ASSOCIATION DU BASSIN VERSANT DU LAC
BLUE SEA

Assessing the Health of a Lake

Lake Science

Lake science is a relatively new discipline. It wasn't until the late 1960's that scientists began studying in earnest the negative impact of human activity on our water systems. With its bountiful supply of lakes and rivers, it is not surprising that Canada has played a major role in this research. In fact, it was through the work done at the Experimental Lakes Area (ELA) in northern Ontario that we learnt about the harmful effects of industry-generated acid rain and phosphorus on our waterways.

Complexity of the Task

Although we now know much more about the many man-made threats facing our lakes and rivers, there is still no simple way to assess the overall *health of a lake* or to predict its future. This is because a lake is a very complex system, with many factors affecting its health. Accordingly, a myriad of data must be collected and studied to determine its current and future state. These data include:

- ph (ie: alkalinity/acidity);
- transparency;
- turbidity;
- temperature;
- levels of phosphorus, chlorophyll a, oxygen, and calcium;
- fish population and reproduction;
- the presence of invasive species, algae, aquatic plants, and periphyton;
- and so on.

To complicate matters, due to the dynamics of a lake, data can vary significantly from one location to another and from one sampling to another. It is only by collecting a wide variety and quantity of data over a lengthy period of time can we have any chance of making a reasonably accurate assessment of a lake's health.

Conflicting Data

To make matters even more interesting, such assessments can vary dramatically depending on what data are used. No single indicator can tell us whether our lake is in good shape or not. In fact, we often encounter conflicting data when trying to make such assessments. For example, a lake can have very good transparency, phosphorus, and chlorophyll a readings but, at the same time, have subsurface rocks covered with thick layers of *periphyton*, be plagued by large beds of Eurasian milfoil, have a bottom blanketed by *decaying organic material*, and experience blue-green algae blooms.

If an assessment were based solely on the aforementioned transparency, phosphorus, and chlorophyll a readings, one could easily conclude that the lake in question was in good shape and had low levels of nutrient inflow. However such positive conclusions would conflict with the above-noted and worrisome physical phenomena. The need for caution when assessing the health of a lake is acknowledged by *RSVL* who qualify their own assessments by stating that a complete evaluation of the trophic state (ie: nutrient level) of a lake

cannot be based solely on physicochemical data (eg: phosphorus readings) but rather must take into consideration certain components of the coastline such as aquatic plants, periphyton, and sediment.

The occurrence of such conflicting data is quite common, even in our own watershed. Accordingly, one must be very careful when making pronouncements about the state of a lake.

The Association's Approach

Your association's approach is to be very circumspect when commenting on the health of our lakes. Instead, we:

- focus on expanding our collection of data so that we have a more complete picture of the situation;
- watch for any indications of potential problems or threats; and,
- concentrate our efforts on addressing such problems and threats before a situation gets out of control.

To be clear, all such problems and threats are of our own making. The natural lifecycle of our waterways is measured in tens of thousands of years. However, human interference can dramatically accelerate that process.

Blue Sea Lake

As a final word, Blue Sea Lake fits the "contradictory" profile mentioned above. Although the lake's RSVL results continue to be good, the lake does have periphyton covering its subsurface rocks, has large beds of Eurasian Milfoil and other aquatic plants, has a bottom blanketed - at least in part - with decaying matter, and has experienced blue-green algae blooms. It is for this reason that we continue to be concerned about the flow of human-generated nutrients (ie: phosphorus) into the lake. It is also why we ask that all residents ensure that their septic systems - the primary source of said nutrients - are fully compliant and functioning properly, and that they strictly follow the MRC regulations on shoreline protection.

As to the other lakes in our watershed, we currently do not have sufficient data to draw any conclusions. However, our approach to assessing their state and our advice to those living on these lakes would be the same.

In simple terms, a ***healthy lake*** is one in which the constituents of its ecosystem interact with each other and the surrounding environment in a such way that will sustain that ecosystem. An unhealthy lake is one in which the sustainability of its ecosystem is compromised. Source: Water Encyclopedia (Science and Issues) - Assessing Lake Health

Periphyton is a slimy mixture of green/brown fresh-water organisms and debris that clings to submerged objects. When covering subsurface rocks, it interferes with trout spawning. Its appearance, as well as the excessive growth of algae and aquatic plants, have been linked to an increase in a lake's nutrients (eg: phosphorus).

The phosphorus in ***lake bottom, decaying organic matter*** is insoluble. While in this state, it does not increase a lake's productivity (ie: the lake's ability to support algae and aquatic plant growth). However, this phosphorus can be converted to soluble form when lake sediment oxygen levels decrease and become anoxic (ie: oxygen depleted). This occurs when algae die and fall to the lake bottom. Once converted to soluble form, the phosphorus can be absorbed by plants and thus accelerate the eutrophication (ie: nutrient-induced aging) of the lake. Of note, the phosphorus from human sources enters the lake in soluble form and immediately contributes to a lake's productivity. (Source: "Phosphorus and the Kawartha Lakes by Michael White)

RSVL is a provincial program comprising a network of volunteers who monitor the health of their lakes. As explained on their website, this program was established in 2004 by the Quebec government to provide shoreline residents with a better knowledge and understanding of their lakes and to encourage them to become actively involved in its protection.