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LIVING

When algae bloom

With so many people now living year-round on lakeshore property, matters of water quality and algae are more important than ever

OUR CHANGING SEASONS
Drew Monkman

I was reading the other day about the brown "sludge" we sometimes see on river rocks in the seemingly pristine waters of early spring. Little did I know that this is usually created by colonies of diatoms, a naturally occurring form of algae. Diatoms, apparently, can actually colour the water shades of brown.

In recent weeks, the topic of algae has also come up in discussions about how the Otonabee River may be affected by the impact of the proposed Trent Rapids power development. According to Niblett Environmental Associates, the environmental consultants for Trent Rapids Power Corp, one possible impact of the project will be an increase in noxious populations of blue-green algae. In their Environmental Assessment Study Report, Appendix J, they warn that "a decrease in water velocity will likely lead to an increase in primary production in this section of the river resulting in more algae and aquatic macrophytes." They go on to say that "the slower flow may allow gulls, Canada geese and mallards to occupy this area during summer months." Finally, the environmental consultant warns that "the main longer term concern for water quality relates to the potential for increases in noxious populations of algae and benthos in the area between Locks 22 and 23 and the monitoring of Chlorophyll-a is recommended."

The inference here is that the combination of the slower flow in the reach of the river, along with increased nutrient (i.e. droppings) input from gulls, Canada geese and mallards will support the potential for increases in noxious populations of algae.

Not many of us are really familiar with what blue-green algae actually is or what threats it might represent. With so many people now living year-round on lakeshore property, matters of water quality and algae are more important than ever. This is especially true since, with spring finally here, our thoughts begin to turn to fertilizing our lawns and gardens. I therefore thought some background information was in order.

Algae are tiny aquatic plants that contain chlorophyll for the purpose of manufacturing food. They are usually green. They exist in many forms, from microscopic single cells to mass aggregates to forms that resemble higher plants. Ontario's waters are home to thousands of different species of these critically important organisms. Algae form the base of the food chain by converting nutrients into organic matter. If there were no algae, there would be no fish. Also, with one important exception, most algae do not produce substances that are toxic to humans. The exception is blue-green algae.

Blue-green algae, or cyanobacteria, are not algae at all. They belong to an ancient group of organisms that are most closely related to bacteria. However, like green plants, they rely on sunlight for energy through the process of photosynthesis. In fact, blue-green algae are given credit for the origin of plants. The chloroplasts that plants use to make food through photosynthesis are actually cyanobacteria living within the plant's cells.

Finnish Environment Institute photo

Algae bloom at a marina (left) and blue-green algae along the shoreline. Note the resemblance to pea soup.

Being bacteria, blue-green algae are quite small and usually unicellular. The reason we can see them is because they often grow in large colonies. They are naturally present in all aquatic ecosystems including lakes, rivers and streams. Many different species of exist, some of which can be quite toxic, as we'll see later.

Like many of the true algae, blue-green algae can become extremely abundant in warm, shallow surface water that receives a high amount of sunlight and increased inputs of nutrients, especially phosphorus and nitrogen. When this sort of super-charged algal growth occurs, it is referred to as a "bloom." Blooms discolour the water and often produce a floating scum on the surface. At times, the water takes on an almost paint-like appearance and consistency. Thick pea soup immediately comes to mind. The wind will often blow the algae into bays, making it all the thicker.

The colours involved in algal blooms can include shades of green, blue, brown and even red. Unpleasant tastes and odours are also associated with these blooms but do not in themselves mean that dangerous toxins are present.

Most large blooms in the Kawarthas occur in late summer or fall but can also happen earlier in a dry, hot year. And, with climate change, drier, hotter summers are to be expected. Species of the genus Microcystis — a potentially toxic group of blue-greens — are commonly involved at this time of year. A completely natural spring bloom of blue-green algae can also occur and become concentrated by the wind. In the spring, the algae feed on naturally-occurring inorganic nutrients brought into the lake by spring runoff. The species typically involved in spring is Aphanizomenon flos-aquae, a filamentous alga.

At the end of the growing season, the algae die. They then sink to the bottom of the water body, where they provide food for decomposers living in the bottom sediment and, in the process, use up oxygen in the water. In ponds and shallow lakes, severe oxygen depletion can cause large fish kills.

Blooms of true algae and those of blue-green algae are often confused. According to the Agriculture Culture Canada website, if you scoop a handful of the bloom with spread fingers and long, stringy masses are left dangling, it's most likely a true algae. If, after straining through your fingers, all that's left are bits and pieces sticking to your skin, it's probably a blue-green bloom.

Some types of blue-green algae produce toxins (poisons) that are released into the water when the algae die and break down. It has been demonstrated that these toxins make blue-green algae less appetizing to zooplankton that feed upon them. Some toxins produce allergic reactions such as rashes and eye irritation in sensitive people who come into direct contact with the toxins when swimming or showering. Other toxins have been found to affect the nervous system. This has been seen in animals that have ingested large amounts of water contaminated with blue-green algae. After ingesting the toxins, some have become paralyzed and died. Fatal poisonings have occurred among cattle, pigs, sheep, dogs, horses, and even waterfowl. It's important to keep pets and livestock away from water if a bloom has occurred.

Studies in the 1990s suggested that one type of blue-green algae, Microcystis, produces a toxin that promotes liver cancer. However, a direct link has not yet been established. Microcystis is often seen in late summer algal blooms in the Kawarthas. It may be responsible for bird and fish die-offs in the 1970s in the Great Lakes that were formerly blamed on pollution. Although municipal water can be treated to get rid of toxins resulting from outbreaks, blue-green algae have strong smells and tastes and can interfere with certain water treatment processes. Addressing these problems can end up being extremely costly to municipalities.

Although blue-green algae does not likely represent a direct health threat to most people, we should not underestimate the very negative aesthetic impact of these blooms. More than anything else, they make being around the water an unpleasant experience. Swimming becomes nearly impossible, and the bloom's unsightly appearance and often pungent smell make boating and fishing equally unappealing. The impact on tourism is potentially devastating.

Phosphorus, and to some degree nitrogen, are the limiting factors in algal growth. In other words, it is the nutrient that controls the abundance or scarcity of algae. These nutrients are found in detergents, fertilizers and in animal and human wastes. A great deal of phosphorus comes from agricultural sources such as through the spreading of liquid fertilizer. This was the most important factor behind last summer's blue-green algae blooms in Quebec.

So, what can we do to limit the frequency of blue-green algae blooms and avoid situations like what happened last summer when 200 lakes in Quebec were affected by major blue-green algae outbreaks? For anyone living near the banks of a lake or river, it is important to ensure that septic systems are updated and adhere to regulations, that you do not use fertilizer anywhere near the lake, that you stay away from dishwasher detergents containing phosphorus (as much as 20 per cent of phosphorus coming from homes can come from the dishwasher), and that you leave or create a 10 to 15 metre wide natural vegetation buffer strip between the lawn and the lake. Even something as simple as refraining from feeding waterfowl is important, since duck and goose droppings can also add a great deal of nitrogen and phosphorus to the water.

As for the Trent Rapids power project, we need to be sure before it's allowed to go ahead that the long-term health of the Otonabee River, the source of water for the city of Peterborough and an extremely important element in local tourism, will not be jeopardized. The Otonabee Region Conservation Authority, too, is very concerned about the multiple threats to the terrestrial and river environments of this project and has called for a peer review by senior scientists of the environmental assessment report prepared for Trent River Power Corp.

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