Missisquoi Bay Watershed ACTION PLAN

The Corporation's mission is to "PROMOTE THE ENHANCEMENT OF WATER QUALITY" in Missisquoi Bay, Lake Champlain, so as to render it usable again and harness its resources from a sustainable-development perspective.

The joint action plan for the Missisquoi Bay Watershed aims to implement actions in partnership with area organizations and municipalities, and the Quebec government. Following are some examples of actions planned to protect shorelines, floodplains, and wetlands.

- Municipal representatives will raise elected officials' awareness of the importance of ensuring respect of government policy on shoreline protection as well as inspectors' training needs and citizens' information needs.
- Farm organizations will perform characterization on the Ewing, Aux Morpions, Au Castor and Wallbridge streams, and determine priority actions for high-erosion zones.
- Environmental groups will give public information clinics on shoreline protection for residents living along watercourses and municipal representatives, as well as perform mapping of wetlands in the watershed.
- Tourism and economic sector representatives will work to inform companies of the importance of shore, bank and floodplain protection, and promote wetlands rehabilitation projects for educational and eco-tourism purposes.

The lakeshores, riverbanks, littoral zones and floodplains protection policy

The Government of Quebec has updated its policy with regard to the protection of lakeshores, riverbanks, littoral zones and floodplains: it is now integrated into the development plans of all regional county municipalities (MRCs). The policy is enforced via individual urban planning by-laws, and affects all watercourses and lakes within each municipality. You can obtain more information from your city inspector, including a copy of the Guide des bonnes pratiques (good practices guide), which you can use to locate riparian buffer zones, familiarize yourself with standards, and choose a stabilization method, among other things.

The Act Respecting Nature Reserves on Private Land

This Quebec government legislation aims to ensure protection of natural sites on private property by the owners themselves or their representatives (typically, nature conservation organizations). Its purpose is preservation of characteristics related to biological, ecological and landscape heritage.

Reference
Ministère de l'Environnement du Québec, Direction régionale de la Montérégie
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Water: shoreline protection policy
Biodiversity; protected areas strategy

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Protecting Shorelines, Floodplains and Wetlands

A source of solutions A network for action
CRITERIA FOR SUSPENDED SOLIDS AND BANK CHARACTERIZATION

**Suspended solids**
Protection of aquatic life:
- $\geq 5 \text{ mg/L}$: chronic adverse effects
- $\geq 25 \text{ mg/L}$: acute toxicity

**Bank characterization**
- Natural or revegetated banks: herbaceous plants or shrubs
- Banks with rockfilling: stabilization work completed
- Eroded banks: embankment broken away or crevices in bank
- Banks with retaining walls: cement wall, gabion wall or other material
A LIVING DRAINAGE SYSTEM

PROTECTED SHORELINES ARE MORE STABLE

Our lakes and rivers don’t have cement linings, like in-ground pools and canals! Lakes and rivers are part of a dynamic balance that involves water flow. There are two key phenomena at work in shoreline erosion: runoff water forms crevices along lake shores and river banks, carrying away soil, while the action of currents, waves and ice causes embankments to break away. Erosion is a natural phenomenon, but when the speed of currents is increased artificially (e.g. by straightening of watercourses, drainage, or storm sewers) or the beds of waterbodies are filled in, this creates imbalance, and shores erode faster. Erosion also leads to higher concentrations of suspended particles in the water, and siltation of lake- and riverbeds. Biodiversity of flora and fauna is vital to the natural exchanges between shores and waterbodies. Vegetated riparian buffer strips ensure better stability.

WETLANDS HELP FILTER WATER

Marshes, swamps, bogs and ponds are examples of wetlands, which enable water to be filtered. Plants in these areas absorb nutrients (e.g. nitrogen, phosphorus) and trap contaminants that would otherwise find their way into lakes and rivers, and even drinking water.

Wetlands also help store water needed during periods of drought. They act like sponges, slowing down the rate at which water levels drop in lakes and rivers during the summer. This in turn ensures the survival of plants and animals, and makes water-based recreational activities much more enjoyable.

RIVER BEND (TOP VIEW)

CONCAVE BANK
Bare bank

CONVEX BANK

CONCAVE BANK
Steep bank

RIVER BEND (CROSS-SECTION)

CONVEX BANK

Erosion

Deposit

Strong currents carry away soil from bare concave banks; currents are weaker near convex banks, and material carried by the water (e.g. gravel, silt, debris, plants) is deposited there.

FLOODPLAINS HELP RIVERS BREATH

Spring meltwater on floodplain, Notre-Dame-de-Stanbridge

When snowmelt in spring is abundant, water spills over from lake- and riverbeds onto floodplains. This is indispensable for a number of reasons. Floodplains accommodate the excess water—if these buffer zones disappear, currents flow even faster, which causes more erosion. By temporarily housing large volumes of water, floodplains thus help rivers “breathe” and flow more gently. Floodplains are vital to northern pike and yellow perch spawning beds, and function as transitional zones for plant species that tolerate flooding, such as willow, silver maple and ash. Lastly, slowing down the flow rates of rainwater and meltwater ensures better recharging of underground water tables.
REVEGETATING BANKS TO REDUCE EROSION

Replanting along river banks helps curb erosion: roots anchor the soil, while foliage protects it from strong rainfall. River banks must be revegetated using indigenous species; that is, those that grow naturally in Québec. The natural diversity of herbs and shrubs must also be reproduced. Species that thrive in humid conditions (e.g. blueflag iris, reed phalaris, sandbar willow, sweet gale) are planted near the bottom of the slope, while others (dogwood, highbush cranberry, lilac, staghorn sumac, elder) will tolerate the drier soil of bank benches. Never plant trees on the embankment itself: they must be at least three metres back from the terrace above the slope. Ask gardeners for indigenous flowering plants, and avoid invasive aliens such as purple loosestrife and the common reed. Do not use fertilizer along shores: you will fertilize algae in the water! Pesticides are a no-no (they are toxic substances), as are structures made of wood treated with creosote (which is brown/black in colour) or chromated copper arsenate (greenish): both of these are carcinogens.

VEGETATED STONE PITCHING FOR EXTREME CASES

Stone pitching is sometimes the only way to counter the action of waves and ice. First, the slope of the bank is flattened somewhat, and a geotextile mat is installed to retain soil but let water through. Then, a "toe trench" is dug in the bed and filled in with irregularly shaped and sized rocks “rip rap.” Herbaceous plants anchor the soil between the rocks, while shrubs stabilize the soil on top of the slope. The “scar” is concealed by other plants, allowing the structure to blend in with the surrounding environment.

BIOMECHANICAL STABILIZATION FOR A NATURAL LOOK

Installation of a natural fibre log, roadside rest area, Otterburn Park

Planting of indigenous species on bank, Parc Floral À Fleur d’Eau, Stanbridge East

Vegetated stone pitching, Saint-Georges-de-Clarenceville

Shoreline stabilization methods that use natural materials are very effective, as they allow water to flow naturally through structures. Retaining walls are now banned, because they impede runoff and end up breaking under pressure from water and soil as well as freeze-thaw cycles. Biomechanical structures are more flexible, are shock-absorbent, and evolve along with the river bank. Because plants are incorporated into them, these structures have a natural look that enhances the shoreline, while the plant roots anchor the soil. They can include fascines (bundles of living dogwood or willow branches), branch layering (anchored “carpets” of branches on the slope), rockfilling (also called “riprap”) at the base of the bank, or natural fibre logs (coconut fibres are shown in the photo). This allows life to flourish along the bank.