# What Is Cyanobacteria?

— A Beginner's Guide to Lake Taihu's Cyanobacteria

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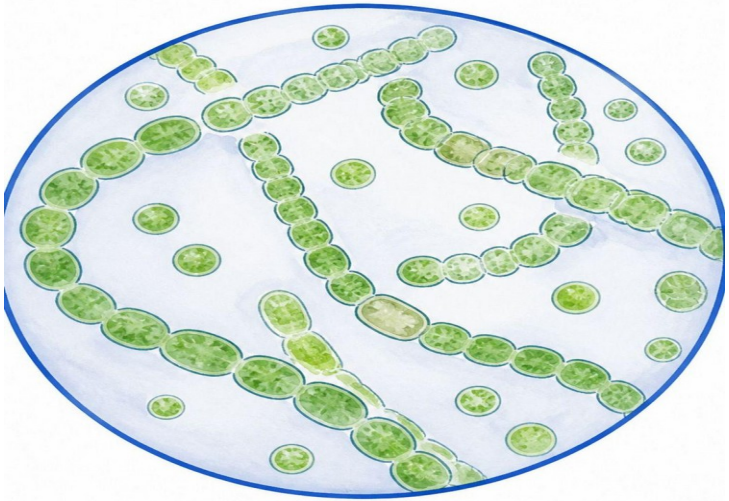


# What Is Cyanobacteria?

### The Most Primitive Algae

Also called blue-green algae — the simplest, most primitive type of all algae.

### One of Earth's Oldest Organisms

Around for about 3.5 billion years; roughly 2,000 known species, with about 900 recorded in China.

### The Star of Freshwater

About 85% live in freshwater, multiplying rapidly in summer (June–September).

### The “Algal Bloom” Phenomenon

Forms a blue-green, foul-smelling scum on the water surface — a “bloom.”

# The “Good” Side of Cyanobacteria

## Oxygen Producer

A photosynthetic organism — early Earth's atmospheric oxygen came mainly from cyanobacteria.

## Base of the Food Chain

Provides a food source for aquatic life through photosynthesis.

## Nitrogen Fixation

Many species carry nitrogenase and can fix atmospheric nitrogen directly, boosting soil fertility.

## A Human Food Source

Spirulina has 15× the protein of soybeans, plus abundant carotene and vitamins.

# Why Did Cyanobacteria Become a “Problem”?

### High Water Temperature

At 25–35°C, cyanobacteria outgrow other algae and become the dominant species.

### Nutrient Overload

High nitrogen and phosphorus levels from accumulated industrial and agricultural pollution around the lake.

### Wind-Driven Buildup

Prevailing southeast winds in summer blow cyanobacteria across the lake to collect in Wuxi's waters.

# Why Do Lake Taihu's Blooms Get So Severe?

## A Large, Shallow Lake

Lake Taihu averages just 1.9 meters deep, so water exchanges very slowly.

## Sediment Keeps Releasing Nutrients

Wave action repeatedly stirs nutrients out of the lakebed sediment and into the water.

## Rising Buoyancy Brings Blooms to the Surface

Once cyanobacteria form colonies their buoyancy rises; when winds calm, they float up and form blooms.

## Wind Piles Them Up Along the Shore

Surface blooms get blown into shoreline bays, such as Wuxi's Meiliang Bay.

# Harms of Cyanobacteria Blooms

## Ecological Harm

→ Large-scale surface coverage blocks sunlight, suppressing photosynthesis in other aquatic plants.

→ When cyanobacteria die and decompose, they consume large amounts of dissolved oxygen, causing fish and shrimp to suffocate.

→ Aquatic biodiversity drops sharply and the water turns foul and smells.

## Health Threats

→ About 50% of bloom-forming cyanobacteria produce microcystins (MCs), released when algal cells rupture.

→ Long-term consumption of toxin-contaminated water may lead to liver cancer.

→ Contact with contaminated water can cause skin irritation and eye irritation.

→ Eating contaminated seafood can cause headaches, fever, diarrhea and other symptoms.

# The 2007 Wuxi “Tap Water Crisis”

> *A million residents “sat beside Lake Taihu with no water to drink.”*

1. **Massive Cyanobacteria Bloom**

   Large-scale blooms erupted in bays like Meiliang Bay, releasing toxins and odor-causing compounds.

2. **Water Intake Contaminated**

   The tap-water intake sat right in the contaminated waters; tap water smelled of rotten eggs.

3. **A Million Residents Cut Off**

   The whole city fell into a water crisis; residents rushed to buy bottled water.

4. **The Inevitable Result of Accumulated Pollution**

   This was not a “natural disaster,” but the inevitable result of decades of pollution.

# Methods for Controlling Cyanobacteria

### Source Control (Most Fundamental)

Reducing external nitrogen and phosphorus loads into the lake, and cutting internal pollution from sediment.

### Physical Methods

Manual harvesting, water diversion, and aeration to raise oxygen levels.

### Ecological Restoration

Restoring submerged plants, managing fish populations, and building lakeside wetlands.

# Treatment Results — In the Data

## ↓26%

Drop in Total Phosphorus

0.120 mg/L (2005–2020) → 0.089 mg/L (2021–2025)

## ↓60%

Drop in Total Nitrogen

3.71 mg/L (2006) → 1.56 mg/L (2025), down nearly 60%

## 15 Rivers

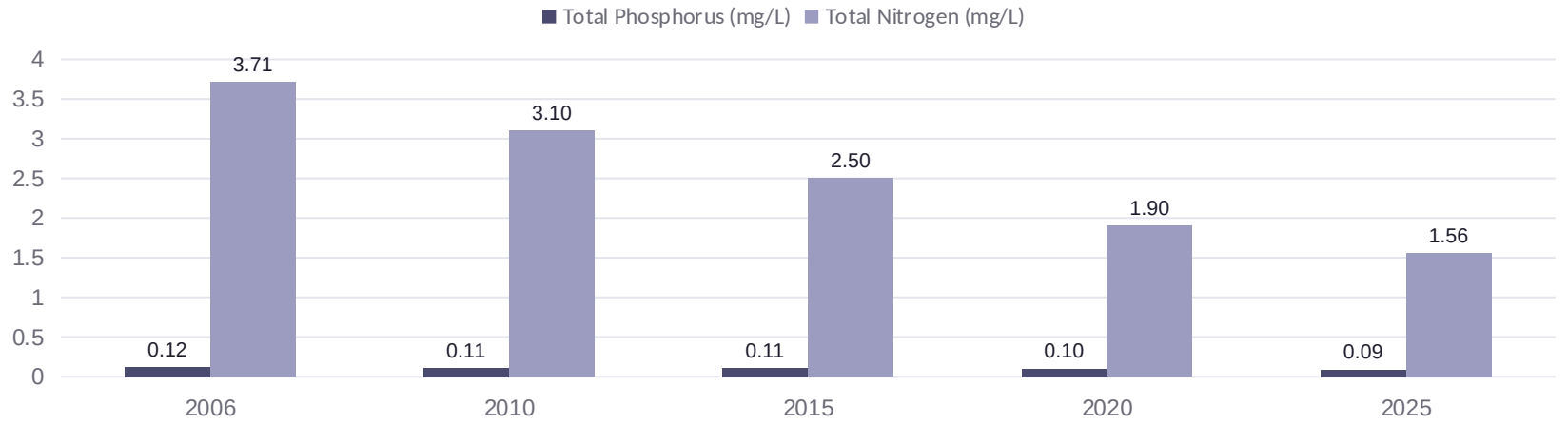
Meeting Standards

All 15 rivers flowing into the lake now meet Class III water quality.

## 18 Years

of Consecutive Safe Summers

18 straight years without a water crisis — treatment is clearly working.



# What Can We Do?

Treating cyanobacteria isn't only the government's job — everyone is a guardian of Lake Taihu's ecology.

### Reduce Household Pollution

Save water, use fewer phosphate detergents, and sort household waste.

### Watch Agricultural Runoff

Support green farming and cut excess fertilizer and pesticide runoff into water bodies.

### Spread Scientific Knowledge

Understand what causes blooms, view water issues rationally, and share accurate knowledge.

### Protect Lake Ecosystems

Don't dump trash into the lake; support wetland protection and ecological restoration.

*Lake Taihu's future depends on the choices we make today.*