

Removing Algae and Controlling Biofilm Formation in Wastewater and Water Treatment Plants



WaterIQ
Technologies™



Ultrasound technology is a proven, cost-effective and reliable solution to rid harmful algae and biofilm from wastewater and water treatment plants that face the challenges of aging infrastructure, labor shortages, and complying with strict regulations.

The Challenge – Algae and Biofilm Threatening Plant Productivity and Cost-to-Operate

Water contamination has become a pressing global issue, primarily caused by excessive nutrient inputs, particularly nitrogen and phosphorus. These nutrients promote the growth of algae, some of which produce harmful toxins, leading to water contamination. The Environmental Protection Agency (EPA) estimates that nutrient pollution from algae blooms results in significant financial losses running into billions of dollars annually.

The problem is further exacerbated by the effects of climate change. Toxic blue-green algae and biofilms thrive in warm, slow-moving water, leading to a rise in their occurrences.

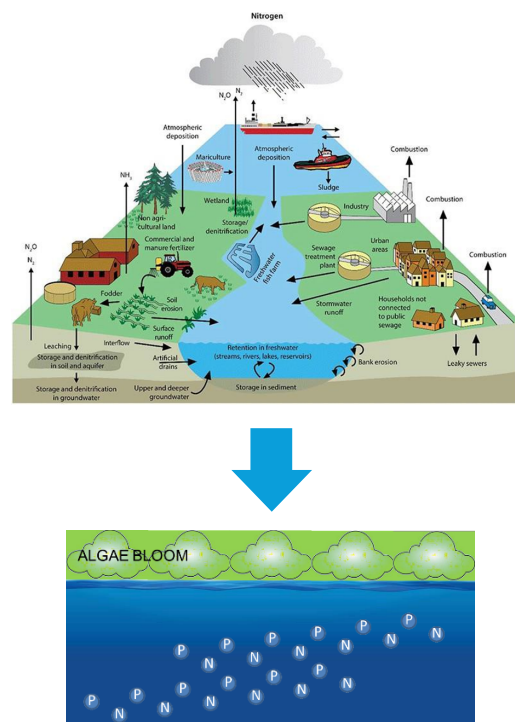


Fig. 1 (left) Excess Nitrogen and Phosphorus can overpower an ecosystem and drive rapid growth of Blooms.

The Problem is Accelerating

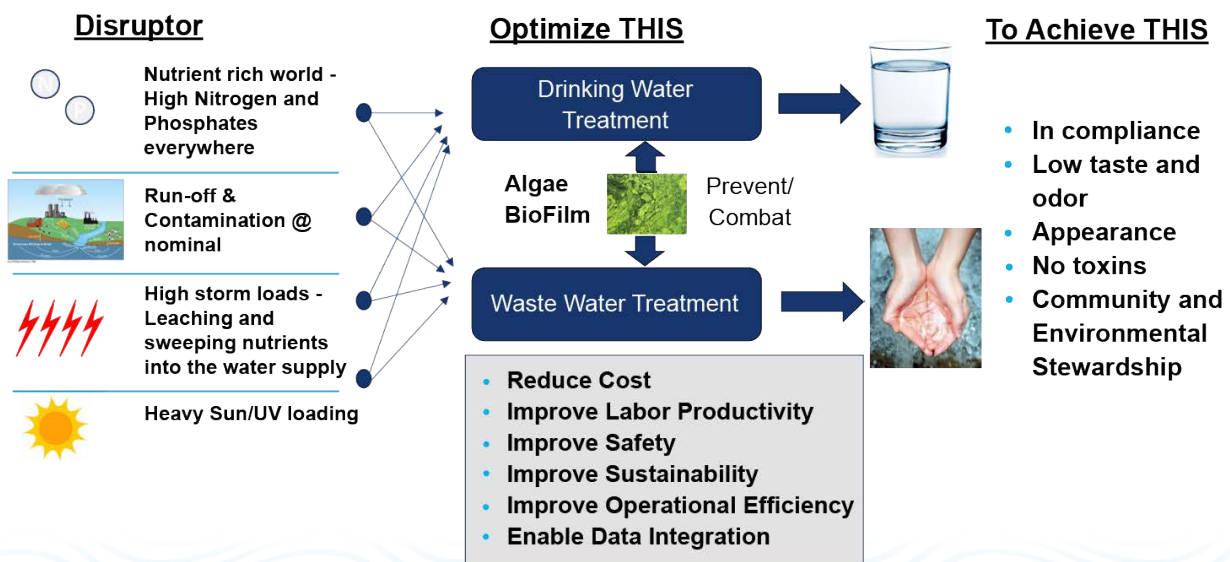
- Intense weather events, such as flooding and turbidity issues, are followed by an increase in harmful algal blooms during warm seasons. The factors contributing to this phenomenon include excessive rainfall, nutrient run-off, and higher water capacity in reservoirs and lakes.

The Problem is Accelerating (continued)

- Nutrients are released due to the abundance of rainfall, flooding urban areas, countryside, golf courses, and agricultural lands, ultimately finding their way into lakes, streams, and rivers.
- Harmful algal blooms are triggered by fertilizers and herbicides containing high levels of nitrogen and phosphorus.
- Upwelling and turnover within lakes create opportunities for HABs to feed on nutrient-rich water rising to the surface during certain weather events.
- Flooding in lakes also releases excess nutrients into the water column, enabling the growth of algae and cyanobacteria.

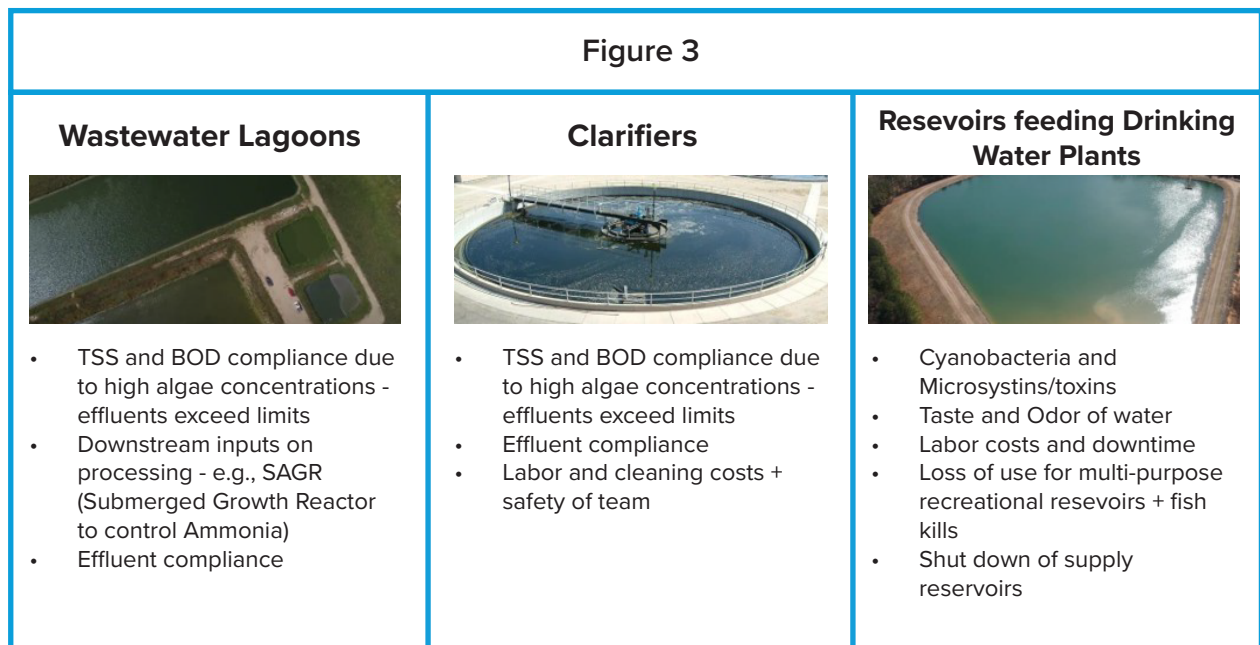
For professionals in wastewater and drinking water management, the increase in nutrient levels poses significant challenges in meeting regulatory compliance, and community water standards. This results in added labor costs, as teams are stretched thin to clean clarifiers, basins, and treat ponds and lagoons. Moreover, there's a rise in material costs for chemicals and downstream processing to address compliance issues and cater to the community's demand for clean, safe, clear, and visually appealing water.

Fig. 2 *The challenge for water processing professionals.*



There are three main areas where algae impact water systems: wastewater lagoons, clarifiers, and inbound drinking water reservoirs sourced from rivers or other bodies of water. Biofilm issues, on the other hand, predominantly affect clarifiers and basins, causing equipment fouling, Total Suspended Solids (TSS) problems, and compliance issues. Non-compliance with TSS and Biological Oxygen Demand (BOD) regulations in wastewater systems incurs substantial fines, leading to the use of costly downstream systems, like Submerged Growth Reactors (SAGR) or chlorination, to address upstream problems. In drinking water, the presence of toxic blue-green algae poses health risks to both humans and pets while also affecting the taste and appearance of water.

Figure 3 illustrates the primary points of impact in a processing plant, including wastewater lagoons, clarifiers and reservoirs.



Other locations in a processing plant include:

- **Raw water** reservoirs and lagoons
- **Sedimentation Basins**
- **Finished Water Tanks**
- **Polishing Ponds**
- Any location where **bio-fouling** interferes with operation

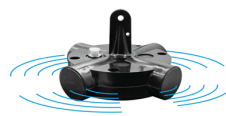
A widespread water problem in urgent need of an efficient solution

The task of wastewater treatment systems is formidable, involving the collection and treatment of used water and sewage, followed by the return of clean, treated water to water sources for reuse. This mission is heavily regulated, whether managed by public or private entities, such as municipal plants, local governments, outsourced companies, power plants, oil refineries, or manufacturing facilities with onsite wastewater treatment. In the United States alone, there are over 16,000 publicly owned treatment works (POTW), 155,000 Public Water Water Systems (PWS) and about 27,000 privately owned drinking water systems providers necessitating an efficient solution to address this substantial challenge.

Ultrasound technology offers a reliable solution for algae control, requiring minimal manual intervention and ensuring safety during application. With its proven effectiveness in eliminating algae, ultrasound technology now incorporates sensors to assess water health and intelligently report findings to personnel who can remotely monitor changes and respond promptly when necessary.

How Ultrasound Works

- Uses ultrasonic sound waves at precise frequencies to target simple cellular structures within Algal cells, disrupting their cellular mechanisms and rendering them disabled.
- Algae sinks to the bottom, gradually dying without releasing harmful toxins.
- Chemicals are not needed in this process.
- Capable of operating 24/7, powered by either AC or DC, or solar supplies.



Critical Structural Resonance targets specific frequencies that cause a cell or structure to vibrate – it does not require a lot of power (<30 W), but does require fine granulation and precision of frequencies.

- Equipped with cloud monitoring and remote capabilities to enable automated remote support and water quality monitoring.

How Ultrasound Works (continued)

Regarding Biofilm:

- The soundwaves mimic water turbulence, impeding the bonding and growth of anaerobic bacteria, which serves as the foundation for biofilms and algae buildup.
- Ultrasound prevents the easy formation of the anaerobic layer, thereby averting the development of aerobic bacteria layers on top.

Fig. 4 (right) *How Ultrasound combats Algae.*

Sound waves are emitted in a 360° pattern, 24 hours/day.

4400 discrete frequencies in 2 bands focused on Green and Blue-Green Algae.

Gases permeate the outer membrane walls, reducing buoyancy, but not releasing toxins.

Disrupts the inner cellular mechanisms, including buoyancy for Blue/Green Cyanobacteria

Algae sinks to the bottom, where toxins are reduced over time as the cell gradually dies.

No impact on beneficial aerobic bacteria or phosphorus release that can contribute to new blooms.

Scan or Click Here to See the Animation Live!

Ultrasound complements water oxygenation and the use of beneficial bacteria in tackling heavy nutrient loading and biomass accumulation at the bottom of water bodies. In many cases, ultrasound alone can effectively resolve these issues. Depending on the condition of your water, a combination of ultrasound with beneficial bacteria or aeration might be the most suitable approach to promptly address your concerns.

When it comes to algae remediation, only ultrasound offers a direct and powerful solution without harmful chemicals. The combination of ultrasound and other methods can sometimes fully resolve your issues.

By implementing ultrasound in the Clarifier, downstream process steps can experience reduced levels and loads, leading to improved overall water quality and better outcomes. Moreover, it achieves these results at the lowest operating cost, enabling you to meet your operating plan successfully.

Placement of an Ultrasound Unit in a Clarifier

WaterIQ's Pulsar 3000 and 4000 can be deployed multiple ways using different sources of power, including connecting directly to AC sources, or DC sources, land based or floating Solar power systems. In a clarifier, the optimum location is typically alongside the weir and down 2-3 ft into the water.

Fig. 5 Deployment Options

Waste Water Processing - Clarifiers



Pulsar units are deployed along the edges - to prevent and combat Biofilm formation - ensuring clear operation.

- Free up your costly team by eliminating biofilm cleanup and allowing them to focus on plant operations.
- Act now to eradicate biofilms before they jeopardize your plant's productivity.
- Cut down compliance costs associated with downstream treatment.
- Easily deploy the solution in Clarifiers, Settling Tanks, and Lagoons.

Drinking Water - Reservoirs and Plants



Pulsar unit deployed with a Sentinel AIQ Solar-powered float system with optional water quality probes.

- Prevent algae before it blooms
- Kill algae when it blooms
- Protect your water
- Protect your community

It will be a tough year for algae

This year, your Drinking Water and Wastewater Treatment Plants are at risk of significant harmful impacts from Blue-Green and Green Algae, caused by record rainfall and stormwater runoffs carrying excessive nutrient pollution to your facilities. To begin addressing this issue, it's crucial to measure nutrient loading in your water and understand the algae's profile - knowing your enemy is vital.

Ultrasound technology from WaterIQ Technologies™ offers a sustainable, round-the-clock solution to combat, prevent, and drastically reduce the harmful effects of biofilms and algae without resorting to harmful chemicals or overutilizing your limited resources.

The next-generation Ultrasound technology by WaterIQ Technologies™ comes with a host of benefits, including:

- Optimization and precision for maximum impact on algae and biofilms, with 4400 frequencies in our next generation of product.
- Sustainability, ensuring long-term effectiveness.
- Chemical-free operation, ensuring environmental safety.
- Complementarity with beneficial bacteria applications.
- Continuous 24/7 operation.
- Cloud monitoring with live dashboards for real-time insights.
- Targeting of biofilms, toxic blue-green and green algae, as well as the highly damaging Golden and Red Algae.

Check out what's possible!

Fig. 6 *Teton Pines Audubon Course - 45 days*

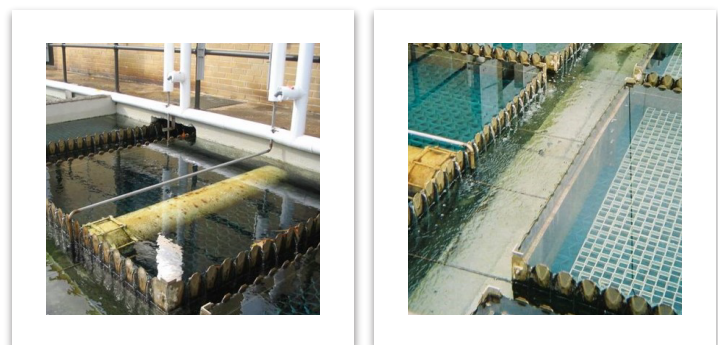
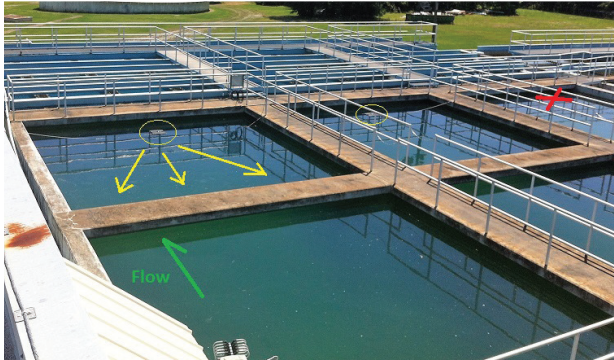


Fig. 7 *Union City reduction in cleaning from 2-6 weeks*

What Customers Say



Searcy, AK - Water & Sewer Systems

“From an operator’s standpoint, nothing can touch it. It’s not chemical. There’s no residual product to test. It’s not a continual cost. There are no maintenance issues. We just plug it in and forget it. It’s easy to do.”

Scotty Boggs, Searcy Arkansas Drinking Water Utility

Syracuse Water Treatment



“WaterIQ Technologies’ Pulsar 4000 has demonstrated to be effective in controlling blue-green algae in the SWD’s open water reservoir in 2022 on algae without resorting to chemicals and proven effective in controlling blue-green algae. The Pulsar family represents the industry’s next-generation ultrasonic algae defense system designed for performance and field reliability.”

Rick Abbott, Syracuse Drinking Water Utility

Learn More

To learn more about WaterIQ Technologies™ products and partners, please scan the QR code below or give us a call.



**Scan or Click me
to learn more!**