



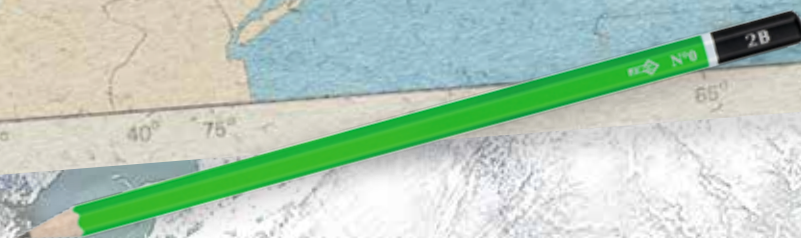
INITIATIVES POUR L'AVENIR
DES GRANDS FLEUVES
INITIATIVES FOR THE FUTURE
OF GREAT RIVERS



The Saint Lawrence River

PAR AVION
VIA AIR MAIL

THE SAINT LAWRENCE RIVER





Tour Programme

- *Toronto*
- *Kingston*
- *Ottawa*
- *Montreal*
- *James Bay and the Giant's Staircase*



Whoever wishes to hail the source of the Saint Lawrence River must go to Toronto. It's not a stopover I would recommend for those suffering from depression.

The flight (AF 0356) was certainly short (7h55) with only a little turbulence (obviously over Perfidious Albion). There is no doubt that Lake Ontario, so vast and blue, makes one think of the sea (at least for today). Did you know that, together with the Saint Lawrence River, the Great Lakes hold 25% of the world's freshwater reserves? But as for the rest... The snow has melted, freeing a huge yellowish area in which, here and there, without apparent logic or continuity, tall buildings stand in groups of

twos and threes. They look like shoddy hair implants on a bald skull. We finally arrive in the city-centre. Skyscrapers, some with fine architecture, attempt to give the impression of a skyline, a mini New York and strangely hesitant town planning.

Here, advantage is taken of the infinite space available, there, frightened of having so much of it, density and concentration rule as if to combat the cold. Tonight there's a carnival at the Toronto ice rink with orchestras, songs and horns. The city is receiving Montreal for the final match of the regular ice-hockey season. Two hours later, silence reigns in the streets : the visiting team won 4-3.

Question: where does the money come from, since plenty is needed to build like this?

After a short inquiry, it turns out that Toronto, which started from nothing, has become one of the most powerful financial centres (the seventh or eighth) in the world in only a few years. Even London should start worrying as the local Toronto Stock Exchange (TSX for those in the know) is threatening the up-to-now almighty and all powerful London Metal Exchange. Admittedly, Canada is rich, potentially with every imaginable mineral: uranium (in concentrations far higher than those of Niger), gold, rare earths, etc., without counting its oil and gas resources. Furthermore, its soil is very far from having revealed all its secrets.

But these treasures have to be exported. One can die poor next to a safe full of cash but impossible to open, hence the importance of logistics, the difficult art which combines transport resources. Pipeline projects abound but come up against the most stubborn obstacles. It is necessary to negotiate with each of the Provinces crossed. Those who plead for a strictly federal organisation of the country should come to Canada. It's easier

to dialogue with the great American neighbour than to find an agreement between Ontario and Quebec. Each is jealous of its prerogatives written in the stone of the constitution. It will then be necessary to overcome the reluctance of the First Nations People concerned by the layout planned. Contrary to the United States, the First Nations have almost always been associated with national development, and their rights are protected.

Lastly, there are the nature conservationists, a very small minority politically, but increasingly present and active. The route of a pipeline had to be changed. It terminated at the Saint Lawrence right opposite the place chosen by the belugas for their breeding ground.

In this context, the waterway takes on particular importance, a situation that is not new. Every river has its major role. For the Saint Lawrence, it is transport. Electricity production came later and only on its tributaries, more or less. Irrigation is unnecessary in these territories gorged with water (as soon as the snow has melted). Thus there is the third function, that of a route. The Indians made no mistake.

They called this immense river the Hochelaga, meaning the "path that advances". Since the arrival of Jaques Cartier in 1535, this huge river has been the main corridor of exploration and then communication with the heart of North America, especially since the network of the Great Lakes opened out to the west.

From the sea (Port Halifax) to the westernmost lake, that called Superior, it is a liquid road stretching 3,700 kilometres along which several developments began at the end of the 19th century and accelerated from the 1950s: locks and diversion canals. This "highway" has been baptised H2O.

The reason is obvious.

We must now take the train to reach the source of the Saint Lawrence and head due west. For almost three hours we travel along the lake without a house to be seen. The shores are empty,

except when a town or rather large village looms ahead: timber houses, a wharf, an occasional grain silo, a hydropower plant. And once again the evidence of how great a privilege space is, especially for a traveller returned from Asia!

How restful all these vast wildernesses are for the eye! But doesn't living in such a dispersed way lead to great losses of energy?

Finally, here's Kingston with its enormous university, its well-known hospital and its two penitentiaries, its islands and marinas that must be very pleasant to frequent during the months without ice. It is mid-April and

the ferry still has to confront a large number of growlers. Here, they call the ferry a "traversier". Long live the defence of the French language.

Hello Kingston and its population of 130,000 spread over a territory which would accommodate 300,000 in Europe and 3,000,000 in China.



The Growlers

In every geography book, Kingston is held to be the "source" of the Saint Lawrence, so it was fitting that we should hail it as such. It is one of the largest rivers in the world, being 1,600 kilometres long, draining a catchment area three times larger than France and with a flow rate reaching 12,000 m³ a second at Quebec, the same as the Rhone in a period of very severe flooding. So homage is due to Kingston.

A homage also to Patricia, a waitress at the local Holiday Inn. To have us forgive her for the very poor fare served to us, she recounted the story of her son, wonderfully happy in Auckland, New Zealand. But let us get back to our business.

Just what is a source? From whence does the Saint Lawrence really spring? There is no doubt that from Kingston onwards, the waters of Lake Ontario enter a kind of natural canal that appears like a river. But since this lake is connected to the four other Great Lakes, why attribute it as the source of the Saint Lawrence? It should be recalled that the five North American "Great Lakes" cover half the surface

area of France, that their depth often exceeds four hundred meters and that if they should spill over the fifty odd American states, they would disappear under 3 metres of water! Sorry, Kingston, no harm meant, but the real source is this gigantic reservoir, fed by all the water collected at the heart of North America. That is what explains this river's power.



The ferry to reach the source of the Saint Lawrence

OTTAWA, the federal capital, and the name given by the Indians to the river that crosses it. Another story of water.

We visit the Ministry of Transport which presents the "Seaway", the H₂O highway strangely qualified as maritime although it consists of a river and five lakes. It starts at Montreal and continues to Lake Superior, 3,700 kilometres interrupted only by locks. The "Seaway" in fact only covers the distance between Montreal and Kingston (306). It is an incomparable means of transport at the heart of one of the richest regions of the world. Every year, 200 million tons pass through it, loaded and unloaded at forty ports! It can be navigated by large boats up to 200 metres long, 24 meters wide and with a draught of 8 metres.



The environmentally friendly will rejoice to hear that just one of these boats replaces 850 trucks.

Reaching Lake Ontario from Montreal means climbing 75 metres.



Ottawa with the thaw in progress

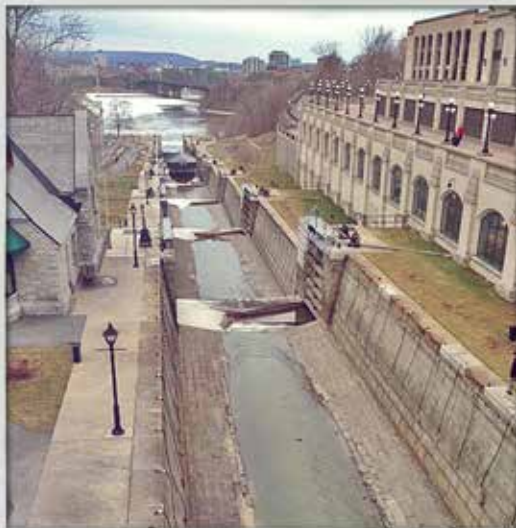
Thus 7 locks have been built along the 300 km stretch and we must continue to climb, passing through Lakes Erie (174 m above sea level) and Huron (176 m) to finally arrive in Lake Superior (183 m). To guarantee the continuity of this "route", it was necessary to build 17 locks and various diversion channels, including the famous Welland Canal which allows bypassing the Niagara Falls where the

water of Lake Erie pours into Lake Ontario. In both Canada and the United States the ownership of the infrastructures (locks, canals and ports) has remained in public hands embodied by the Federal Ministry of Transport, which has delegated the management to a private company. In fact, two twin companies manage the Seaway, one Canadian and the other American. Necessity and intelligence reign. Although most of the waterway and

installations are in Canada, a boat setting out from Montreal will cross the border at least twenty times before reaching Lake Superior. These companies make their money from the tolls levied on the boats, but the States must step in to offset a deficit that is regular since structural: the receipts never compensate the costs, far from it. Maintenance in this hostile environment is as vital as highly expensive.

It should be emphasised that this Seaway is seasonal. Ice jams the locks from December to April. Whatever the case, ice impedes any navigation, making it necessary to resort to trucks and especially the very dense and well-maintained railway network.

The relationship with the United States is ancient and has withstood the test of time as with an old couple who've been through many trials. It has achieved a balance that no dispute appears able to shake. In addition to the two sister companies, the United States and Canada have worked together, starting in 1909 with the Boundary Waters Treaty and the creation



The canals of Ottawa

of the International Joint Commission (IJC), then the Great Lakes Charter in 1985 and the St. Lawrence River Basin Sustainable Water Resources Agreement in 2005, and have always found the right equity. The IJC presides and it goes without saying that the stakes of this good relationship are high. Much of the industrial activity of the two countries (40% for the United States and more than 60% for Canada) is gathered in the basin of the Great Lakes on which stand large cities including our old friends Toronto and Ottawa, as well as Buffalo, Detroit, Cleveland, Chicago and so forth. If this region were a State, it would be the fourth most powerful economy in the world. The two sister companies perform their mission valiantly, despite their tight budgets. All the employees told me how proud they were. "We carry on from the pioneers. It's our duty



Visit to the Embassy

to make sure that the route they opened up stays open. If the winter's long, it gives us the opportunity to repair everything". The foreman at the Saint Lambert lock showed us the latest device: huge suction cups. As soon as a boat becomes stationary, they are positioned to clamp on the hull and keep the boat in place.

There is no longer any need to throw lines, an operation that can often turn out to be dangerous and even fatal. This invention apparently came from New Zealand and was further developed by Italian engineers and then adapted to the climate by Canadian engineers. Only a

few types of rubber resist very low temperatures. The suction pad has now become globalised.

Another part of the river, one that has more right to call itself "seaway".

A visit to the port of Montreal, open year round since 1964 and capable of berthing any boat with a draught less than eleven metres. Its geographic position is particularly advantageous. 1,600 kilometres from the sea, it lies at the heart of a densely-populated and active region.

In less than forty-eight hours a good can be delivered to 70 million American and Canadian consumers and the ship-owners know that Montreal lies at the end of the most direct route when coming from Europe and the Mediterranean.

One and a half million twenty-foot equivalent units are transported every year (soon five million) : bulk liquids (oil products) and solids (iron and copper ore, salt for roads, sand), one of the largest cereal terminals in the world and one of the fastest for handling (5,000 tons can be loaded onto a boat in an hour, while 3,000 tons can be unloaded), a marine terminal that can receive 50,000 cruise passengers, a private railway network (100 kilometres long) perfectly linked with the national and American networks, a direct link to highways that reach out easily across the whole continent. Efficiency,

flexibility, intermodality: the advantages of Montreal are impressive.

It is obvious why it constantly expands its network of contacts and sustains the rhythm of its development in spite of the ups and downs of the economic situation. There are only two limits to this optimism.



The Saint Lawrence lock equipped with suction cups.

It will be necessary to continue deepening the channel. The current depth of 11 metres will not suffice for the draught of the giant post Panamax ships, especially since other North American ports offer depths of 16 metres and more. Another handicap is the lack of compactness. In order to receive a great number of ships when it took more than a month to unload them, the wharfs were extended excessively over almost 15 kilometres.

It was impossible to automate the management of such a large space. Contrary to the example of Singapore, no one considered moving. Competition with other ports, including that of New York, could become fierce in the long term. Nothing can ever be taken for granted in logistics. The revenues are never more than temporary, including those attributable to geography. Ever more investment is required to obtain a chance of keeping them flowing.



Ships bound for the frozen north berthed at Montreal.

But make no mistake ; it is the tributaries of the Saint Lawrence that have led it to play such an important role in the development of its basin, mostly to the east, meaning Quebec. Dams and hydropower plants have been built on their courses under the sole responsibility of Hydro Quebec, a public company and the fourth largest producer of hydroelectricity in the world, after two Chinese companies and a Brazilian one.



*An aerial view of James Bay
before the thaw*

Air Inuit, flight 3H 304

Departure for James Bay, or more specifically the small town of La Grande. The temperature forecast is -14°C ; perceived temperature (there's a light breeze) -25°C . Bertrand Porquet, a nonetheless hardened traveller and also the CNR Director of Strategic Planning, is shivering already. With reason, since he looked only at the weather forecast for Montreal, where summer has just begun.

Two days by road from Montreal; the territory of James Bay covers $350,000\text{ km}^2$, a fifth of the surface area of Quebec. We are in the mid-north, between the 49th and 55th parallels. James Bay starts in the west, while the Otish mountains rise in the east. Numerous rivers flow down from their heights including that called the Grande (800 km long) as well as the Eastmain, the Caniapiscau, the Opinaca, and more besides. Water covers 15% of this huge territory which is why, in 1977, Robert Bourassa, the young but nonetheless visionary Prime Minister of Quebec, decided to launch a gigantic development programme.

The Robert Bourassa reservoir

“No one will say that we lived poorly from such a rich land”. Two visions confronted each other at the end of the 1960s: the construction of many nuclear power plants or that of R. Bourassa. Ontario opted for the former but now appears to somewhat regret its decision. It all began with the creation of a huge reservoir at an altitude of 600 metres by closing off the River Caniapiscau. Then, as many dams as possible were built on all the rivers of the catchment area of the Grande Rivière, down to the sea level. The same water can therefore pass through seven turbines. Nine reservoirs and eight hydropower plants will be constructed. Fittingly, the largest

will be called Bourassa. It has the particularity of being the largest underground hydropower plant in the world. An additional head of 7 metres was obtained by digging through the granite. With its evocative name of Giant's Staircase, its flood spillway is designed for a ten thousand year flood, with a maximum flow rate of 16,000 cubic metres a second. The gain in power justified the additional cost. This example suffices to demonstrate the ambition of the project and the constant concern given to the long-term.

325 dikes had to be built, representing a volume of 177 million m³ of fill.

The result is there: 16,500 MW of installed capacity for the entire complex, providing half Hydro Quebec's production.

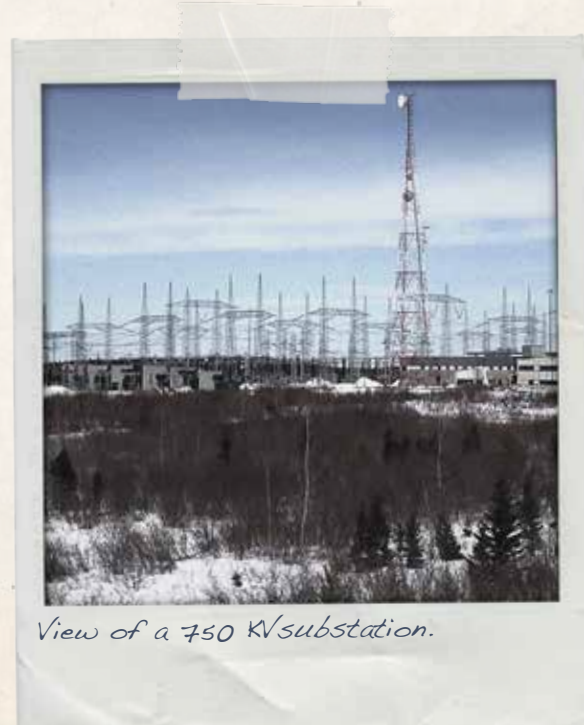
Evaluations of the global cost are difficult to make. The value of money 40 years ago was not the same as that of today, but the figure of \$18 billion has been mooted to which another \$6 billion must be added to transport the electricity : six lines of 735,000 volts each to supply Montreal and Quebec plus a DC line (450,000 volts) delivering to the United States (Boston).

These titanic works provided the authorities and Hydro Quebec with the opportunity to forge new relations with the indigenous populations. Old conflicts gave way to negotiation and then partnership. It should be emphasised that the Inuit and the Cree were practically the only inhabitants of the territories.

These two communities signed the James Bay and Northern Quebec Agreement with all the interested parties, governments and companies. The text covers all the controversial issues including financial compensations,

the continuation of traditional activities, the protection of the fauna and flora, reforestation obligations, local autonomy, the development of social services, education and health, etc.

These provisions are completed regularly. The Cree signed the Peace of the Brave with the electricity producer in 2002. Dams sometimes open up new eras and no one appears to contest the Grande Rivière complex.



View of a 750 KV substation.

The Giant's Staircase



