

ADAPTATION STRATEGIES FOR MAINTAINING HARBOUR AND SHIPPING ACTIVITIES IN THE ST. LAWRENCE IN A CONTEXT OF CLIMATE CHANGE

DECLINING WATER LEVELS IN THE ST. LAWRENCE/GREAT LAKES SYSTEM



CONTEXT

Climate projections for the Great Lakes Basin in 2050 show a potentially significant drop in water input, depending on the scenario in question. Hydraulic modelling of these scenarios showed that St. Lawrence water levels would decrease considerably. In and around Montreal, the drop could be as much as one metre below that shown on charts. The duration and frequency of such severe low-water episodes could negatively affect shipping on the St. Lawrence.

OBJECTIVE

Analyze the potential of various adaptation options that would make it possible to maintain shipping traffic on the St. Lawrence at least at its current level.

RESULTS

Should hydrology in about 2050 correspond to a normal water year, the declines observed would not be detrimental to shipping operations. However, where a year of low hydraulicity is taken as a reference, declines in water level could reach up to one metre below that shown on charts in Montreal for several consecutive months, decreasing downstream so as to be no longer perceptible around Bécancour.

Several adaptation options were explored in relation to potential gains:

- Small fluctuations (less than 15 cm): technical and technological adjustments (COWLIS load-optimization system) or squat equation (increased draft)
- Moderate fluctuations (15 to 50 cm): adaptation of the physical environment (dredging and hydraulic structures)
- Large fluctuations (50 cm and over): structural and organizational adaptations (ship configuration, restructuring of shipping activities).

IMPACT

This was the first study on the St. Lawrence that both quantified the impact of climate change on water levels and explored the relevance of different adaptation options. In light of the results obtained, the scope of the expected water-level declines will require equally significant adaptation measures. While the research was aimed initially at contributing to the deliberations of the *Comité de concertation navigation* on the matter, the findings point to the importance of broadening those deliberations to include all St. Lawrence users, so that the adaptation solutions selected can be implemented from a sustainable-development perspective.

PROJECT LENGTH

2 years • Completed in 2005

Information:

projet@ouranos.ca

514 282-6464

www.ouranos.ca

PARTNERS

- Environment Canada
- Shipping Federation of Canada
- Ministère des Transports du Québec (MTQ)
- Fisheries and Oceans Canada
- Port of Montreal

FUNDING

- Climate Change Action Fund (CCAF)
- Ouranos

TEAM

Lead Researcher

Pierre D'Arcy

Fisheries and Oceans Canada

Associate Researchers

Jean-François Bibault

Environment Canada

Rachid Raffa

MTQ

Denis Lefavre, Bernard Doyon and Pierre Rouleau

Fisheries and Oceans Canada

Yann Ropars

Consultants Ropars inc

Claude Rioux

Université du Québec à Rimouski

PROJECT OVERVIEW

- Model data (climatic and hydrodynamic), for use in quantifying the scope of the variations anticipated over the next 30 to 50 years, were integrated.
- The relevance of adaptation options based on three low-water-level scenarios – small (0-15 cm), moderate (15-50 cm) and large (50 cm and over) – were assessed.
- The financial, economic and environmental repercussions of these options were estimated.