

## Algae and Blue Green Algae Remediation



### Blue Green Algae

Each year, our lakes, reservoirs, ornamental ponds and waterways, become infested with blooms of algae, which in the summer months can spawn the highly toxic 'Blue Green' variety.

The presence of 'blue green' algae in a body of water, poses a serious health hazard to humans and any aquatic or non-aquatic wildlife that lives in or feeds off the water.



Blue Green algae, has therefore been the subject of intensive study but thus far the exact mechanisms that trigger its formation, are not fully understood.

### The Causes

The bodies of water affected by algae blooms are usually static or slow moving and when the conditions are right, the algae can grow at an alarming rate turning it from a healthy ecosystem to a toxic environment.

- This usually occurs in the hottest months, so **water temperature and sunlight** are obviously part of the process.
- The 'blue green' blooms tend to occur near populated areas or in localities downwind or downstream of them, which suggests, that **pollution** contributes to the problem.

- Many of the outbreaks occur a few days after heavy rainfall that has come after a prolonged dry spell. This indicates that pollution from **rainwater runoff**, which adds fertilisers and hydrocarbons to the list of pollutants involved, could also be a contributing factor.
- As rain droplets form around **airborne particles**, a large variety of pollution sources could be implicated.

## An Ecosystem out of Balance

All eco-systems require balance to maintain their viability. They will tolerate a certain amount of pollution and climatic variation, but once these limits have been exceeded, the eco-system starts to break down. This is particularly true of slow moving or static water bodies where algae are part of the food chain. When conditions arise that allow it to grow faster than it is being consumed, algae “blooms” occur and the situation rapidly gets out of control.

What happens?

- Run-off from heavy rain makes the water murky and loads it with pollutants such as phosphates and nitrates on which algae thrive, but which are toxic to the other aquatic creatures that help to keep the algae under control. This tips the balance in favour of the algae.
- The algae blooms rapidly deplete the water of oxygen, which is essential for the fish and other members of the eco-system that feed on the algae.
- The algae now grow out of control and blooms progressively take over the water surface. The blooms and the murky water from the pollutants prevent sunlight from penetrating below the surface layers.
- The water surface now receives all the sun’s energy while none of the lower layers of water are being heated and a temperature inversion results. Thermal water movement ceases and no oxygenation of the lower water levels takes place. The bacterial micro systems gradually die off and an anaerobic dead zone occurs at the bottom of the water body.

The conditions for ‘blue green’ algae are now in place but the transition from algae to ‘blue green’ algae is so rapid and so toxic that precise diagnosis of the mechanisms involved has proved to be very difficult to achieve.

One crucial factor is that the ‘blue green’ algae only occur when extensive blooms of green or other algae are already present. Therefore, if a way of controlling the conventional algae blooms can be found, the ‘blue green’ algae could be prevented from forming.

## The Algae Treatments Required

- Algae prevention and removal of existing algae blooms.
- Improvement in water clarity to further prevent temperature inversions and anaerobic dead zones at the lake bottom.
- Enhanced growth of plants that process the pollution and provide food and shelter for the wildlife that feed on the algae.
- Enhanced growth of beneficial bacteria and other micro-organisms by reducing suspended matter to sub 4 microns particles to provide them with bite sized particles that they can easily process.
- Breakdown of the pollution from rainwater run-off into tiny particles to restore water clarity.
- Dampening of the reactivity of the pollutants to lessen the production of toxins in the eco-system.

## Solving the Algae Problem

As in any form of treatment, prevention is better than cure and Hydrosmart is a chemical free water treatment technology that not only prevents algae blooms from occurring, but progressively reduces existing blooms.

The Hydrosmart technology uses computer generated resonance frequencies to effectively neutralise the electron bonding mechanism by which all chemical reactions and crystal building takes place. This process changes minerals contained in the water supply into tiny sub 4 micron, non-reactive particles

The tiny particle size is highly significant as most algae and fungal formations need particles in excess of 6-8 microns to form on. When they lose this growing base they cease to feed or breed.

Hydrosmart it is widely used in vineyards and agriculture to de-scale irrigation systems, control salinity, and enhance plant growth. It was in the vineyard dams and reservoirs that Hydrosmart's ability to control algae first came to light. These dams are particularly prone to algae blooms and it became apparent that algae was not forming in the treated dams and existing algae was progressively being removed and no longer clogging up their irrigation filters and drip lines.

The following photographs show the successful treatment of algae in the Burra Creek in the township of Burra South Australia, following the installation of 2 Hydrosmart systems.



**Before**



**After**

The creek in the centre of this township very popular with tourists was almost constantly covered in a "carpet" of algae and after researching the algae treatment options available, decided to install Hydrosmart. Following are some of the comments made by the council's parks and gardens officer, whose responsibility it is to manage the creek environs:

*"Within a short time of the installation the water was noted to be "foamy" which indicated to me that things were starting to happen. I then noted that the algae was starting to lift from the bottom of the creek bed, rising to the surface. Although this made it look as though the problem wasn't getting any better, flushing the creek via the sluice gate showed that there was much less algae than there appeared. Approximately two to three months after the installation the creek was practically algae free, giving tourists and residents almost crystal clear water as part of their creek views. These units have also prevented any further outbreaks of algae."*

## Water Clarity

One of the first effects to be observed is a dramatic improvement in water clarity. This is due to all the minerals and chemicals present in the water being reduced to 4 microns or less. These tiny particles do not absorb or scatter light and therefore allow a large proportion of it to pass through.



**Before**  
pH 7.2 TDS 2270 DO 5.9



**After**  
pH 7.9 TDS 2270 DO 6.7

The water clarity achieved in the above photographs, is due to the particle size reduction. This particular water comes from a bore at One Tree Hill and was treated with Hydrosmart for 24 hours as part of tests to assess its ability to pre-treat the water for use in aquaculture.

## Conclusion

Both these abilities will be needed if we are to provide long term and sustainable solutions to the control of algae blooms. The ability to dampen down chemical interaction will go a long way towards neutralising the effects of chemicals and other pollutants that will inevitably find their way into our water systems, as long as we have rainfall. The ability to rapidly restore water clarity after these have taken place, will allow the sunlight to penetrate the lower levels of the water body and restore thermal circulation required by the smallest members of the eco-system. This will restore the health of the whole body of water and prevent the algae from forming blooms and the subsequent temperature inversions. Without large algae blooms, the conditions under which 'blue green' algae forms will probably not occur.