BiOWiSH® TECHNOLOGIES

Case Study

BiOWiSH® Aqua & Aqua FOG

BiOWiSH® Aqua and Aqua FOG Contribute to Improved Water Quality in Baihetan National Wetland Park in Sichuan, China

Baihetan National Wetland Park

Executive Summary

Beijing NARI Yihe Environmental Technology Co., Ltd, an authorized distributor of BiOWiSH® water treatment products in China, helped to improve water quality at Baihetan National Wetland Park, the most beautiful park in Chengdu, Sichuan.

By implementing a comprehensive one-month treatment program and a five-month operation and maintenance period, the algae outbreaks were controlled, and water clarity and quality indicators improved significantly with the help of BiOWiSH® Aqua and Aqua FOG.

Background

About BiOWiSH Technologies
Headquartered in Cincinnati, Ohio, BiOWiSH Technologies, Inc. is a global provider of biotechnology solutions for the agriculture, aquaculture and environment management industries. BiOWiSH® technology helps industries and governments leapfrog conventional, costly, and capital intensive treatment technologies for more cost-effective bioaugmentation solutions for the natural treatment of waste and surface water. BiOWiSH® provides a safe and natural means to speed up natural degradation processes in surface water bodies resulting in rapid organic matter degradation, effective nutrient (N & P) management and long-term improvements in water clarity and dissolved oxygen. For more information, visit biowishtech.com.

BiOWiSH® Aqua & Aqua FOG

- Rapid nitrification and indentrification in aerobic and anaerobic conditions
- Rapidly reduces fats, oils, and grease
- Reduces sludge production and handling
- Increases plant capacity
- Reduces odors
- Reduces aeration requirements
- Reduces need for chemical additives
- Improves plant stability
- Reduces hydrogen sulfide, ammonia, and nitrates
- Pre-treats influent in collection systems
- Natural and non-toxic

Available Sizes

- 100 g/3.5 oz
- 1 kg/2.2 lbs
- 5 kg/11 lbs
- 10 kg/22 lbs

About Baihetan National Wetland Park
Baihetan National Wetland Park is located in Huaqiao Street, Xinjin District, Chengdu city, with a scenic area of about 1.07 square kilometers. The name Baihetan is “land of white crane,” which means cranes are easily found in this area. Since 2022, it was rated as a national AAAA-level tourist attraction and is the only “National Wetland Park” in Chengdu. Its idyllic landscapes are surrounded by water, bridges, and various animals and herbs. The type of river-sandbar wetland in the scenic area has extremely high ecological value, and it is a proud representative of the wetland system of Sichuan, forming hundreds of wetland beaches and ecological meadows, which is a natural “kidney of the city”.

Figure 1: Baihetan National Wetland Park

Algae Growth in Baihetan Wetland Park

In April 2021, a type of algae started to grow rapidly, and it covered the whole area of the park, 80,000 m^2 and volume of 120,000 m^3, in a very short time. The park’s multiple attempts at various water treatment technologies, including manual salvage and chemical treatment, proved to be ineffective and the algae recurred quickly.

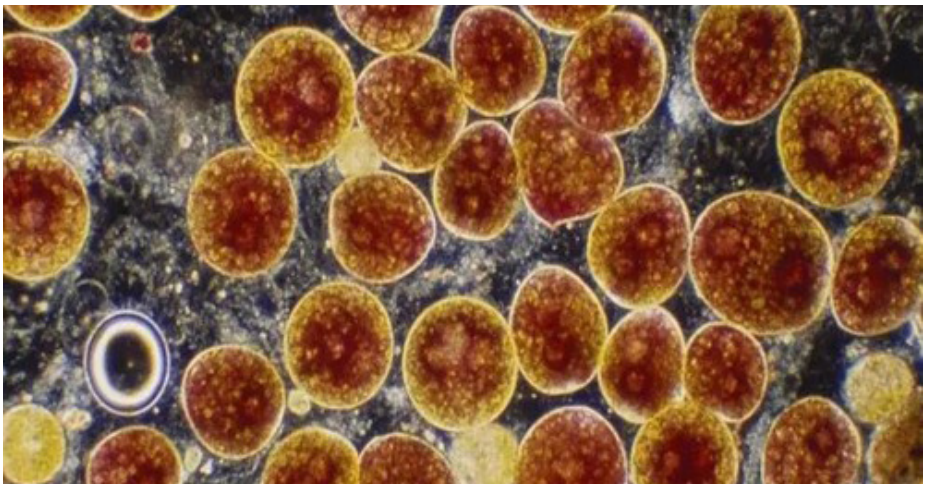
Figure 2: Rapid Algae Growth

Objectives

In November 2021, BiOWiSH distributor and local partner, Beijing NARI Yihe Environmental Technology Co., Ltd, was invited to enter the park to begin water bioaugmentation services. The remediation program included a unique microbial solution, BiOWiSH® Aqua, and algae automatic capture equipment (solar). By implementing these technologies as a comprehensive program, the algae was controlled and water clarity improved significantly.

Figure 3: Highlighted Areas of Algae Growth of Baihetan Wetland Park

Figure 4: Microscopic Image of Euglena Sanguinea Algae Present in Baihetan Wetland Park Water Source



After sampling and analysis, the algae type is determined as “Euglena Sanguinea.” It typically exists in stagnant water bodies with high nutrient levels. The ideal growth condition also includes temperatures within 26 to 28° C and pH between 6.5 to 8.5. Because of the strong phototropism, Euglena Sanguinea can be accumulated easily and presents as a strong red or brownish red color (Figure 2).

This wetland park has a water source from a discharge of a Sewage Treatment Plant (STP) with a daily input of 20,000 m^3. In some circumstances, the Total Nitrogen (TN) of the effluent is extremely high due to the ineffective biological unit in the STP. Based on the theory from Rainfield, the N/P ratio at 10 sampling points in this park varied from 35.2 to 113.4, which is much higher than the Rainfiled standard N/P ratio of 16. It can be concluded that TN is the major factor of the algae overgrowth, not the N/P ratio. The TN is mainly from the sludge layer of the park.

Implementation Program

The implementation program was based on the need to address rapid growth of bare algae in the wetland park area, the release of sediment pollutants, the weak self-purification capacity of the wetland system, and the difficulty of operation and maintenance.

This program was designed in accordance with the principles of in-situ treatment (on-location), improving water bodies for both short and long term. The use of biological technology and integrated automatic collection technology were implemented to improve and restore water quality, while significantly reducing labor maintenance requirements. Extreme conditions such as heavy rainfall and sunlight were also taken into consideration when designing this water treatment program.

Table 1. Summary of The Technologies

Methods	Implementation	Targets
BiOWiSH® Aqua	Treatment Period: 2 ppm, once/day Maintenance Period: 0.2 ppm, 3 times/week	Promote microbial diversity to lower free N and P species in the water column
BiOWiSH® Aqua FOG	Treatment Period: 2 ppm, once/day Maintenance Period: 0.2 ppm, 3 times/week	Accelerate bioaugmentation reduce algae oil
Biological Flocculant from NARI Yihe	2 ppm, once/month	Improve water clarity
Integrated Automatic Algae Collection Equipment (Solar)	The use of Automatic Algae Collection Equipment (3) covers the whole area	Increase cleaning efficiency, reduce manual labor cost

Application Method

During the treatment period (1 month), the target dose of BiOWiSH® Aqua and BiOWiSH® Aqua FOG was 2 ppm each, on a daily regime, to help shift the biology in the pond to reach the tipping point for remediation. Solid product was dissolved into fresh water (ratio of 1 kg product to 30 L water) and uniformly sprayed over the surface of the water using a backpack sprayer along with a boat to cover most of the key areas.

Following that, the maintenance period (5 months) consisted of 0.2 ppm of Aqua and 0.2 ppm of Aqua FOG three times per week, applied in the same manner. Biological Flocculant from NARI Yihe was also added to the maintenance schedule at 2 ppm on a monthly basis to improve water clarity. In addition to that, an "Integrated Automatic Algae Collection Equipment" was applied to collect and remove the debris, algae and other trash on the surface. The equipment is powered by photovoltaic cell, and it can generate continuous water wave by disturbing and filtering the solids into the storage tank to be collected and removed. This automatic system can work continuously, and it is more efficient than traditional manual cleaning and maintenance on the water surface.

Figure 5: Application Method

Table 2. Technical Parameters

No.	Parameters*	Average Before Treatment, mg/L**	Average After Treatment , mg/L***	Change %	Target	Notes
1	COD	42.85	19	**56% Decrease**	≤20mg/L	Standard III
2	NH3-N	0.96	0.236	**75% Decrease**	≤1mg/L	Standard III
3	TN	10.85	5.57	**49% Decrease**	30-50% Down	-
4	TP	0.13	0.079	**39% Decrease**	≤0.2mg/L	Standard III

** Water Sampling Sources: 4*

*** Sampling on Sep 9, 2021*

**** Sampling on April 1, 2022*

Results

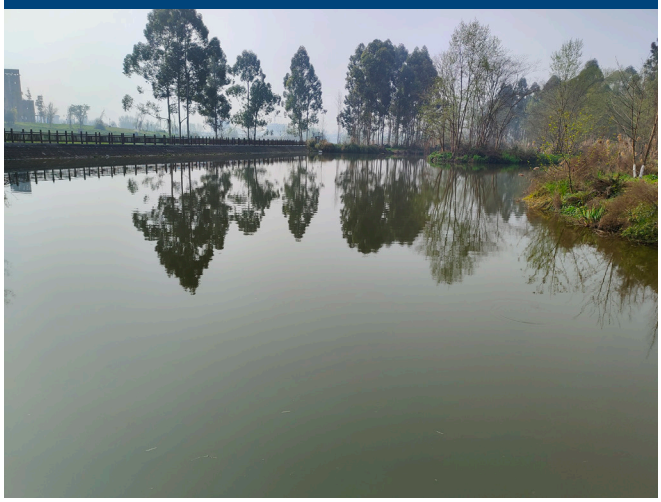
After a one-month treatment period and a five-month operation and maintenance period, the water quality indicators were comprehensively improved, and TN, COD, and NH3-N are in level of Standard III of China.

Through bioaugmentation, water remediation and sludge in-situ treatment, this biological system has been enhanced and improved effectively.

Figure 6: Before and After Treatment Side-by-Side Comparisons

BEFORE: 10-29-2021

AFTER: 03-08-2022



Conclusion

The successful water treatment implementation program contributes to the AAAA tourist attraction. If you are visiting Baihetan Park today, you will see a beautiful, diverse and colorful wildlife along with clean water bodies. You can enjoy a wonderful afternoon with your family and friends in this land of idyllic beauty.

Figure 7: Current Conditions of Baihetan Wetland Park

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