

## **The importance of vegetated shoreline buffer zones around Otty Lake**

Lakes are classified into three groups according to their physical condition and the amount of nutrients they receive.

An oligotrophic lake is deep, cold, and clean and capable of supporting trout species. Mesotrophic lakes are characterized by abundant beds of submerged aquatic plants and much higher nutrient concentrations. They generally support warm water fish species such as bass, perch and pike. A eutrophic body of water is degraded due to excessive nutrient inputs and is subject to algal blooms, the excessive production of aquatic plants and poor water quality. The bottom waters of such bodies are commonly deficient in oxygen and are not suitable for high quality fish species.

Otty Lake is a mesotrophic lake, and our great challenge is to stop it from deteriorating into the eutrophic category. Otty Lake is heavily populated and it does not need more nutrient inputs from any source. Vegetated lakeshore buffer strips inhibit the movement of nutrients into the lake and are one important way we can all help improve the water quality of the lake. Good water quality is essential to our use and enjoyment of the lake, and to the preservation of high property values.

This is a summary of the science behind these ideas. I hope you find it interesting.

### A little Geology:

Otty Lake is underlain by Precambrian rocks which belong to the Grenville province of the Canadian Shield. The rocks along most of the waterfront are metamorphosed sedimentary rocks called "paragneisses". My home on Baxter Lane is underlain by coarse grained, crystalline, white marble which is a metamorphosed limestone. These rocks have a radiometric age of about 950 Million years and are part of a physiographic feature called the Frontenac axis.

Along the eastern shore of the lake some beds of almost flat lying Paleozoic sandstone are exposed. This is the building stone that most of Perth was built out of. It is made up of cemented quartz (silica) grains. The reddish and yellowish tints in the whitish sandstone are iron materials in different oxidation states. The Perth sandstone is Cambro-Ordovician in age and is about 450 million years old. This bedrock mass is slightly fractured.

Otty Lake was glaciated during at least 4 major glacial ice advances and was at times covered by a thickness of as much as 1.5 km of glacial ice. The last major glacial period, called the Wisconsin, left Otty Lake about 11,500 years ago as it receded north

The north-east to south-west orientation of the Rideau lakes attest to the ice flow direction and the intense scouring of the bedrock it produced. This left the Otty Lake watershed with a very thin and very permeable soil cover. On my property the soil is very granular and is less than .5

metres thick. Rainwater flows into it and through it very readily. This is an important fact in the discussion of why we need to preserve and enhance vegetated shoreline buffer zones.

### A little Hydrology

Otty Lake receives water in at least four ways.

- Directly by rain and snowmelt,
- By the inflow of water from the lakes, streams and wetlands that make up the Otty Lake watershed,
- By springs (groundwater discharge areas). Groundwater is warm, and the spring on my property never freezes over and adds water to Otty Lake even during winter months.
- Near- surface groundwater flow.

The first three are easy to understand, but the last one requires some explanation. How does near-surface groundwater flow work?

### A little Hydrogeology

The upland rocky areas that surround Otty Lake are areas where rain and snowmelt infiltrate into the thin permeable soils that the glaciations left us. This process is called “groundwater recharge”. Once water has entered the soil horizon it either moves along the rock surface downhill towards and into the lake, or it enters into the fractures in the bedrock and moves downward until it reaches the water table. Fractured rock forms an “aquifer” if it holds and transmits water, and aquifers provide the water source for the wells drilled at homes within the Otty Lake watershed.

There are a number of sandy beaches along Baxter Lane. These beaches stay wet, even long after a rain event. This attests to the fact that significant amounts of groundwater discharge into the lake, after flowing downhill through the thin soils over the rock surface.

So what has groundwater got to do with vegetated shoreline buffer zones?

### Some ideas about the movement of contaminants:

Any chemical substances that we use on our properties that are water soluble will move with the near surface groundwater flow and will discharge into the lake along the waterfront. These substances include:

- Lawn and plan fertilizers (phosphorous, nitrogen and potassium compounds)
- Septic tank effluent
- Pesticides and herbicides used in our gardens
- Gasoline, solvents, and paints.

Let me outline one example. If you fertilize your lawn in the spring, you are adding nutrients to the lake and helping degrade the lakes water quality. Phosphate in groundwater is stopped as it flows through iron-oxide rich, reddish sand by a number of geochemical processes. However, there is essentially no attenuation of nutrients in the thin soils or in the fractured rock that surround Otty Lake.

### Nutrient uptake by plants

Certain native plants are very effective at cleaning groundwater as it moves downslope and discharges into Otty Lake. These attenuation processes include filtration processes in root systems and nutrient uptake. During my consulting career I built a number of constructed wetlands using native species to clean groundwater contaminated with leachate, sewage and substances such as gasoline. The idea works well!

Unfortunately ornamental plants are not effective in cleaning nutrient rich groundwater and the May 2007 "Report on the state of Otty Lake and its watershed 2007" states that over 40% of the Otty Lake shoreline have ornamental shorelines.

All that is required is a 1.5 metre buffer zone of natural vegetation along our shorelines. One option is leave the buffer zone to re-vegetate naturally, but a better and more aesthetic solution is to plant some of the species that are known to be excellent at nutrient attenuation.

There is an excellent list of native tree, plant and shrub species in the 2007 report. These species include plants such as Red Osier Dogwood, Large leaf Meadowsweet, Shrubby Willow, Virginia Creeper, and various grasses and wildflowers. These species are attractive, will not block your view of the lake or access to it, and are not expensive.

Why mow your lawn up right up to the lakefront anyhow? It is much more fun to sit down, drink a suitable beverage, watch your beautiful buffer zone flourish and know you are improving water quality and protecting your investment.

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