## **STATUS REPORT SEPTEMBER 2016**

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### **COMMITTED TO CLEANER** WATER!

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#### **Protecting our Rivers**

## **THE VIVIRY PROJECT**

Since 2010, COBAVER-VS has been studying water quality in the watersheds of the Vaudreuil-Soulanges regional county municipality (RCM) to help inform the water management plan of the region. **One of our central concerns has been the impacts of urbanization in each of the watersheds.** A large part of the Vaudreuil-Soulanges RCM is also part of the Montreal Metropolitan Community (MMC) and has undergone strong population growth and urban expansion in recent decades. The Viviry, situated principally in Hudson, is one of the most urbanized rivers in the region. We thus set out to **characterize water quality in the Viviry** during the summer of 2015, working in collaboration with the Liber Ero Research Chair at McGill University.

The Viviry basin is relatively small when compared with other watersheds of the RCM (10.3 km<sup>2</sup>) and the length of the main river channel is only 5 km. Over this short distance, however, the surrounding landscape changes substantially, 37.8% of the area being quite natural and 32.3% very developed. Agricultural fields, golf courses and road networks are also prevalent in the surrounding watershed, each acting as potential sources of pollution. We chose **five sampling stations** along the length of the river (see map below) to evaluate how changes in the surrounding landscape influence water quality.



#### **Vital Vegetation**

At times underestimated, plants (trees, shrubs and herbs) protect rivers from pollutants sourced from the surrounding landscape. Vegetation that grows along the banks of rivers absorbs chemicals that can diminish stream health and helps to prevent erosion (see figure, "Ecological Roles of Riparian Buffers"). It is then essential to evaluate the capacity of riparian buffers to fulfill their ecological functions.



Ecological Roles of Riparian Buffers

We used the Index of Riparian Buffer Quality (IRBQ) to class the shores of the Viviry into five categories ranging from "very poor" to "excellent". The method was developed by the *Ministère de Développement Durable et de la Lutte contre les Changements Climatiques* (MDDELCC) and is based on the coverage of nine landscape categories (forests, shrubs, herbs, logged areas, fallow land and grassland, crops, bare soil, exposed bedrock and infrastructure) found along the length of the river, each one weighted according to its influence on water quality.

Results show that most of the riparian buffers along the Viviry and its tributaries are good (42%) or excellent (21%). However, improvement is needed in some areas (see map below).



#### Water Flow

**Bank erosion** is a natural phenomenon that is constantly taking place. Nevertheless, this process can be greatly accelerated by certain anthropogenic activities such as **deforestation** and **development**. We identified critical points of erosion along the entire length of the Viviry, evaluating the intensity and type of erosion and whether intervention was urgently needed (see map).



**Obstructions to water flow** can be quite problematic as well. In fact, obstacles can **block water flow**, **erode riverbanks** and even cause **flooding**! We paid special attention to obstacles along the river, which primarily consisted of fallen trees, refuse, drains, dams and obstructed culverts.



#### **Viviry Water Quality**



We used two indices to study water quality: the **Index of Bacterial and Physiochemical Quality (IBPQ)** from the MDDELCC and the **Diatom Index for Eastern Canada (DIEC)** from the l'Université du Québec à Trois-Rivières (UQTR).

We used the **IBPQ** to see whether water from the Viviry is drinkable or if we can swim or fish in the river. The index integrates multiple parameters including **total chlorophyll a, fecal coliform count, nitrates and nitrites, suspended solids and total phosphorous.** High values of IBPQ indicate high water quality.

In the graph below, coloured lines represent the different chemical variables. Clearly, **IBPQ is much higher at the river's headwaters** where the surrounding landscape is more natural than further downstream where it's especially urban.

Phosphorous and suspended solids sourced from urban runoff build up in the water column at Station 4 because of the dam at Pine Lake. These pollutants are then filtered from the water to some degree by the wetland protected by the town of Hudson at Station 5 - an example of successful conservation in action!



Viviry River Water Quality							
Parameter	Criteria	Site 1	Site 2	Site 3	Site 4	Site 5	Description
Total Chlorophylle a (mg/L)	< 8.6	2.36	1.87	1.73	3.42	2.53	Measure of algae and aquatic plants
Fecal Coliform Count (CFU/100 ml)	< 200 <sup>1</sup>	110	270	400	590	1200	Affects aquatic activities, like swimming
	< 1000 <sup>2</sup>						
Nitrates and Nitrites (mg/L)	< 2.9	0.4	0.56	0.83	0.8	0.77	Can cause health problems
Suspended Solids (mg/L)	< 13	8	12	17	33	27	Impacts aesthetic quality of water
Total Phosphorous (mg/L)	< 0.03	0.041	0.063	0.075	0.12	0.061	Phosphorous promotes algal blooms
Upstream   Do						nstream	
<sup>1</sup> Suitable for swimming (direct contact) <sup>2</sup> Suitable for other aquatic activities (indirect contact)						Good Me Quality Qu	dium Poor ality Quality

#### Viviry Water Quality (continued)

#### River communities can contain dozens of diatom species





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**DIEC** is based on the community composition of **diatoms**, which are brownish microscopic algae that carpet river bottoms. Diatoms are used as indicators for the health of plants and animals in the river since they're sensitive to the concentration of nutrients (e.g. nitrogen, phosphorous) in the water column and to the presence of organic matter. While pollutants negatively affect some species, others thrive off of them! This index measures water quality by comparing the diatoms found in the river with those that would be expected under polluted conditions. Water quality is graded from A (good water quality) to F (poor).

On the whole, DIEC results for the Viviry tend to be negative. Samples from the different stations indicate relatively average to poor conditions for diatoms and thus other plants and animals as well. Stations 3 and 4 obtained the lowest scores (D) likely due to the urban areas adjacent to these sites. Stations 1, 2 and 5 are all located in municipally protected wetlands that filter nutrients from the river.



#### **How We Compare**

To better understand our results, we compared water quality in the Viviry with that of five other important rivers in the region: the Beaudette, Delisle, À la Raquette, Rigaud and Rouge rivers.

Observations were made between 2011 and 2015 with two stations per river, one upstream and the other



downstream. We compared the different rivers using a number of chemical measures including: fecal coliform count, total phosphorous, nitrates-nitrites, suspended solids, pH and turbidity. The graph below shows the average IBPQ values for each river across all measures at their respective upstream and downstream sites. Values range from 0 to 100 with higher values representing better quality water.

As you can see, the **Viviry has the highest water quality across all parameters at its upstream site**. Further downstream, however, water quality is as poor as most other rivers because of fecal bacteria and phosphorous polluting the river from nearby residential areas. Unlike the Viviry, runoff from agricultural areas is the greatest source of pollution for the other rivers.





#### How We Compare (continued)



On the above map, IBPQ scores are given to the watershed of the À la Raquette, Beaudette, Delisle, Rigaud, Rouge and Viviry rivers. The Viviry and Beaudette score well with a grade of B while the watersheds for the other rivers fare less well and get a grade of C. The issues encountered on the Viviry are largely related to high concentrations of **phosphorous**, **fecal coliform count and suspended solids** originating from urban areas. On the contrary, the other rivers in the Vaudreuil-Soulanges region have **high levels of phosphorous** from nearby **farmlands**.

The Rouge river has the worst results, be it at its upstream or downstream site. Upstream, the À la Raquette has results similar to those of the Rouge but its water quality increases downstream. For the Beaudette, Delisle and Rigaud rivers, there's little change in IBPQ at their upstream or downstream sites, having generally intermediate values.

#### **Taking Action!**

There are many ways that you can help improve water quality in the Viviry and other rivers in the MRC Vaudreuil-Soulanges! Since the main concern is the surplus of phosphorous and suspended solids, here are some ways that you can have a positive impact on river health.



Opt for biodegradable and phosphatefree cleaning products!

Allow space for native plants to grow in riparian buffers!



Conserve rain water using drainage ditches and rain buckets!

Promote biodiversity by letting a diverse plant community grow in your lawn!



Check your septic system since a leak would prove catastrophic for all!



For more information, call 450-451-0755 or visit www.cobaver-vs.org

# Thank you for your support!



