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Blue-green Algae – Making Water Dangerous

Hartbeespoort Dam, perhaps South Africa's most well documented case of a eutrophied water body.

In South Africa, we are highly dependent on surface water (rivers and dams) for our daily water supply. Pollution of these water bodies can have serious effects, such as eutrophication and the presence of algal blooms.

Nutrient enrichment (eutrophication) remains one of the leading causes of water quality impairment in the world. Agricultural and urban runoff, municipal and industrial wastewater effluents, and septic tank leach fields all contribute plant nutrients (such as phosphorus and nitrogen compounds) as well as other pollutions which eventually end up in our rivers and dams.

Water bodies that are eutrophic experience an increase in algae, especially cyanobacteria. Cyanobacteria (also

known as blue-green algae) are organisms with some characteristics of bacteria and some of algae. They are natural inhabitants of many inland waters, estuaries and the sea. A mass of cyanobacteria in a body of water is called a bloom. When you see a bloom of cyanobacteria in water, it will often appear blue-green (hence the common name). These blooms are not only aesthetically unpleasant but also release bad smells.

Extreme and prolonged eutrophication leads to the deterioration of water quality, taste and odour problems, oxygen depletion and decline of more desirable fish species. The resultant prolific growth in algae also disrupts water treatment, which means the water is more expensive and difficult to treat for drinking water purposes.

CYANOBACTERIAL TOXINS

Cyanobacteria are made up of cells, which can house poisons called cyanobacterial toxins.

Cyanobacterial toxins are usually released into water when the cells rupture and die. Many people have become ill from exposure to freshwater cyanobacterial

DID YOU KNOW?

Eutrophication and associated cyanobacterial blooms have been recognised as a problem for hundreds of years. The first recorded episode of animal poisoning attributable to cyanobacteria occurred in Australia in 1878.

WHAT DOES IT MEAN?

Algal bloom: A mass of cyanobacteria in a body of water.

Cyanobacteria: Simple, single-celled or filamentous organisms that are similar to algae in their photosynthetic abilities.

Cyanobacterial toxins: The natural produced poisons stored in the cells of certain species of cyanobacteria.

Eutrophication: The enrichment of water bodies (such as dams and lakes) with plant nutrients, particularly phosphorus and nitrogen compounds.

toxins, experiencing symptoms such as headaches, fever, diarrhoea, abdominal pain, nausea and vomiting. If you swim in contaminated water you may get itchy and irritated eyes and skin, as well as other hay fever-like allergic reactions.

Cyanobacterial toxins are deadly to animals. Most water-based poisonings by cyanobacteria occur when heavy surface growths or scums accumulate near shorelines of lakes and dams where animals have free access to high concentrations of these toxic cells.

One group of toxins produced and released by cyanobacteria are called microcystins

because they were isolated from a cyanobacterium called *Microcystis aeruginosa*. Microcystins are the most common of the cyanobacterial toxins found in water, as well as being the ones most often responsible for poisoning animals and humans who come into contact with the water.

It is important to note that the presence of cyanobacterial blooms do not always mean that the water is contaminated. About 30% to 50% of cyanobacterial blooms are said to be harmless because they contain only non-toxic species of cyanobacteria.

HISTORY OF CYANOBACTERIA-LINKED INCIDENTS IN SA

Local records of animals poisoning incidents that can be attributed to cyanobacteria date back to the 1920s, when mass mortalities of thousands of cattle, sheep, horses and rabbits living around pans in the north-eastern Free State and south-eastern Transvaal were reported.

The local farmers referred to the condition as 'pan sickness' and although veterinary officers from Onderstepoort suspected algal poisoning it was only after the construction of the Vaal Dam in 1938 that the causative link could be confirmed. As the dam filled, it flooded large areas of fertile farmland, resulting



Hyacinth, a water weed, is also associated with eutrophication.

in eutrophic conditions that triggered a bloom of cyanobacteria. This caused the deaths of thousands of animals on farms adjacent to the dam in the summers of 1942 and 1943. Since that time numerous cases have been reported involving wildlife, livestock, fish and bird fatalities.

Today, the Vaal Dam, as well as other dams known to be eutrophic (including Hartbeespoort, Rietvlei, and Roodeplaat dams) are monitored regularly by the authorities for any signs of algal blooms. Unfortunately, more people, more urbanisation and more industrial and agricultural activities mean more pollution, and eutrophication (with associated cyanobacterial blooms) seems to be on the increase.

REMEDICATION PROGRAMMES

At some dams remediation programmes have been launched in an attempt to improve the water quality. One such a programme is being undertaken at Hartbeespoort Dam.

Known as *Harties Metse A Me*, the remediation programme includes a range of activities to improve the state of the Hartbeespoort Dam. These activities include, among others, a resource management plan, which will determine the use of the dam; a monitoring programme to ensure water quality issues are addressed; restoring shoreline vegetation and placing booms in the dam to assist with physical removal of algae and hyacinth, a water weed. 



Eutrophication not only spoils the aesthetic appearance of a dam but negatively affects recreational activities such as water-sports and angling.