

## COMMENTARY

# The secret life of Lakes

## Part 2

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**A**S I mentioned in last week's article, bodies of freshwater can be placed into two categories, standing waters and running waters, with the focus being placed on the former. Standing waters can be defined as freshwater that is relatively still in a depression in the land's surface. Because of this relatively static nature, it is only natural that stratification takes place and with it different fauna and flora. Lakes are very unique in their characteristics and have their own flora and fauna; for example, Lake Baikal in southeastern Siberia is perhaps the oldest and deepest lake in the world with a depth of about 1,637 metres and contains many endemic species. Stratification in lakes is of two types, temperature and light.

However, in order to understand this more clearly one has to become acquainted with the different layers of water. They are basically the epilimnion, metalimnion and hypolimnion, which are the top, middle and bottom layers respectively.

The first type of stratification that we will look at is temperature stratification, which can take two forms normal or inverse. In the first form approximately the first two metres are heated by solar radiation. Therefore, the top layer is hotter than the hypolimnion due to lack of conduction of heat since no mixing occurs, which would readily occur in a running body of water. This increase in temperature of the epilimnion makes it less dense and it floats on the colder, denser hypolimnion. The point at which these two layers meet is fairly abrupt and a thermocline is produced. Oxygen diffuses into the water from the air; hence the oxygen concentration is highest at the top and decreases as one gets deeper, unless mixing occurs.

In the second form of temperature stratification - inverse stratification, the epilimnion is colder than the hypolimnion; there the top layer consists of ice which is colder than the bottom layers but floats due to water's unique ability to become less dense on freezing. In both these types of temperature stratifications, the presence of a thermocline prevents mixing of the layers. As a result there is no up dwelling of nutrients therefore low numbers of organisms would be present. Of course this does not exist in lakes in our climate.

The second type of stratification to be dealt with is that of light stratification. Light with long wavelengths are utilised in photosynthesis. Light does not penetrate all the way to the bottom and only the wave lengths that penetrate the upper layers can be used in photosynthesis, therefore, there will be an increase in primary productivity in the top layers.

Some other characteristics include water that is clear of suspended particles as they usually settle to the bottom. This in turn allows light to penetrate the water column and allow for the development of phytoplankton. Phytoplankton needs light to carry out photosynthesis and can be thought of as the plant component in this aquatic ecosystem. It is also the basis for zooplankton and over food webs. Turbulence is not good for phytoplankton as they are not strong swimmers and can be swept into areas where they cannot survive, for instance, areas with poor nutrient or light content.

One must also take into consideration the nutrients that supply this ecosystem will enter the lake from surrounding areas as run-off or as sub-surface flow, where the water enters from the soil just under the ground level. However, pollutants can enter lakes through run-off as well. In tropical lakes, nutrients are cycled at a faster pace due to increased rate of metabolism. Nutrients also tend not to be sequestered or deposited in the substrate.

With standing bodies of water stratification of the flora and fauna can take place horizontally and vertically. We dealt with vertical stratification in the first article. In this article we will deal with horizontal stratification. Horizontal veg-



tation around the edges of the lake will have the same effect as with a river or stream. The plants that are found in such ecosystems can be placed into four categories: emergent, floating, free-floating or submerged. Emergent plants are those that are rooted, with most of the leaves and stems above water, for example mangrove. Floating plants have just their leaves above water while free-floating plants have their root systems in the water. Finally submerged plants as their name suggests have their roots and stems in the water column.

When it comes to the fauna of a lake ecosystem, besides the microscopic fauna mentioned earlier, one instantly thinks of large animals such as fish, turtles or eels that are found in lakes and reservoirs (man-made lakes) in our country. But, some of the fauna found here are neither terrestrial nor aquatic, they are aerial, such as dragonflies. Other insects such as mosquitoes make this their breeding ground particularly stagnant areas near the shore. Larger aerial members of this ecosystem are birds, some of which may be migratory and visit for only part of