 m^3/s within the Lakes' basin, and exporting the rest. But what is the logic of exporting *any* water from the Lakes while they are facing levels below the normal range? Given all the uncertainties surrounding the nature and timing of climate change and its variable effects, Mr. Gingras may be overly optimistic.

Nothing is said in the Northern Waters plan with respect to threats to aboriginal rights or to biodiversity in this region, other than that the authors are "respectful of the environment." It is as though no value exists at present in the water of this area of origin.

Three years later, none of the federal, provincial or state governments have responded to the MEI's overtures. If, as seems likely, they have dismissed this specific plan, are there other routes or other ways by which Quebec could export profitably a substantial portion of its northern waters? Or will Quebec's "blue gold" continue to be a source of inspiration only to the writers of paperback fiction (Burstyn, 2005)?

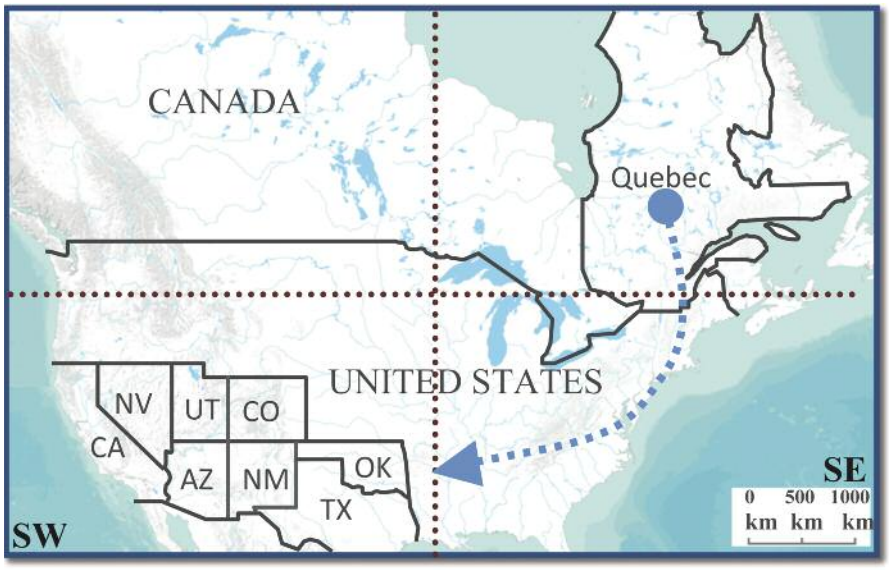
GEOGRAPHICAL REALITIES

Like a long list of entrepreneurial schemes that preceded it, the MEI plan for water export fails from many perspectives, including economic, social, legal, political and environmental. Given the independence often expressed by Quebec on national issues, and the opposition it may express to federal legislation to prohibit bulk removal of freshwater from Canadian drainage basins, another argument may be advanced: that Quebec is not well-placed geographically to export its water in bulk. This paper supports that argument.

First, we should briefly review previous experience with a smaller-scale version of bulk water export, by marine tankers. Quebec's opportunities would appear to be limited to streams flowing south to ice-free ports on the Gulf of St. Lawrence, such as Sept-Îles. Entrepreneurs in Quebec, however, as well as in British Columbia, Ontario and Newfoundland, have to date failed to establish an economic basis, let alone convince their governments or public opinion of the merits of proposals like the Coutu water export plan (Noël, 1996). They are simply too far from Middle Eastern and Asian markets, compared with other possible water suppliers (e.g., Norway), a lesson already learned by Alaska after two decades of failing to attract buyers for its huge freshwater resources from distant locations like California or China. There is not much activity yet in shipping freshwater commercially; what little traffic there is can be attributed mostly to countries serving the water needs of their nearby small islands. Not surprisingly, United Nations officials advocate that the response to future water shortages rests with countries learning to use their resources more efficiently, rather than importing a low-value, high-weight substance like freshwater from halfway around the world (Raskin et al. 1997).

Perhaps the main prize for Quebec could be won by diverting its major rivers overland directly across the Canada-US boundary. Or could it? Just as Canada generally is not well located to serve global markets by marine transport, Quebec is off-centre in North America, lying in the northeast quadrant of the continent, as far away as it could be from the dry regions of the American Southwest where it might expect to find its largest market (Fig. 3).

Fig. 3 Quebec: a disadvantaged location?



To make matters worse, Quebec is almost everywhere downstream of its immediate neighbours, especially Ontario and the eight Great Lakes states, and to a lesser degree, Labrador and Vermont, all of whose waters flow mostly *into* Quebec; there is very little flow *out* of the province to these bordering jurisdictions or to New Hampshire or Maine (Tables 1 and 2). The ratio of inflow to outflow is a startling 99.6% to 0.4%.

Table 1. Flows INTO Quebec from neighbouring jurisdictions

Rivers/Lakes	Flow (m3/s)
Ottawa (ON)	596*
St. Lawrence (ON and 8 Great Lake States)	6,990
Salmon (NY)	2**
St. Regis (NY)	6**
Chateauguay (NY)	3**
Richelieu (NY, VT)	355
Memphremagog (VT)	32
Several small rivers (NL)	542**
Total	**8,526**

* Contribution of tributaries from the Ontario side only

** Estimates extrapolated from closest flow monitoring stations

Sources: Water Survey of Canada (HYDAT) and United States Geological Survey (Real-time water data for the nation), average annual streamflow data

Table 2. Flows OUT OF Quebec to neighbouring jurisdictions

Rivers	Flow (m3/s)
Mississquoi North branch (to NY)	2*
Hall's stream (to NH)	4.8**
Daaquam (to ME)	8.9**
Big Black (to ME)	1
Little Black (to ME)	1
St. Francis (to ME)	12.7**
Total	**30.4**

*Flow eventually returns north to Quebec via the Richelieu River.

** These are international boundary rivers, thus only about half the flow is credited as flowing from the Quebec side.

Sources: Water Survey of Canada (HYDAT) and United States Geological Survey (Real-time water data for the nation), average annual streamflow data

Of course, the volume of water crossing from neighbouring provinces and states, while significant, is still far short of the volume which originates from rain and snow falling within Quebec itself and flowing directly to the ocean (Table 3). Quebec could opt to export some of this abundance, including rivers in the north, (whether or not already dammed by hydroelectric projects) draining toward James, Hudson and Ungava Bays, but once this flow is turned around and diverted all the way southward toward the St. Lawrence lowlands, large-capacity pipelines would have to be constructed to pump it, against gravity, using massive quantities of energy, in order to reach the international boundary and beyond. None of the neighbouring states or Ontario would welcome such a project passing through their territory, since they have no need for imported water themselves, and would be particularly reluctant to share their river valleys for its passage because of accompanying flooding and environmental hazards.

Table 3. Flows ORIGINATING in Quebec, en route to ocean (m3/s)

Flows originating in Quebec	Flow (m3/s)
Northern Quebec rivers	16,800
Ottawa River (excluding Ontario inflow)	1,329*
St. Lawrence River	2,140**
North Shore-Gaspésie rivers	6,800***
Total	**27,069**

* Estimated from Ottawa River Regulation Planning Board data.

** Excluding inflows at Cornwall-Massena dam above Quebec boundary.

*** Excluding inflows from Labrador.

Sources: Water Survey of Canada (average annual flow data). Also, see Pearse et al. (1985, 28); and Laycock (1985, 28-29).

CONCLUSION

All in all, if a market for Canadian freshwater was eventually to develop south of the border, particularly in the drier southwestern states, Quebec is *not* the province best situated geographically to supply it.

Ontario, for example, has the capability of drawing additional water from northern Ontario (beyond what it diverted decades ago from Ogoki and Long Lake drainage) to compensate for falling levels of the Great Lakes, or for other purposes, if neighbouring Great Lakes states were to agree on a joint venture. And British Columbia also has the advantage of prime access to the American west via the Fraser and Columbia river systems, access much superior to Quebec's. Neither of these provinces, however, is considering such action; both have passed laws or regulations to prevent it, as have other provinces to varying degrees (Quinn, 2007).

Acknowledgement

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Appendix (supporting information)

With respect to the flow of fresh water, the Canada – United States boundary can be divided into boundary waters (flowing along the boundary), transboundary waters (flowing across the boundary in either direction) and watershed divide (no flow along or across the boundary). A list of international boundary and transboundary waters is provided in Appendix 7 and 8 of the classic text by Bloomfield and Fitzgerald, *Boundary Water Problems of Canada and the United States,* 1958, Carswell, Toronto.

International Boundary waters for Quebec include:

- St. Lawrence River (only for a kilometre or so) between Quebec and New York;
- Hall's Stream (uppermost tributary of the Connecticut River) between Quebec and New Hampshire;
- SW branch of the Saint John River between Quebec and Maine;
- St. Francis River and Beau Lake between Quebec and Maine.

International Transboundary waters flowing *south* from Quebec include:

- South and North branches of the Missisquoi River (both eventually enter Lake Champlain and flow back north via the Richelieu River into Quebec);
- Daaquam River, Big Black and Little Black Rivers, all tributaries flowing from Quebec across the boundary to the Saint John River in Maine.

International Transboundary waters flowing *north* into Quebec include:

- St. Regis, Salmon and Chateauguay Rivers, all tributaries to the St. Lawrence River from New York State;

- Lake Champlain - Richelieu River from New York and Vermont;
- Lake Memphrémagog – St. Francois River from Vermont.

International Watershed Divide extends for approximately 180 km of the Quebec boundary with New Hampshire and Maine. This is the only watershed divide along the entire 8900 km boundary between Canada and the United States. There is no flow along or across the divide, which extends along the international boundary from Hall's Stream to the Daaquam River.

Interprovincial Boundary waters include:

- Ottawa River for several hundred kilometres between Ontario and Quebec.

Interprovincial Transboundary waters flowing *south* from Newfoundland –Labrador into Quebec's north shore include:

- Natashquan, Little Mecatina, St. Augustin and St. Paul Rivers.

Interprovincial Watershed Divide extends for most of the Labrador/Quebec boundary, all the way from the northern tip of Labrador southward to the 52nd parallel where the boundary then extends eastward.