

## Contextual Narratives for Water Uses

### 1 General Socioeconomic Context

**(a)** *Production value of the interest:*

There is no production value associated to the use of water for drinking water production but it represents a very high social cost that can be affected by water levels. The municipal demand is linked to the large majority of the residential population but also to other major installations like hospitals, schools, commercial center and buildings. Industries also rely on water for production or cooling systems; the availability of water either from municipal water treatment plants or through private intake systems could have serious financial impacts (eg.: industry closures).

**(b)** *Number of stakeholders:*

There are 2.3 millions residents that rely on the Lower St. Lawrence River and 6.3 millions residents on Lake Ontario and Upper St. Lawrence (both Ontario and the US).

**(c)** *Organizational characteristics:*

The stakeholders are located all along the systems but two different groups can be distinguished in interest and location: 1) domestic users in the Greece and Thousand Island area and 2) municipal water treatment plants in the Lower St. Lawrence River (Montreal metropolitan area).

**(d)** *Values and perceptions of the interest: .*

The municipal water supply is obviously considered as an essential interest. In general however, this interest is perceived as not critical as it is only affected in extreme situations. This situation is also true for other uses like industries and wastewater treatment plants. Smaller users (intake line, shore residents) may feel they are left aside but mitigation measures may be more appropriate to solve their problems.

**(e)** *Significant statutory, regulatory and policy restrictions:*

In the next ten years the most significant statutory, regulatory or policy restrictions that could affect water regulation are more related to discharge in low water level conditions. The pollutant dispersion, the impacts of outfalls on the aquatic biota (Clean Water Act) and the thermal dispersion are the main concerns. However, low water levels at which these concerns should seriously be considered are much below actual regulation levels. In general, the Lake Ontario – St. Lawrence River water is of very good quality and eventual regulation regarding water quality for drinking water production should not be problematic.

**(f)** *History of the interest:*

This interest was introduced in the regulation plan mainly for the downstream portion as municipal plants were identified as vulnerable to water level fluctuations.

**(g)** *Trade flows and current market conditions:*

Municipal water uses of the system could slowly increase, according to the population increase.

**(h) Effect of last high or low water conditions:**

High water conditions in the past have not been a problem as low levels are generally more problematic. High water levels experienced more recently, combined with an increased population on some islands resulted in the appearance of new concerns (groundwater contamination). Low water levels were not reported as problematic, maybe because of smaller withdrawal that can tolerate lower levels.

**2 Performance Indicators:**

- Infrastructure PI: Drinking water production plants infrastructure costs required to adapt to levels lower than the critical levels identified. This PI is based on costs estimations to build a new intake structure when the critical level is reached. The costs provided probably overestimate the costs strictly linked to water level problems. Other solutions relieving part of the problem would probably be put forward before building a new intake (lowering demand, etc.).
- Taste & Odors PI: The costs of upgrading municipal drinking water treatment plants to treat taste & odors compounds. T&O are not regulated and are considered as aesthetic problems. However, it is a serious nuisance as it affects both the comfort and the confidence of the population. This PI was once again based on cost estimation for the addition of a treatment stage. For this PI to be trespassed, a low water level is needed for three consecutive years (during 1 QM). More research would be needed to define a clear link between water level and severe T&O problems resulting in investments from municipalities. In this case, the costs are probably underestimated as higher water levels could occasion problems, in combination with other factors.

Other municipal and private users impacted by water level such as: shoreline wells, groundwater contamination (Wilson Hill area), sewage overload, were evaluated but not represented as performance indicators in the shared vision model. The impacts to those interests were found to be marginal in comparison to the PIs defined.

**3 Potentially Significant Benefit Categories Not Addressed by the Current Performance Indicators (secondary impacts)**

As the Lake Ontario-St. Lawrence River system will remain an abundant source of good quality water, no secondary impacts to M&I uses were identified.

**4 Key Baseline Conditions:**

The critical values calculated for the shared vision model consider the nominal capacity of the plants, thus taking into account the future population growth (for the existing plants). The construction of new plants should not be problematic as lower levels would be considered. The impacts were evaluated for the actual Seaway configuration. The change in water depth in the Lower St. Lawrence River resulting from widening or deepening of the seaway would change the conclusions of the analysis. Some infrastructure could become in critical situation, potentially requiring relocation.

**5 Key Trends:**

The use of water for municipal and other purposes is not expected to skyrocket in the near future. Water is available throughout the system but water levels can limit the availability for actual installations. Any new facility that would rely on water (water production plants or others) should design their infrastructure to account for more variability in water levels.

## **6 Expected Consequences of Changes:**

The possibility of relying on other sources of water than the St. Lawrence system is almost inexistent for plants located along it. Mitigation would thus have to be considered. The costs estimated in the shared vision model include the costs of new withdrawal infrastructures for vulnerable municipal facilities. These solutions however take a long time to be effective and would require planning. Another impact of level fluctuations is quality deterioration (position of emergency intake) for the Montreal plants. This impact will be alleviated by the treatment upgrade scheduled in the next few years. The taste and odors problematic is also linked to lower water levels and costs were estimated to treat them. Globally, mitigation strategies could be applicable but the costs would have to be taken into consideration.

The potential loser from new regulation or change in the water system (seaway) is the Lower St. Lawrence as the variations are greater and the infrastructure more sensitive to changes.

## **7 Adaptive Behaviors**

The adaptive behaviors underlying a performance indicator should be described. The description of adaptive behaviors should provide insight as to why a particular adaptive behavior was chosen from among alternative possible behaviors. What is the likely adaptive behavior of the recreational boating sector to and extended low water period? How likely is it that the sector will adapt?

## **8 Risk Assessment:**

The vulnerability of the various water uses to level fluctuations was identified as fairly low considering the regulation scenarios considered (very low probability of reaching a critical level). However, the risk associated to very rare events is very high if not predicted. For example, water shortages in Montreal. The information gathered during this project highlighted the need for planning and raised the awareness of the people in charge to the low probability-high risk events.

## **9 Sources:**

- Barbeau, B. & Carrière, A. December 2003. *Impacts of level fluctuations in the St. Lawrence River on water treatment plant operation*. Report presented to the International Joint Commission.
- Carrière, A., Barbeau, B. & Opitz, E. February 2004. *International Lake Ontario-St. Lawrence River Study Water Uses Technical Working Group Integrated Report*. Report presented to the International Joint Commission
- Carrière, A., June 2004. Influence of Lake St. Lawrence levels on the contamination of private wells in the Wilson Hill Island area. Addendum to the *International Lake Ontario-St. Lawrence River Study Water Uses Technical Working Group Integrated Report*. Document presented to the International Joint Commission.

## **10 Review Process**

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External Review: N/A