



WATER

SEDIMENTS

SHORELINES

BIOLOGICAL RESOURCES

USES

WATER QUALITY IN THE FLUVIAL SECTION

Physicochemical and Bacteriological Parameters

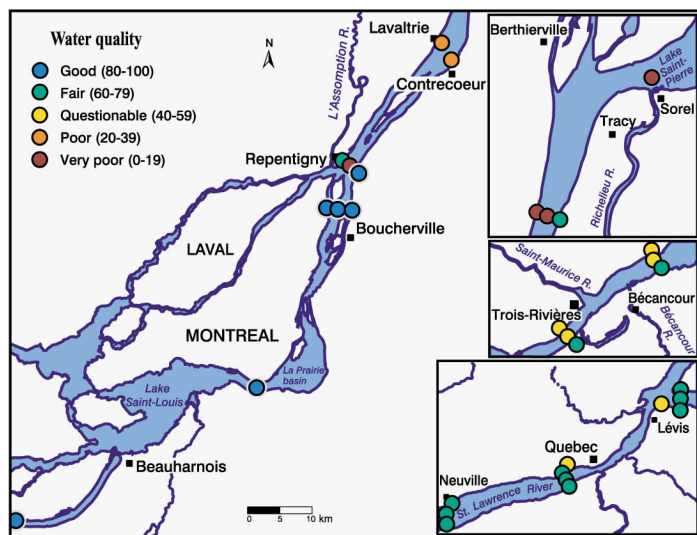
Background

Thanks to the *Programme d'assainissement des eaux du Québec* (PAEQ) and the *Programme d'assainissement des eaux usées municipales* (PADEM), major cleanup initiatives have been undertaken in

tributary watersheds and riverside municipalities of the St. Lawrence River over the last 20 years. By monitoring the quality of the water using descriptors of nontoxic pollution (eutrophication, hypoxia, erosion and fecal and organic contamination), we can measure the

environmental benefits of these cleanup efforts and of forthcoming measures in the municipal and agricultural sectors. This monitoring program will possibly allow us to point up the effects of climate change on water quality. The water quality monitoring network of the Ministère de l'Environnement du Québec is made up of 31 sampling stations and extends from the outlet of Lake Saint-Francois down to the western tip of Île d'Orléans. High-frequency monitoring is also performed near Quebec City (Lévis water intake) by the St. Lawrence Centre of Environment Canada.

Figure 1. Water quality in the St. Lawrence River, summer 2000 and 2001



environmental benefits of these cleanup efforts and of forthcoming measures in the municipal and agricultural sectors. This monitoring program will possibly allow us to point up the effects of climate change on water quality. The water quality monitoring network of the Ministère de l'En-

Overview of the Situation

The Present

Figure 1 presents an overview of St. Lawrence water quality as measured in summer 2000 and 2001 using Quebec's water quality index (IQBP). The water quality is good up to the island of Montreal, but deteriorates downstream. The main problems and losses of use affect the ship channel and the water mass immediately to the north. These

Photo: Hélène S. Dubois. © Le Québec en images. CCDMD

problems are primarily the result of bacterial contamination from the Montreal wastewater treatment plant which does not disinfect its treated wastewater before releasing it to the river — and from sewer overflows during rainfall events. The bacteriological contamination issuing from this section of the river starts to diminish in Lake Saint-Pierre, but remains perceptible until Bécancour, some 125 km downstream of Montreal. In the Quebec City region, water quality is fair in the large fluvial water masses, but questionable near the shore, where the water is turbid.

The Past

For the purposes of comparison, the results obtained in summer 1995 and 1996 are presented in Figure 2. The percentage of stations with water of good or fair quality has fluctuated over time, though it has diminished steadily over the past four years, going from 87% in 1998 to 65% in 2001 (Figure 3).

The water quality at some sampling stations located close to the shore (water intakes of Contrecoeur, Sainte-Foy and Lauzon) deteriorated between 1995 to 2001, when a slight increase in turbidity, probably linked to a lower river discharge, was noted. An increase in bacteriological contamination was also observed at some sampling stations influenced by the effluent discharges of the Montreal wastewater treatment plant. This degradation would also be linked to low flows and lower water levels, which would have the effect of modifying the area of influence of discharges from this treatment plant, further concentrating the pollutants released.

Figure 2. Water quality in the St. Lawrence River, summer 1995 and 1996

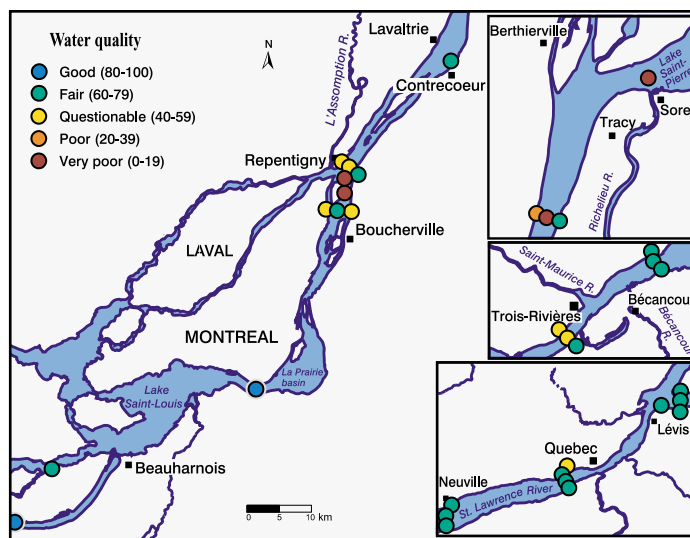
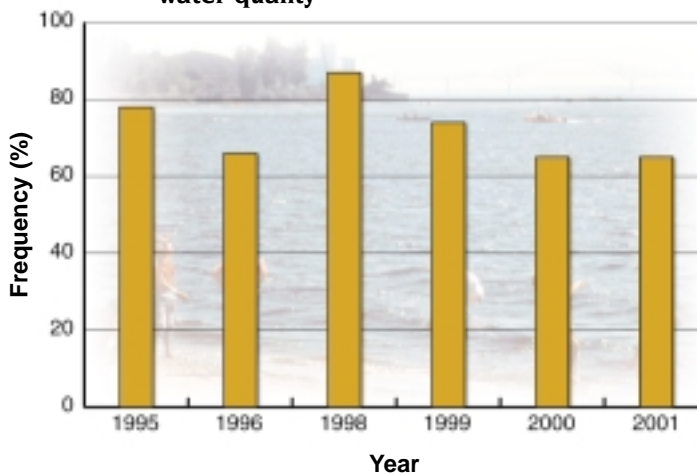


Figure 3. Percentage of stations with good or fair water quality



Near Quebec City (Lévis water intake), concentrations of suspended particulate matter and fecal coliforms did not change significantly between 1995 and 2001 (figures 4 and 5), whether the effect of river discharge is considered or not. With regard to phosphorus, a reduction of some 30% is observed,

with levels falling from 0.032 mg/L to 0.022 mg/L (Figure 6). This decrease, however, is related to a reduction in the river discharge (thereby reducing runoff and erosion) and not to cleanup interventions or to a reduction in point-source discharges.

Figure 4. Changes in suspended particulate matter near Quebec City

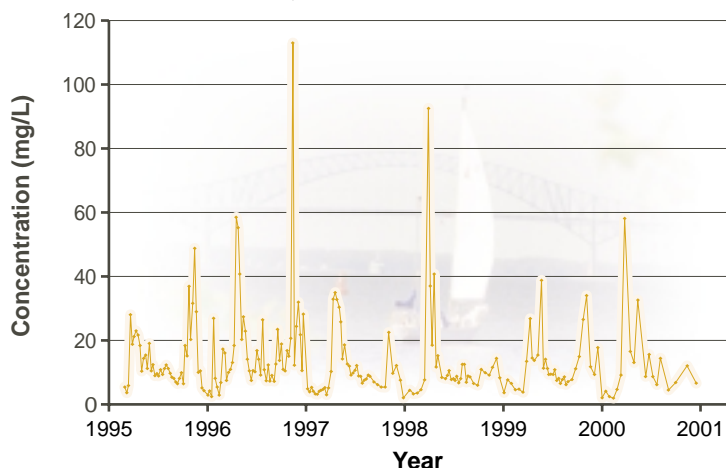


Figure 5. Changes in fecal coliforms near Quebec City

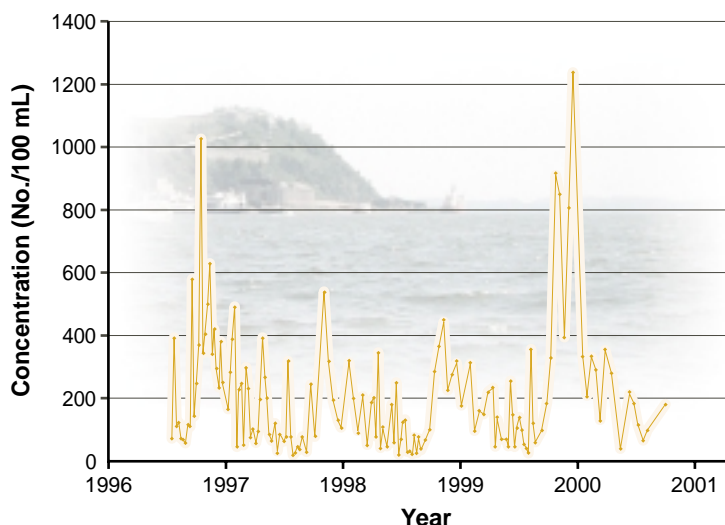


Figure 6. Changes in phosphorus near Quebec City

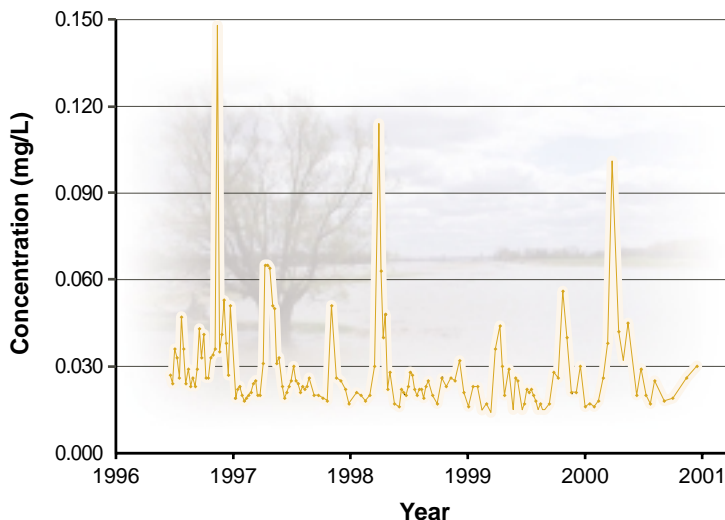


Photo: MENY

KEY VARIABLES

The IOBP is used to assess the general quality of fresh water for the following uses: swimming and water sports, protection of aquatic life, protection of a body of water against eutrophication, and raw water supply intended for consumption. The index is based on conventional physicochemical and bacteriological water quality parameters and combines eight variables, in this case: phosphorus, fecal coliforms, turbidity, ammonia nitrogen, nitrates/nitrites, chlorophyll a, dissolved oxygen, and pH.

The IOBP ranges from 0 to 100 and serves to define five different classes of water quality:

- A (80–100): good
- B (60–79): fair
- C (40–59): questionable
- D (20–39): poor
- E (0–19): very poor

Changes in the annual percentage at sampling stations with water of good (A) or fair (B) quality as well as changes in concentrations of phosphorus, fecal coliforms and suspended particulate matter near Quebec City provide us with an indication of whether or not the quality of St. Lawrence River water is improving or deteriorating.

Outlook

This monitoring program should provide a record of how the St. Lawrence River is changing relative to changes observed in the Great Lakes. The data should also allow us to assess whether the observed trends are the result of the modification of the flow regime or due to cleanup initiatives.



Photo: Joanne Boisvert, © Le Québec en images, CCDMD

St. Lawrence shoreline, in Saint-Angèle-de-Laval

To Know More

DESCHAMPS, G. and S. PRIMEAU. 2001. *La qualité de l'eau autour de l'île de Montréal, 1973–2000; porte ouverte aux usages*. Service de l'environnement de la Communauté urbaine de Montréal and ministère de l'Environnement du Québec. Montreal. 43 pp. + 3 app.

HÉBERT, S. 1999. *Qualité des eaux du fleuve Saint-Laurent, 1990–1997*. Envirodoq No. EN990161, report QE-119. Ministère de l'Environnement du Québec, Direction des écosystèmes aquatiques. Quebec City. 38 pp.+ 4 app.

HUDON, C. and A. SYLVESTRE. 1998. *Qualité de l'eau en aval de l'archipel de Montréal, 1994–1996*. Scientific and Technical Report ST-170. Environment Canada – Quebec Region, Environmental Conservation, St. Lawrence Centre. Montreal. 338 pp.

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State of the St. Lawrence Monitoring Program

Four government partners — Environment Canada, the ministère de l'Environnement du Québec, the Société de la faune et des parcs du Québec, and Fisheries and Oceans Canada — are pooling their expertise and efforts to provide Canadians with information on the state of the St. Lawrence and long-term trends affecting it. To this end, environmental indicators have been developed on the basis of data collected

as part of each organization's ongoing environmental monitoring activities. These activities cover the main components of the environment, namely water (quality and quantity), sediments, biological resources (species diversity and condition), uses and, eventually, shorelines.

For additional copies or the complete collection of fact sheets, contact the

St. Lawrence Vision 2000 Coordination Office:

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The fact sheets and additional information about the program are also available on the Web site: www.slv2000.qc.ca.

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