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# Algae Control Methods to Prevent Algal Blooms

There are four main algae control methods; chemicals, aeration, mixing and ultrasound. Using the right method, will help you to keep a healthy, well-balanced water body. Excessive cyanobacteria (blue-green algae) and green algae growth in lakes and reservoirs can have negative

consequences for the water quality. The water turns green, sand filters can clog, and some algae can produce geosmins and MIB, giving the water an 'earthy' and 'malty' taste. This blog post provides a complete overview of algae growth conditions and four main control methods, including a chemical-free algae solution.

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## What is algae control?

Algae control are actions taken to manage algae problems. The long-term management of algae should at least involve reducing nutrient inflow into the water body. However, long-term nutrient reduction requires extensive changes in policies and human activities and therefore take many years for significant improvement in water quality can be seen. There are some short-term **treatment options** available for managing algae problems such as aeration, chemical or biological additives or ultrasound technology.

A preventive measurement that can be taken is the **real-time monitoring of essential water quality parameters and algae indicators**. Real-time monitoring of water quality parameters related to phytoplankton dynamics such as Chlorophyll-a, phycocyanin, Temperature, DO, pH, Turbidity, and Redox is essential for short-term forecasting of potentially harmful algal blooms. These parameters provide direct and indirect information about the concentration of algal biomass in a waterbody. Once a bloom is predicted, it is easier to anticipate an algae bloom and take preventative measures.

### Chemical-free algae solution

LG Sonic technology provides an environmentally friendly solution to monitor and control algal blooms in large water surfaces.

Treat large water surfaces

Reduce chemical usage

Safe for fish, plants and other aquatic life

[Learn more](#)

## Algae growth conditions

In all water bodies, a basic level of algae is present. These algal concentrations belong to the normal lake ecology and are important for the ecological balance within the water. However, when a specific **algal type starts growing exponentially**, it can suffocate other organisms within the water that are important for a balanced lake ecology, causing a deterioration of the water quality, and eventually massive deaths of fish and other aquatic organisms, creating an imbalance in the lake that may result in reduced levels of dissolved oxygen, reduced plant growth and altered pH levels.

### What causes algae to grow?

Favourable conditions for blue-green algae are stagnant water in combination with high temperature and high concentration of nutrients (**nitrogen and phosphorus**) in the water. Especially in the summer months, when the water temperature increases, the concentration of algae can grow exponentially. Water in raw water reservoir is often stagnant, the lack of circulation of the water can cause the algae to over-compete other organisms in the ecosystem and thus create massive algae blooms.

Even if new nutrients cease to be introduced into the water body, the biochemistry of a pond or lake is such that, due to the laws of growth, decay and gravity, eutrophication will not be stopped. This is because of an internal phosphorus cycling; the plant food never leaves. Further introduction of nutrients related to human activity, such as agriculture, will increase the level of eutrophication. A gradual increase of eutrophication is a natural process for any lake, but when it escalates beyond a certain level it causes virtually irreversible changes to the ecosystem. This again provokes the release of nutrients stored in the bottom sediments, and the process accelerates.

**“Excessive algae growth can be caused by nutrient pollution, high temperatures, low turbidity, and/or slow-moving water.”**

## Ultrasonic Algae Control

Ultrasound technology reduces algae up to 90% and prevents the growth of new algae.

Reduce chemical usages. Environmentally friendly. Low operational costs.

[Learn More](#)

## Algae problems

Excessive **cyanobacteria (blue-green algae)** and green algae growth in a water reservoir can have negative consequences for the water quality. Cyanobacteria- also known as blue-green algae- cause problems when blooming in lakes, ponds and reservoirs. Toxins from cyanobacteria have caused many instances of fish kill and death of domestic animals. They can also cause illnesses, paralysis in humans and some are suspected to be involved in the occurrence of liver cancer. Where surface water is used for drinking purposes, cyanobacteria may also endanger the supply, because toxins and odorous metabolites can dissolve in the water and escape conventional treatment, giving rise to health issues and taste and odor problems to the water.

**“Blue-green algae cause problems when blooming in lakes and water reservoirs, such as health issues, fish deaths, and odor problems.”**

## Types of algae

Algal growth occurs in three basic forms:

- Planktonic
- Filamentous
- Macrophytes

Planktonic algae are single-celled, microscopic algae that float freely or in colonies in the water. They can turn the water green or to other colours, including yellow, brown or red.

Filamentous algae are single celled algae which form together long hair like mats.

Macrophytes algae resemble true plants in that they appear to have stems and leaves.



The three basis forms of algal growth: Planktonic, filamentous and Macrophytes algae.

## Algae control methods

The presence of **cyanobacteria is a severe and global problem**. When it comes to lakes or bigger ponds, the current methods all have their advantages and disadvantages. While some methods are environmentally unfriendly (Algaecides), other methods are expensive (Aeration). The next chapter will also explain the new concept of combining real-time water quality monitoring, web-based software and ultrasound to monitor, predict and control algal blooms in large water surfaces. To treat and control the growth of algae, current options that are commonly used include the following four main methods:

1. Chemicals
2. Aeration

3. Mixing
4. Ultrasound

## 1. Chemicals

Chemical intervention involves treating the water with a variety of additives, such as alum, lanthanum, or any other products that precipitate or sequester the ionized orthophosphates. Aquatic herbicides used to treat algae are called algaecides and are often copper-based compounds, such as copper sulfate, copper chelate complexes or the chemical Endothall. Care must be taken in the use of algaecides because they can cause algal cell rupture, which can result in intracellular toxins being released into the water reservoir. A rapid decay of an algal bloom may result in the release of high concentrations of algal toxins into the water. In addition, the potential long-term effect of chemicals on the ecological balance of the entire lake is a serious factor that needs to be considered.

## 2. Aeration

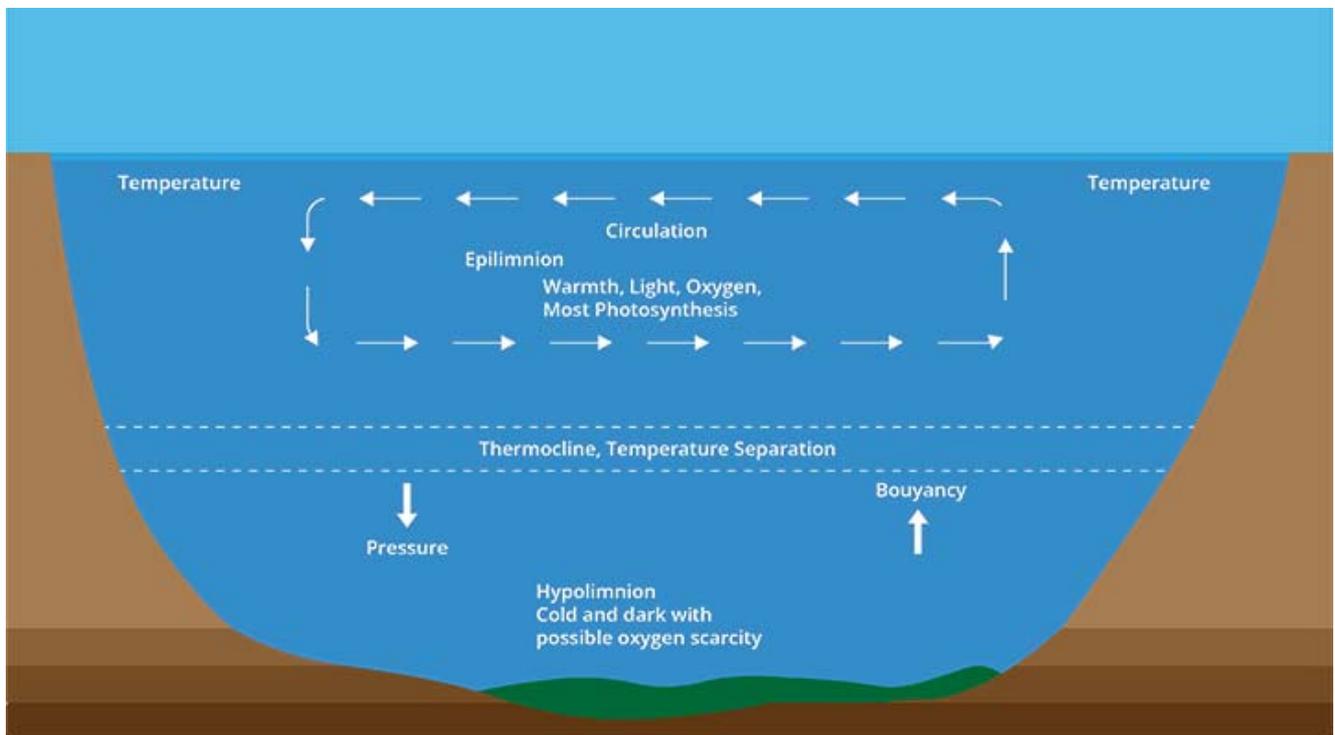
Aeration is used to increase the level of oxygen in the water. Aeration is an environmentally friendly technique to maintain and rejuvenate water bodies. To eliminate chemical use and create a healthy ecosystem, aeration systems can be used. It is important to maintain healthy levels of dissolved oxygen in your pond because the oxygen aids in the breakdown of decaying vegetation and other nutrients that find their way into the water.

This breakdown of the bottom silt is carried out by microorganisms where the water meets the soil. The decomposition is carried out by both aerobic and anaerobic bacteria. Aerobic decomposition requires a continuous supply of oxygen and proceeds more rapidly as dissolved oxygen concentrations are near saturation levels. The primary result of aerobic bacteria decomposition is carbon dioxide. Anaerobic decomposition is slower than aerobic decomposition, and the end products are organic compounds such as alcohols and foul-smelling organic acids.

The disadvantages of this technology are the high costs for maintenance (labor costs) and energy use. Since aeration does not kill the algae directly, the efficiency of this technology against algae is not always certain.

## 3. Mixing

The main function of mixers in a reservoir is destratification, which is a process in which the water is mixed to eliminate stratified layers (Epilimnion, Metalimnion, Hypolimnion: see figure below) and make it less favorable for algae growth in certain layers.



To control algae effectively, it is usually advised to circulate Epilimnion and Metalimnion to keep iron, manganese, and anoxic odors that commonly occur in the Hypolimnion layer away from the surface water.

The disadvantage of the mixing or circulation of water is often the high maintenance required to the systems regarding wear and tear, and the fluctuating results the systems can have on algae blooms.

## 4. Ultrasound

Ultrasound are sound waves with frequencies higher than the upper audible limit of human hearing (22 kHz). At specific frequencies, these **sound waves can be used to control algae growth (video)**.

Cyanobacteria use gas vesicles for buoyance and depth regulation. During the day, algae are photosynthesizing in the top layer, using carbon dioxide and dissolved nutrients from the surrounding water to produce oxygen and polysaccharides. At night, the cyanobacteria cells empty their gas vesicles (vacuole) to sink to the bottom and use oxygen and nutrients to produce biomass.

Ultrasound waves create a sound layer in the top layer of the water. The sound layer has a direct impact on the buoyancy of the algae. The algae cells will sink to the bottom and are unable to photosynthesize and eventually die due to a lack of light.



The MPC-Buoy uses four ultrasonic transmitters for complete 360 algae control in lakes

**Controlling algae with ultrasound** is a well-established technology that has existed for many years. It is an environmentally-friendly technology that is harmless to fish and plants. It is, however, important for the efficiency of the technology that specific frequency programs be used, based on the type of algae that requires controlling. Due to the adaptability of algae during seasons within a lake, the ability to change these ultrasonic frequencies is of **importance for long-term algal control**.

**“Low power ultrasound is safe for fish and other aquatic life.”**

## Summary of different control methods



Algicide



Aeration



Mixing



Ultrasound

<ul style="list-style-type: none"> <li>• Effective</li> <li>• Fast results</li> </ul>	<ul style="list-style-type: none"> <li>• Increased oxygen levels at the bottom improve the ecological balance of a lake</li> <li>• Environmentally friendly</li> </ul>	<ul style="list-style-type: none"> <li>• Prevents stratification</li> <li>• Environmentally friendly</li> </ul>	<ul style="list-style-type: none"> <li>• Environmentally friendly and cost-effective</li> <li>• Can be used for large water surfaces</li> </ul>
<ul style="list-style-type: none"> <li>• Can be harmful for the environment</li> <li>• Needs frequent dosing for long term effect</li> </ul>	<ul style="list-style-type: none"> <li>• No direct effect on algae</li> <li>• Expensive</li> </ul>	<ul style="list-style-type: none"> <li>• High in maintenance</li> <li>• Reduced efficiency depending on the water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Can control up to 90% of the algae</li> <li>• Takes some weeks before you can see the results</li> </ul>

Summary of different algae control methods

## Chemical-free algae solution

There are various ultrasonic solutions available to treat smaller water areas (up to 200 meters/650ft). The devices comprise floating systems with transmitters that emit ultrasound waves underwater in order to control common types of algae. For larger water surfaces such as drinking water reservoirs, there are products available based on solar powered buoy constructions, for example, the **MPC-Buoy**. The MPC-Buoy, developed by the Dutch company LG Sonic, is a solar-powered platform that makes use of continuous **water quality monitoring** to control algae with ultrasound.



The MPC Buoy installed in a lake in the Netherlands

Within a body of water, physicochemical parameters, water flow, and microorganisms present can differ. The type of algae can vary and even change during the season. To use ultrasonic waves effectively, it is important that specific ultrasonic frequencies be used. LG Sonic uses scientifically proven ultrasonic frequencies to control many types of algae. The size of an algae cell, its morphology, and the general water quality determine the frequency necessary to control algae. It is therefore very important to monitor the water quality (Chlorophyll a, Phycocyanin, Turbidity, DO, pH, Redox, temp) to predict an algal bloom and to identify what kind of algae is growing and effectively base the ultrasonic treatment on that.

**MPC-View**  
Water monitoring software



MPC-View software provides real-time water quality monitoring for effective ultrasonic algae control.

The MPC-Buoy provides a complete overview of the water quality by collecting the following parameters every 10 minutes:

- Chlorophyll  $\alpha$  (green algae)
- Phycocyanin (blue-green algae)
- pH
- Turbidity
- Dissolved Oxygen
- Temperature

The collected data is delivered in real time via radio, GPRS, or 3G to a web-based software platform. Based on a developed algorithm, LG Sonic is able to modify the ultrasonic program to the specific water conditions and predict an algal bloom a few days ahead. Depending on the information received, the ultrasonic program can be modified to address the water conditions and type of algae present. In this way, it is possible to eliminate existing algae and prevent algal blooms.

The University of Portsmouth, UK; UNICET Catania, Italy; and BOKU, Austria found that LG Sonic units are safe for fish. LG Sonic devices have been tested to determine their effect on zooplankton, and no negative effect was found.

**“At this moment LG Sonic is running MPC-Buoy projects in more than 15 countries worldwide.”**

## LG Sonic ultrasonic algae and biofouling control

Since 1999, LG Sonic has been a leading international manufacturer of algae control and biofouling prevention systems. Our products provide an environmentally friendly solution to effectively control algae in lakes, reservoirs, treatment plants, and other applications. Over the last decade, more than 10,000 LG Sonic® products have been successfully installed in 52 different countries.

### **90% blue-green algae reduction using sound waves**

In Auckland, New Zealand, ultrasonic sound waves reduced blue-green algae by 90 per cent. [Learn more.](#)

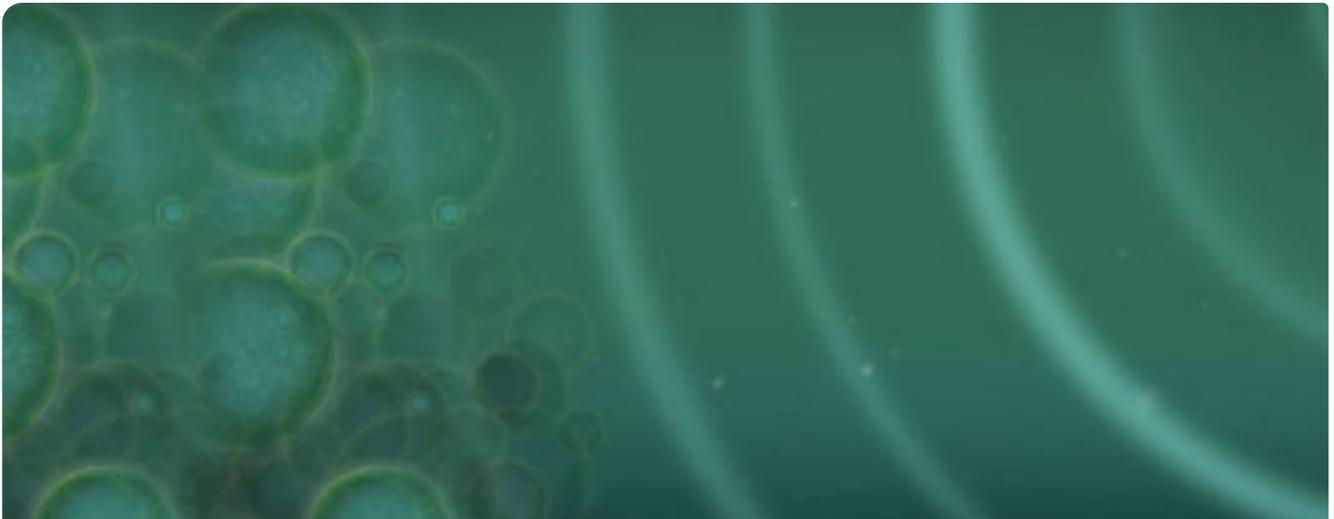
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