MOLEAER

CONFIDENTIAL

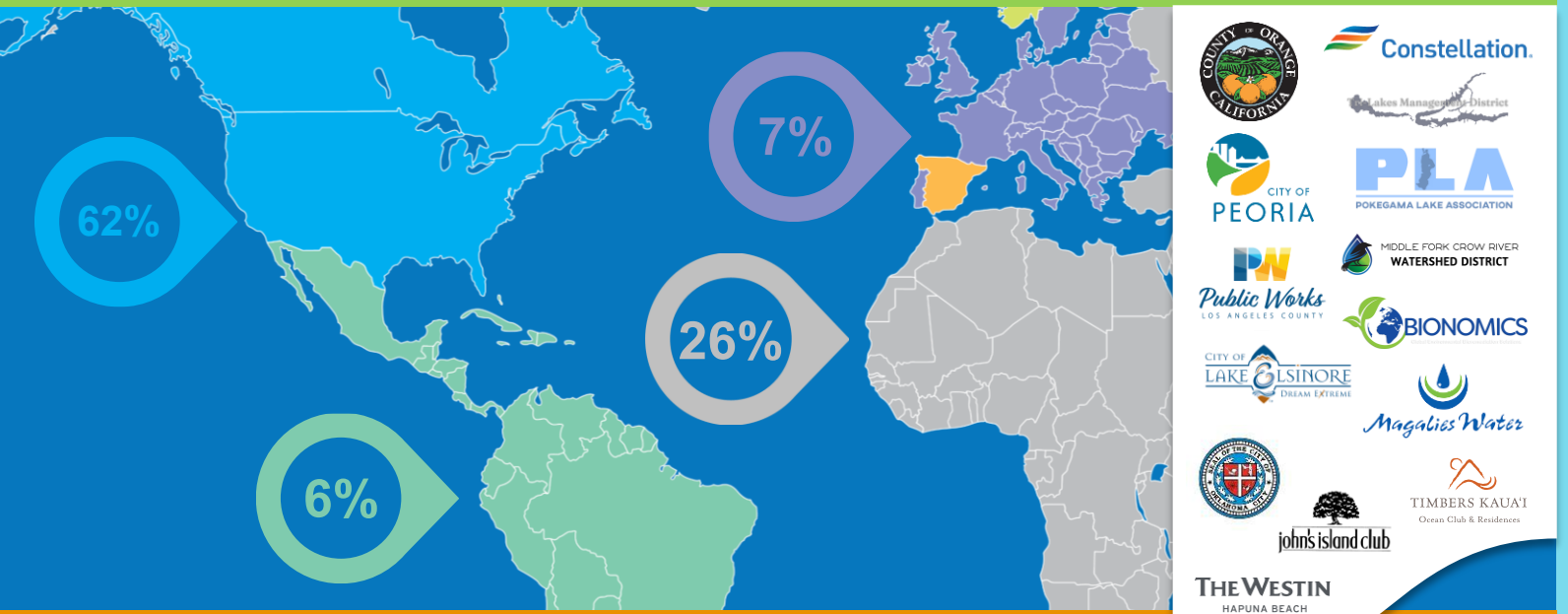
April 2025

Restore Waterbodies Sustainably

with Moleaer nanobubble solutions

Over 4,000 Nanobubble Installations

650+ Nanobubble Installations in Waterbodies & Waterways



Constellation.
CITY OF PEORIA
PLA POKEGAMA LAKE ASSOCIATION
MIDDLE FORK CROW RIVER WATERSHED DISTRICT
Public Works LOS ANGELES COUNTY
BIONOMICS
CITY OF LAKE ELSINORE DREAM EXTREME
Magalies Water
TIMBERS KAUA'I Ocean Club & Residences
johns island club
THE WESTIN HAPUNA BEACH RESORT

The Moleaer Difference

- Leader in nanobubble science and it's applications
- Largest R&D and Application Development teams with over 15 PhDs:
  - Investigating nanobubbles and their impacts in various applications
  - Developing prescriptive solutions and monitoring plans
- Largest NB treatment installation and customer base globally

Surface Water Team

Dr. Denise Devotta
Senior Limnologist

Chris Stephan
Global Director of Surface Water

Shane Hoyt
Limnologist

Clint Hanson
Business Development Manager- Western US

Jon Morales
Business Development Manager- Central US

Erin Klores
Business Development Manager- Southeast US

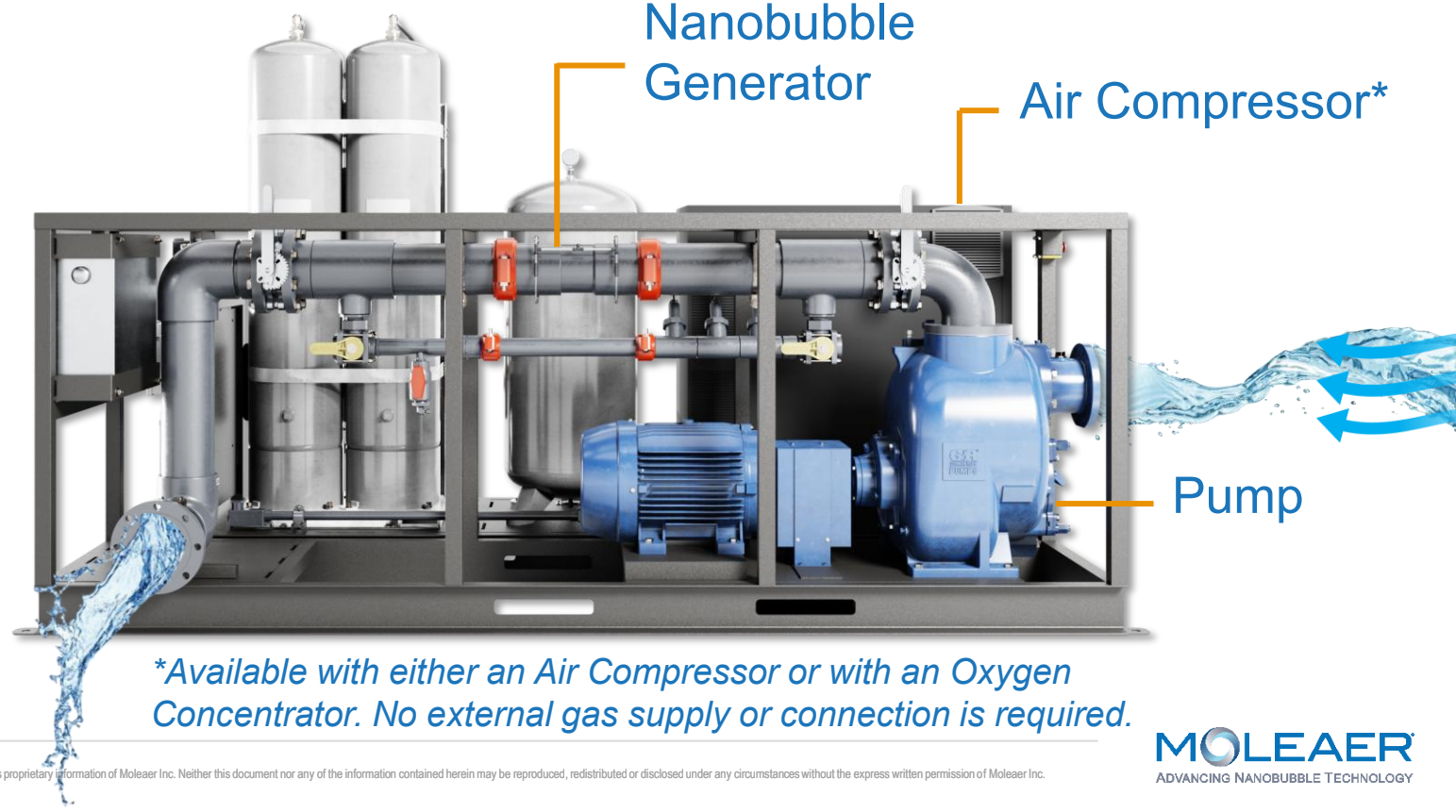
MOLEAER ADVANCING NANOBUBBLE TECHNOLOGY

Moleaer's Patented Technology

Scalable for any size waterbody:
100's of installations over 1000 GPM

Introduces **dissolved oxygen** and **nanobubbles**:

- Most cost-effective way to provide critical dissolved oxygen to waterbodies
- Nanobubbles deliver the oxygen to the bottom where it is needed most
- Promotes natural lake recovery processes



**Available with either an Air Compressor or with an Oxygen Concentrator. No external gas supply or connection is required.*

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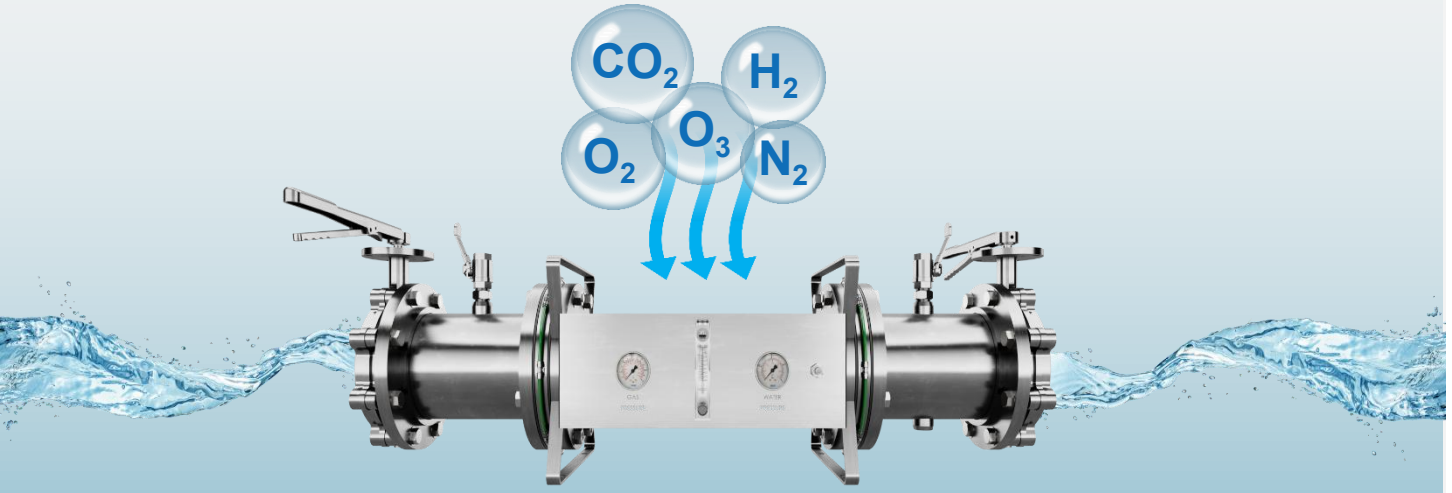
Moleaer's Nanobubble Generator

Best-in-class Oxygen Transfer Efficiency | Scalable, Versatile Easy-to-Install Technology



Moleaer's patented technology introduces two forms of gas into water: **Dissolved and Nanobubbles**

Dissolved Oxygen

Dissolved Oxygen = amount of oxygen in water.

Moleaer's technology **dissolves oxygen** with best-in-class efficiency in any depth.

Nanobubbles

Charged gas nanoparticles, 1/1000th thickness of hair.

They do not rise, **do not easily dissolve**, improve gas stability, and catalyze physical, biological, and chemical reactions.

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Lake Elsinore, California

From Closure to Clarity

About the Waterbody

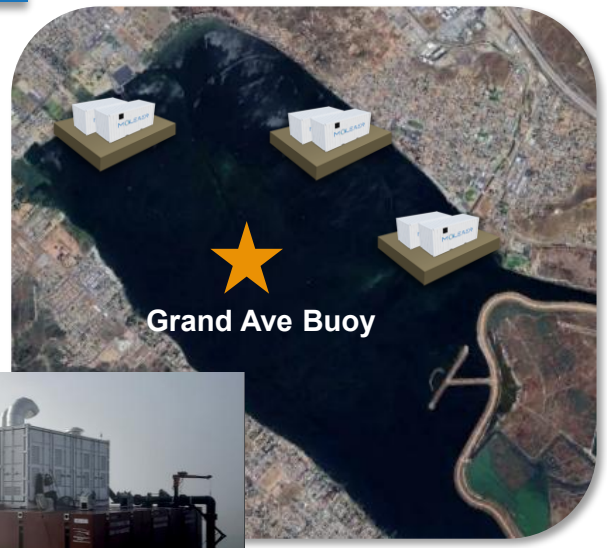
- Surface Area: 3,311 acres (1334 ha)
- Max Depth: 24 ft (7.3 m)
- Volume: 30K acre-feet (37 million m^3)
- Receives 6.5M GPD (24k m^3) of treated effluent

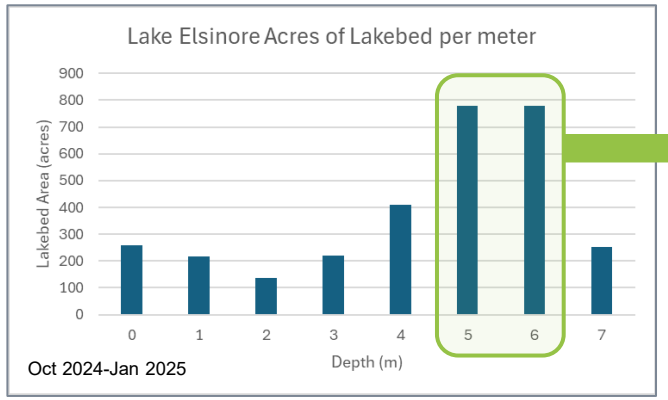
Challenges

- Recurrent lake closures due to HABs
- Poor clarity & high nutrient loading
- Economic impacts for community
- Inefficient, outdated aeration system

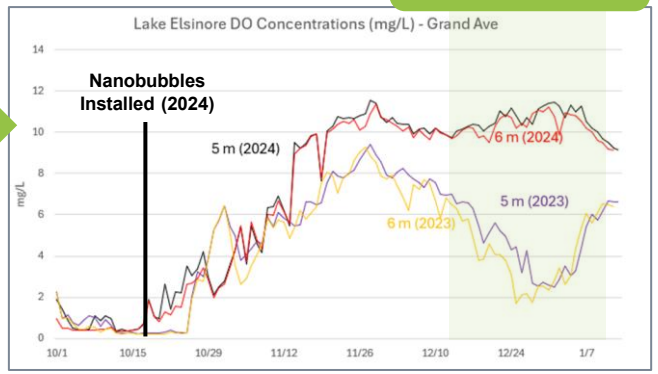
Results: (1) 2,400 GPM (545 m^3/hr) & (2) 4,500 GPM (1022 m^3/hr) Nanobubble Barges

- Significant reduction (50-90%) in early-season cyanobacteria levels
- Up to 7,000% reduction in turbidity (highest water clarity reported in 2 Years)
- Elevated DO sustained at critical depth, > 2,000 meters from nearest nanobubble unit





Seasonal DO decline did not occur with NBs



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Tadd Lake, Minnesota

Pilot: Major Improvements Compared to Control

About the Waterbody

- Surface Area: 10 acres (4 ha)
- Max Depth: 8 ft (2.4 m)
- Volume: 50-acre-feet (61,714 m^3)
- Terminal lake, connected to Upper Lake (surface area: 25 acres (10 ha)

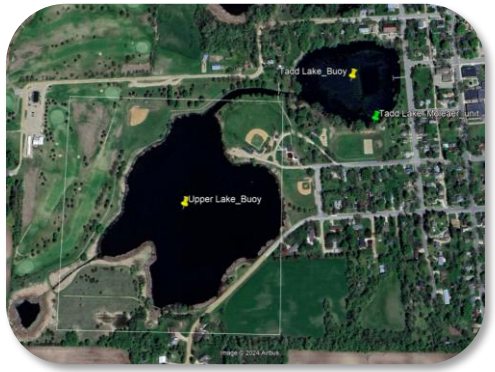
Challenges

- Poor water clarity
- Excess algae growth and odor issues
- Invasive aquatic plant proliferation
- Unable to use recreationally
- Legacy poor water quality issues

Results: 1,000 GPM (227 m^3/hr) Trailer

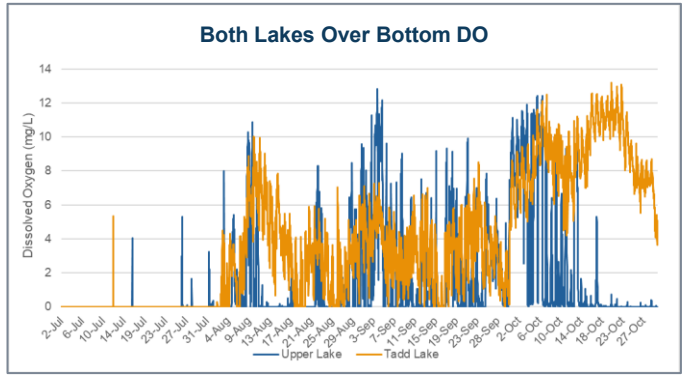
Compared to Control Lake:

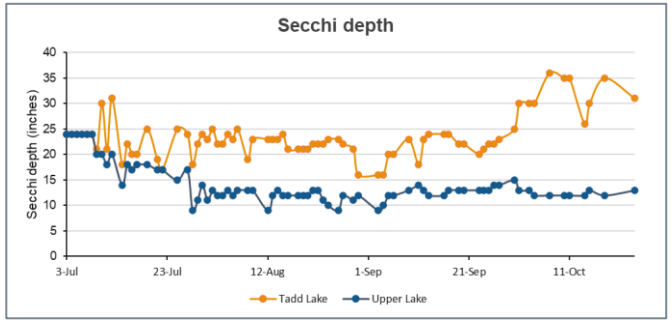
- > 2x clearer
- 2x higher over bottom DO
- ~ 4x lower orthophosphate levels
- > 4x less total algae loads



Nanobubble Pilot:

- July 2 – Oct 24, 2024
- Upper Lake: Control site





	> 3 mg/L (fish struggle)	> 1 mg/L (fish die)
Tadd	65%	88%
Upper	25%	25%

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Lake Arrowhead, Wisconsin

Pilot Marina Shows Remarkable Results in 75 Days

About the Waterbody

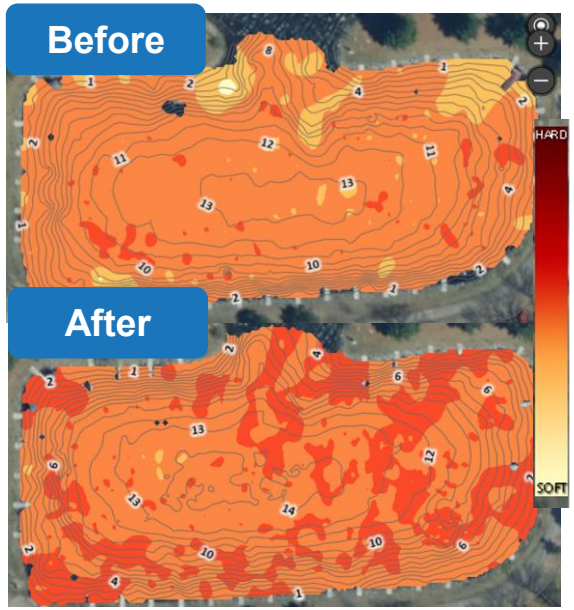
- Marina Surface Area: 2 acres (0.8 ha)
- Lake Surface Area: 300 acres (121 ha)
- Flowing Lake System: 900 acres (364 ha)

Challenges

- Excessive algae and very poor water clarity
- High muck accumulation
- Stagnant area of lake with poor circulation
- Legacy poor water quality issues

Results: 1000 GPM (227 m^3/hr) Trailer

- DO levels were 50% higher than control
- Increased depth by 1’ (30 cm)
- Water clarity improved by 2-3’ (61-91 cm)



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Greenways Golf Course, Soet River, South Africa

Odor Elimination for Local Community

About the Waterbody

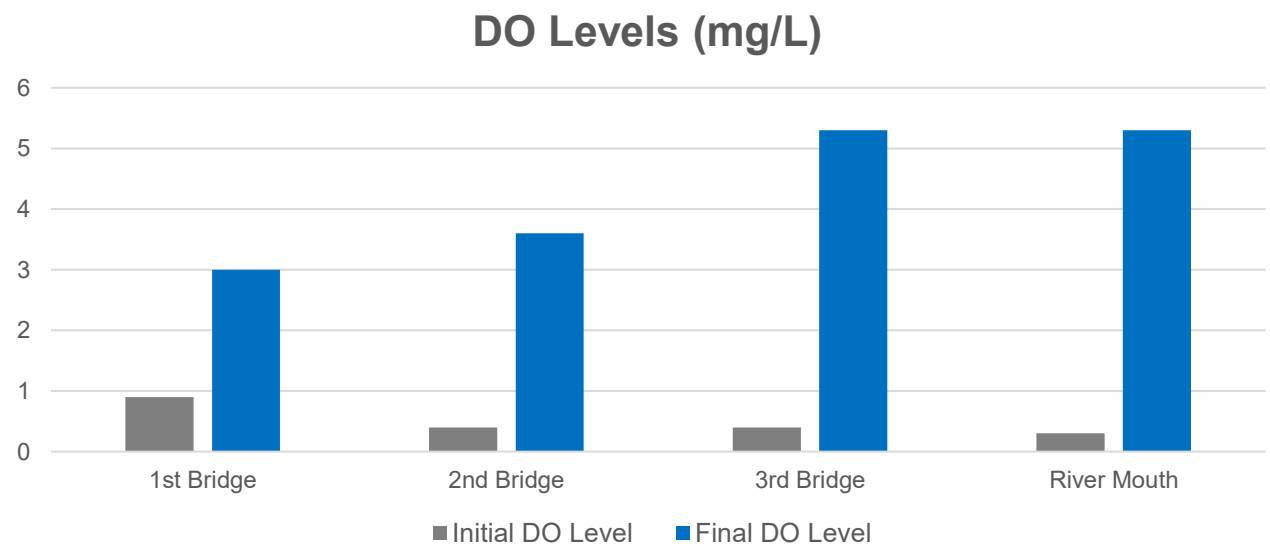
- Length: 300 m (984 ft)
- Depth: 51 cm (20 in)
- River with tidal influence

Challenges

- Incoming river flow with high levels of pollution
- Foul odors from hydrogen sulfide (H_2S) formation
- High turbidity

Results: (2) Clear nanobubble generators

- Increased DO by up to 1600%
- Increased ORP levels to 220 mV
- Reduced water turbidity by 89%
- Decreased COD by 68%
- Eliminated foul odors from H2S



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Tidal Stormwater Channel, California

3,000 Locals Return Home in Urban Community

About the Waterbody

- 15.7-mile (25 km) brackish, tidal stormwater canal apart of 133 sq mile (344 sq km) watershed

Challenges

- Low oxygen levels in water channel
- Hydrogen sulfide (H_2S) gas production
- Rotten egg smell, displaced 3,000 ppl

Results:

- Eliminated H_2S formation, foul odors and people returned home
- Increased dissolved oxygen
- Digested organics (i.e. “muck”)

GLOBAL WATER AWARDS

2022 Water Project of the Year Distinction

- 50,000 GPM (11k m^3/hr) treatment capacity equaling 60M gallons (227M liters/day) of water per day treated
- Dates of Treatment: October 2021 – March 2022

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ADVANCING NANOBUBBLE TECHNOLOGY

Satellite Beach, Florida

About the Waterbody

- Surface Area: 1.5 acres (0.6 ha)
- Brackish water

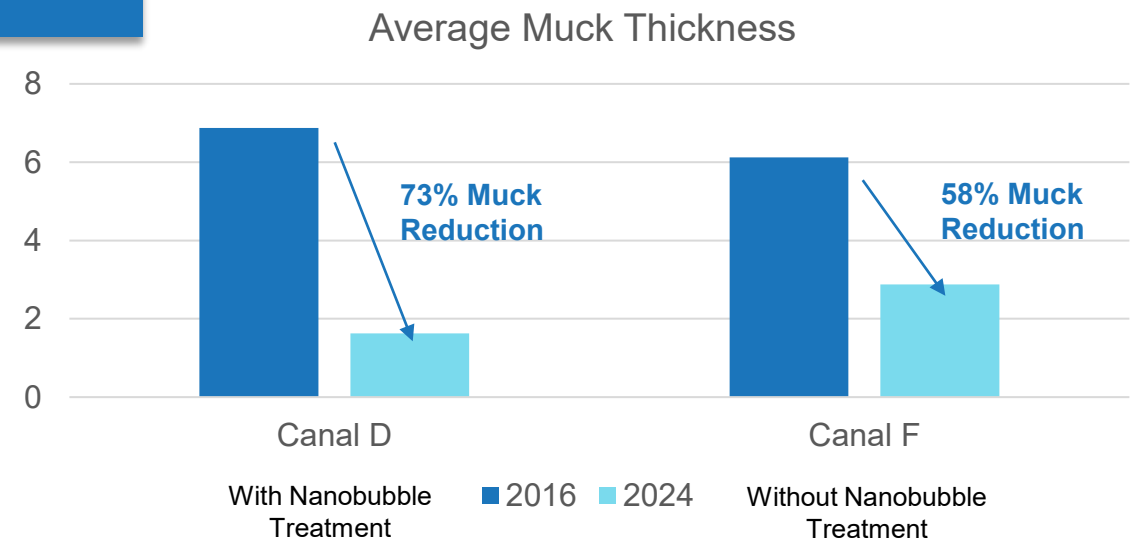
Challenges

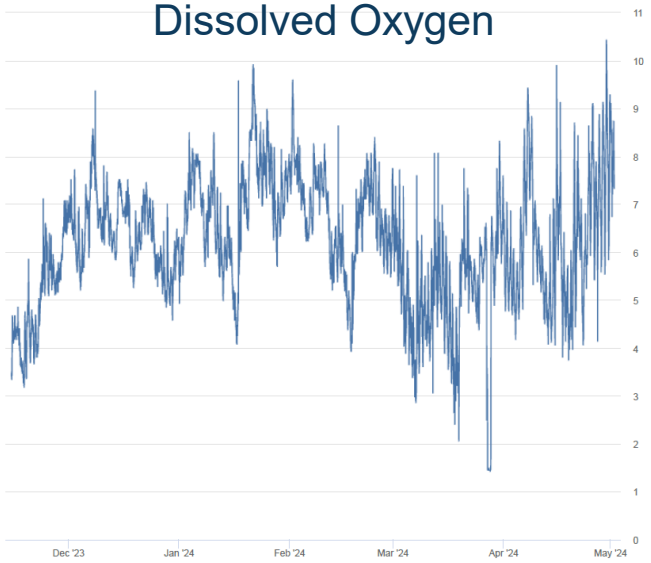
- Thick muck
- Poor water quality

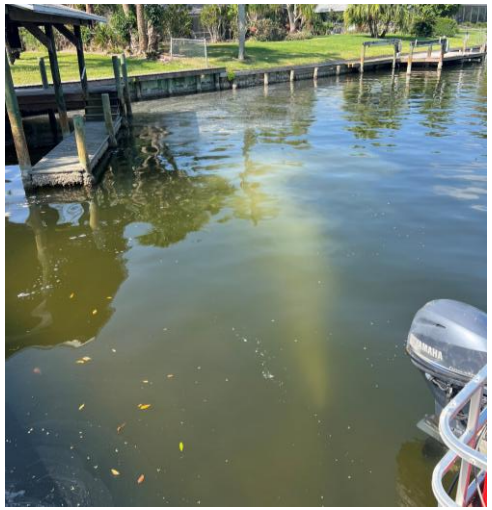
Results: Clear 150 nanobubble generator

- Average 73% reduction in muck in the pilot canal, a 15% improvement over the control
- Elevated dissolved oxygen in the water column and at the sediment-water interface

Better Muck Reduction Over Control







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Hartbeespoort Dam, South Africa

Success in South African Dam Spurs Community

About the Waterbody

- Surface Area: >2,000 ha
- Max Depth: 30 m (84 ft)
- Average Depth: 9.8 m (65 ft)
- Volume: 192,800,000 m^3 (51B gal)
- Ret Time: 6 mo to 1 yr

Challenges

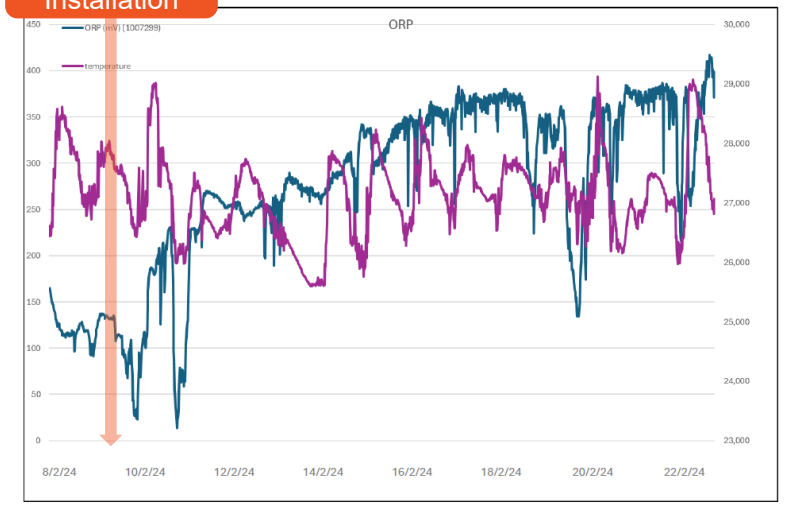
- Poor water clarity and legacy of poor quality
- Excessive algae growth
- Invasive aquatic plant proliferation
- Unable to use recreationally
- Odor issues

Results: 2,400 GPM (550 m^3/hr) NB System

- Nutrient reduction (Ammonium, Orthophosphate)
- COD increase
- Significant bottom muck digestion in treatment zone
- Reduced nutrient flux in treatment zone and outfall
- Improved resilience against incoming nutrient load
- Cyanobacteria, Microcystin & *E. coli* reductions in treatment area & outfall

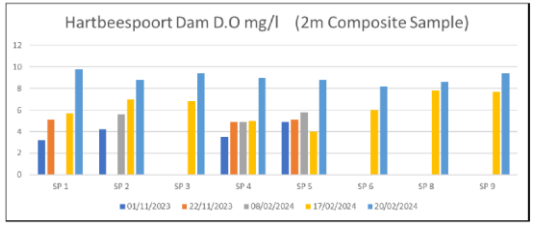
Nanobubble Installation

ORP

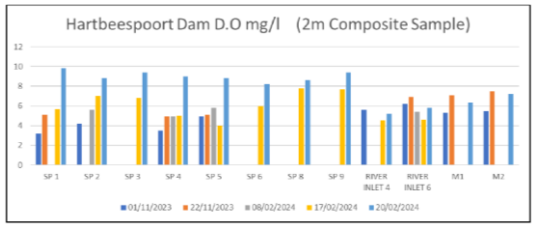


Dissolved Oxygen

Pilot Zone



Monitoring Zone



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Stormwater Basin, California

Coliform Control in Urban Stormwater Basin

About the Waterbody

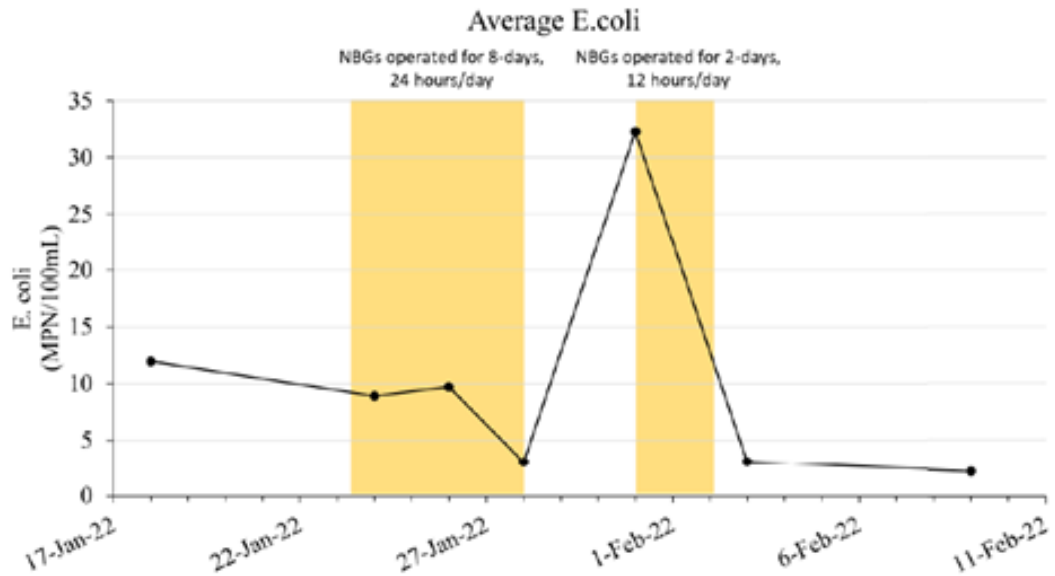
- 25 surface acres (10 ha)
- Max depth: 100 ft (30 m)

Challenges

- Foul odors
- Microbial contamination
- Poor water quality

Results

- Increased DO from 0.5 to 4.4 mg/L at sediment
- Increased sediment ORP from -260 to +160 mV
- Reduced coliforms up to 75% in 8 days



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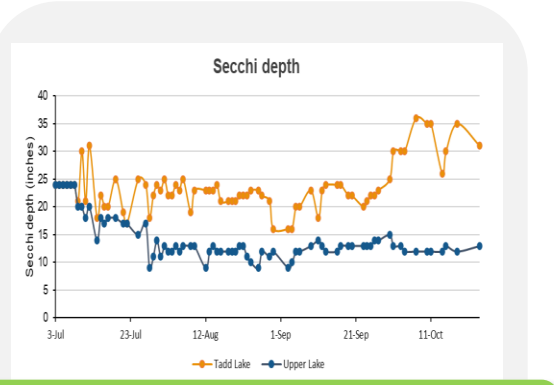
Visible & Data-Driven Results in Diverse Waterbodies



Tadd Lake

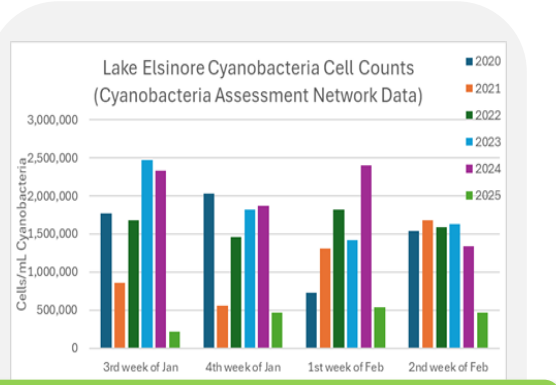
Problem:

- Algal blooms & odor
- Poor water clarity
- Unable to use recreationally

Results:

Compared to Control Lake:

- > 2x clearer
- 2x higher over bottom DO
- ~ 4x lower orthophosphate levels
- > 4x less total algae loads



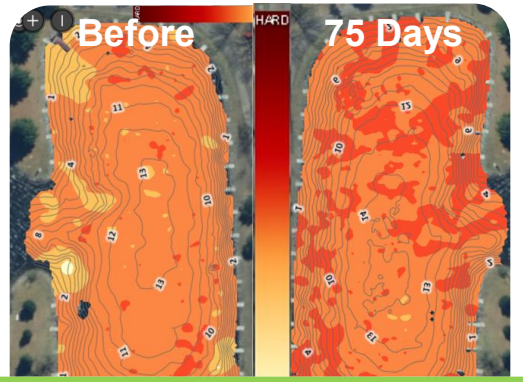
Lake Elsinore

Problem:

- Lake closures due to HABs
- Poor clarity & high nutrient loading
- Inefficient, outdated aeration system

Results:

- 50-90% reduction in early-season cyanobacteria
- Up to 7,000% reduction in turbidity
- Highest water clarity reported



Lake Arrowhead Marina

Problem:

- Algal blooms & poor water clarity
- High muck accumulation

Results:

- DO levels were 50% higher than control
- Reduced muck and increased depth by 1’ (30 cm)
- Water clarity improved by 2-3’ (61-91 cm) in first 30 days

Tidal Stormwater Channel

Problem:

- H2S formation causing foul odors & displaced people

Results:

- Eliminated H_2S formation and foul odors
- 3000 people returned home
- Increased dissolved oxygen over 15 mile canal

GLOBAL WATER AWARDS

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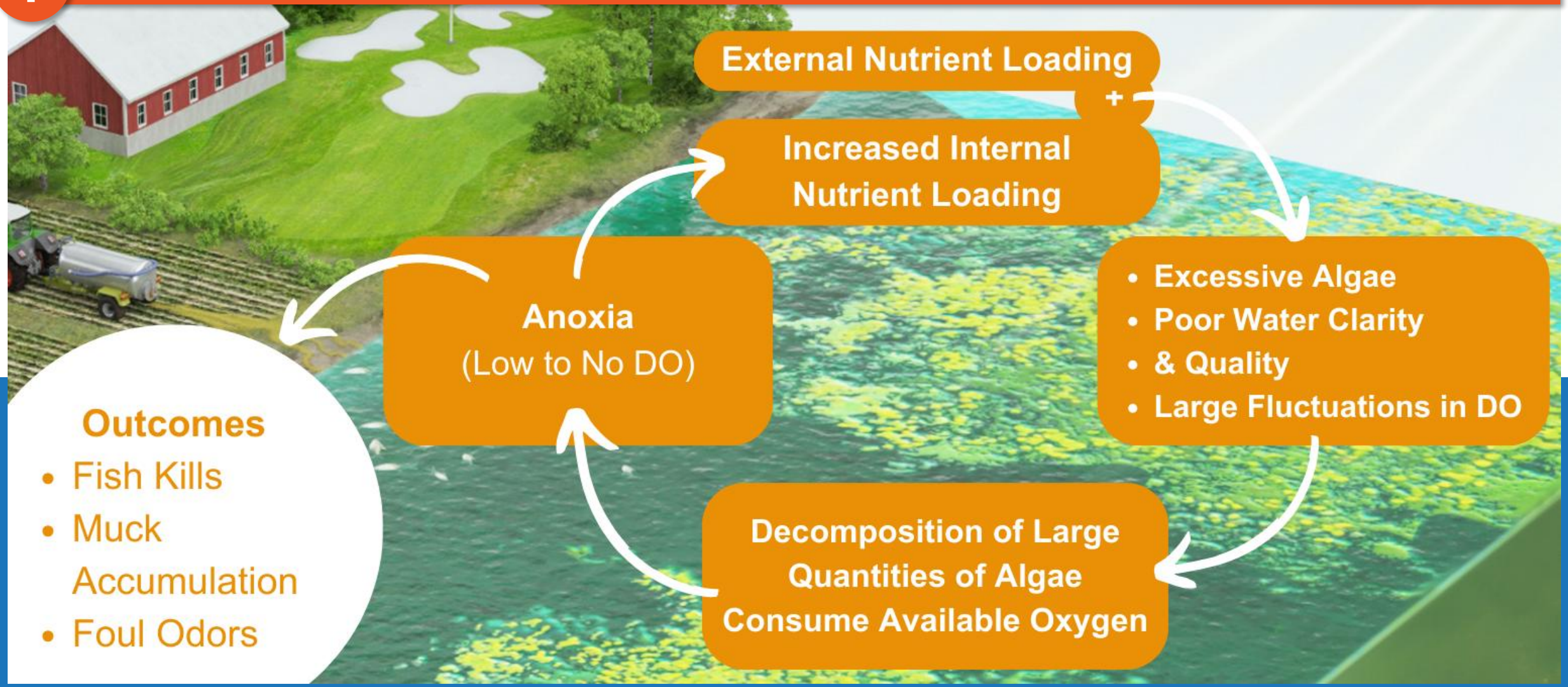
The Problem: Nutrient Loading & Anoxia Fuel Waterbody Impairment

50% of Waterbodies Globally are Impaired, Impacting Communities & Aquatic Ecology



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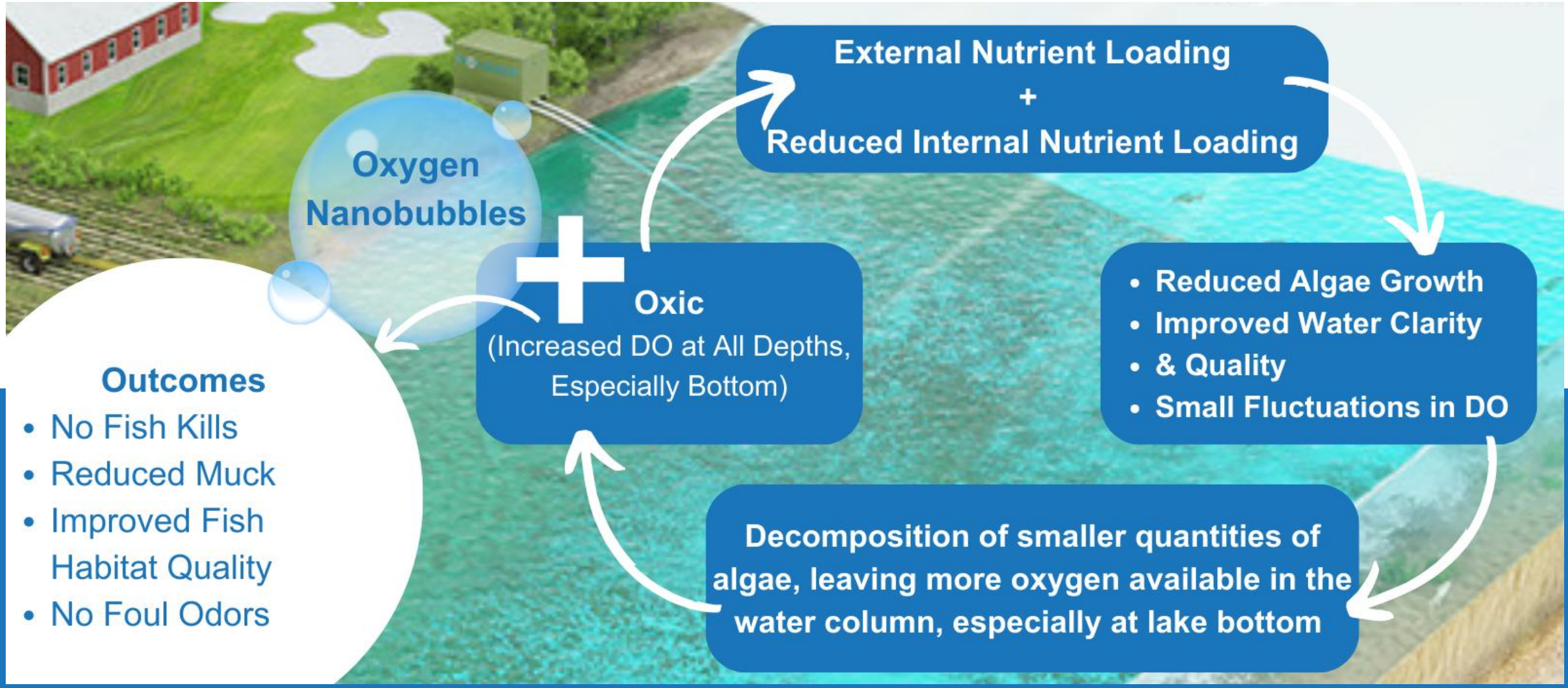
The Solution: Moleaer Nanobubble Treatment Enhances Oxic Conditions & Increases Resiliency to Restore Waterbodies



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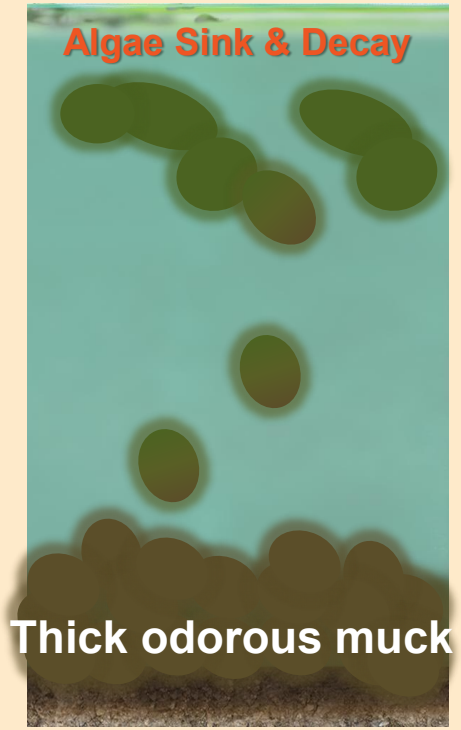
How Moleaer Nanobubble Technology Reduces Muck

The Muck Challenge
Anaerobic Conditions Limit Aerobic Muck Digestion, Resulting in Muck Accumulation



Enter Nanobubble Technology
Increase Dissolved Oxygen in Water Column & at Lake Bottom

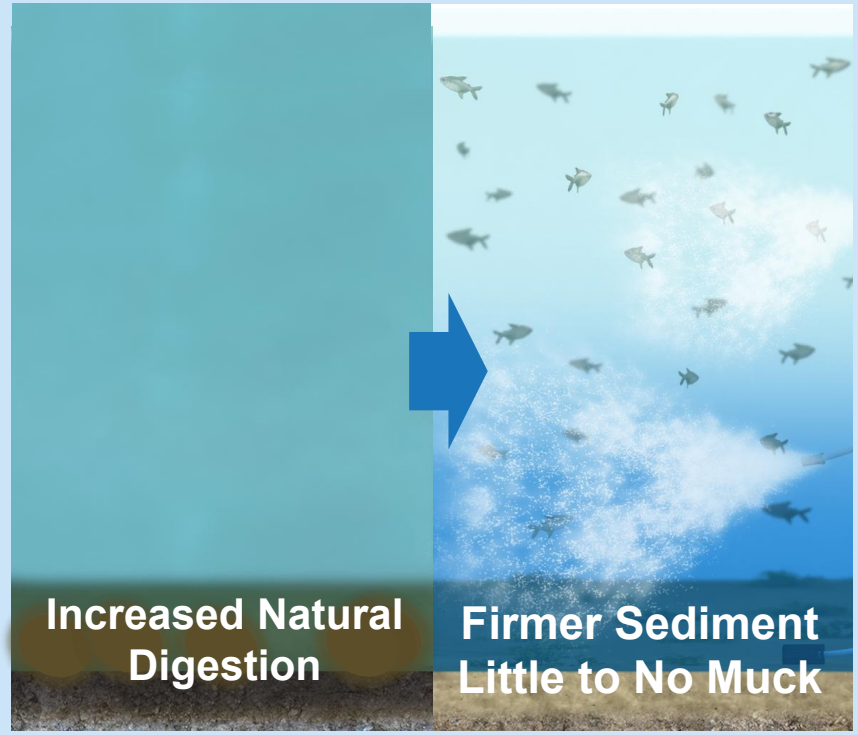
Kick-start & Catalyze Aerobic Microbial Activity

↓

Accelerates Natural Muck Digestion by Microbes

↓

Reduce Muck Depth, therefore Increasing Water Depth



As time elapses with Nanobubble Treatment

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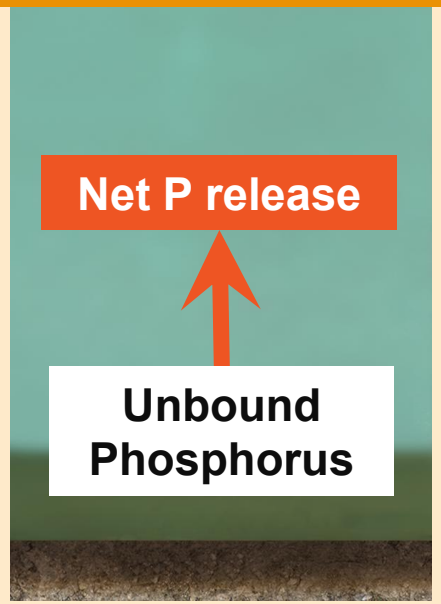
How Moleaer Nanobubble Technology Mitigates Nutrients

Mainly Chemically Mediated

Internal Nutrient Loading

The Phosphorus Challenge

Under oxic conditions, Phosphorus is bound to iron or manganese in sediments. Under anoxic conditions, these compounds get reduced, releasing Phosphorus



Enter Nanobubble Technology

Increase Dissolved Oxygen in Water Column & at Lake Bottom, Elevating ORP

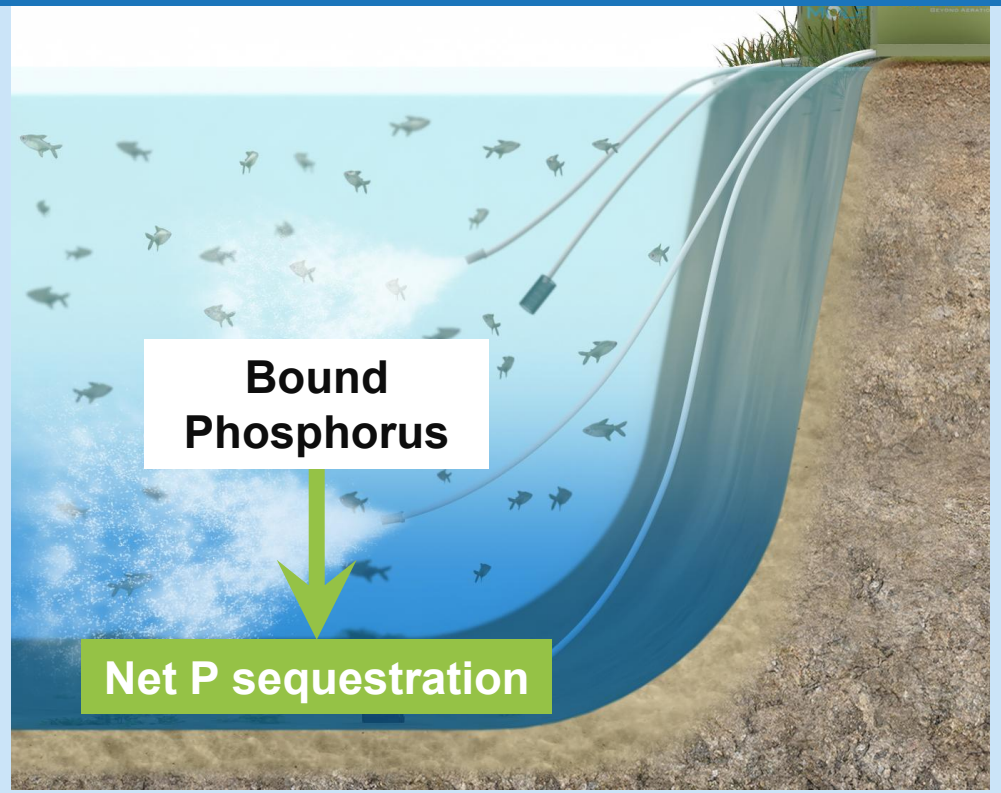
Iron or manganese binds with Phosphorus

↓

Phosphorus is sequestered in sediment

↓

Reduced Phosphorus levels in water column



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How Moleaer Nanobubble Technology Mitigates Nutrients

Mainly Microbially Mediated

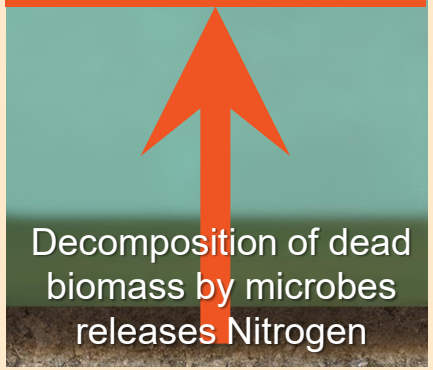
Internal Nutrient Loading

The Nitrogen Challenge

Anoxic/Low ORP

Rate of Ammonium production by certain microbes > Rate of Ammonium oxidation by other microbes

Large N release in the form of Ammonium



Enter Nanobubble Technology

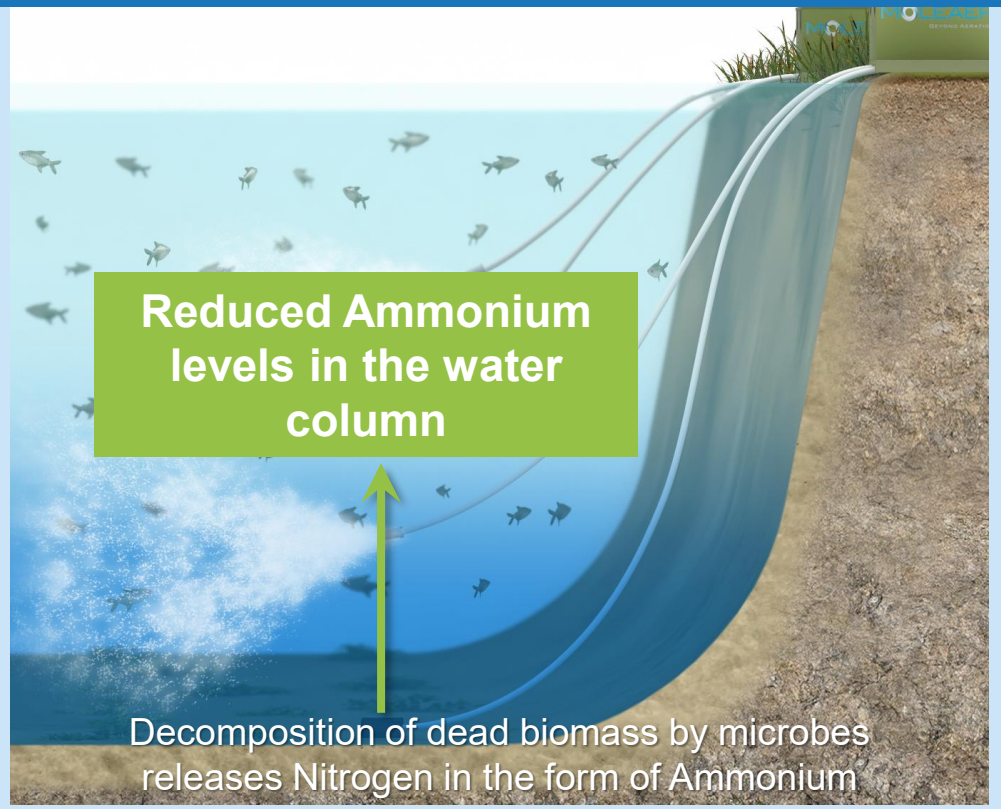
Increase Dissolved Oxygen in Water Column & at Lake Bottom, Elevating ORP

Decomposition of dead biomass by microbes releases Ammonium

Oxic/High ORP

Rate of Ammonium oxidation by certain microbes > Rate of Ammonium production from other microbes

Reduced Ammonium levels in water column



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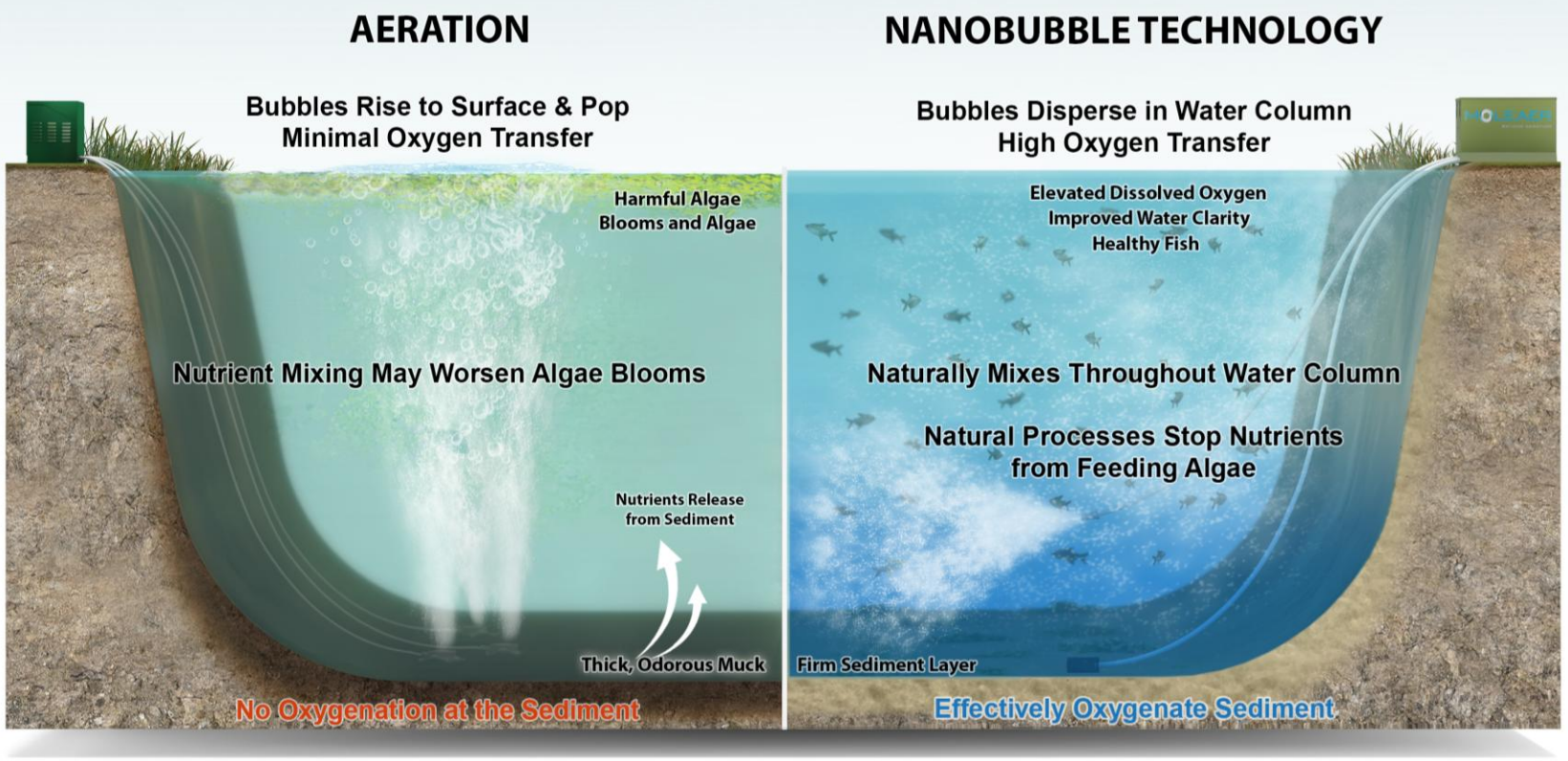
Nanobubble Technology vs. Aeration / Oxygenation Systems

Aerate means to "supply with air"

Localized benefit only
No benefits
to flowing water

Submerged components or large areas and require high maintenance

May require dredging for installation



Easy to maintain, shore-mounted equipment

Single treatment point for large areas

Flexible air sources (air, oxygen or ozone)

Works in all waterbodies (big, small, deep, shallow and flowing)

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Nanobubble Treatment vs. Traditional Lake Treatments

Alum “Aluminum sulfate”

Control internal phosphorus release through precipitation and settling

Challenges:

- Treatment lasts ~10-20 years
- No impacts on nitrogen or muck
- Doesn’t address anoxia
- Doesn't mitigate external loading
- Potential toxicity to aquatic life if applications are not properly designed and controlled

Mechanical Dredging 10-100x More Expensive

Physically remove organic (muck) and inorganic sediments

Challenges:

- Expensive, requires waterbody closure, heavy machinery, and waste disposal
- Negative ecological impacts
- Extensive permitting requirements
- Doesn’t address anoxia
- Potential nutrient/pollution release
- Often only provides short-lived benefits

Nanobubble Treatment

Creates and enhances oxic conditions, increases ORP & accelerates lake recovery processes to:

- Mitigate nutrient loading
- Reduce muck, algae/HABs, foul odors, coliform loads & fish kills
- Improve water clarity
- No heavy machinery, ecological disruption, or waterbody closure needed
- Provides sustained, long-term benefits

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How Nanobubble Treatment Benefits Waterbodies

Nanobubbles Create and Enhance Aerobic Conditions, Especially at Depth

Enable Natural Lake Processes & Increase Lake Resiliency

Accelerate Muck Digestion

- Improve sediment hardness
- Reduce sediment oxygen demand over time
- Reduce need for dredging

Mitigate Nutrient Levels

- Reduce internal nutrient loading

Reduce Algae & HABs

- Less nutrients to fuel algae
- Increased ORP which promotes breakdown of algal toxins

Improve Water Clarity

- Reduce blue-green algae dominance
- Promote increased species diversity throughout aquatic food web

Reduce Fish Kill

- Improve and sustain dissolved oxygen levels for fish health
- Reduce muck and improves fish habitat quality for spawning and feeding

Eliminate or Reduce Foul Odors

- Eliminate or greatly reduce H_2S, MIB and geosmin levels that cause foul odors and off-flavor compounds

Reduce Coliforms

- Proven to reduce coliform and *E. coli* loads without harsh chemicals
- Reduce potential health risks

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ADVANCING NANOBUBBLE TECHNOLOGY

Not a Silver Bullet: Nanobubbles are the Basis of an Adaptive Lake Management Program

Moleaer's Nanobubble Treatment is the Foundational Component of a Multi-Faceted, Adaptive Lake Management Program

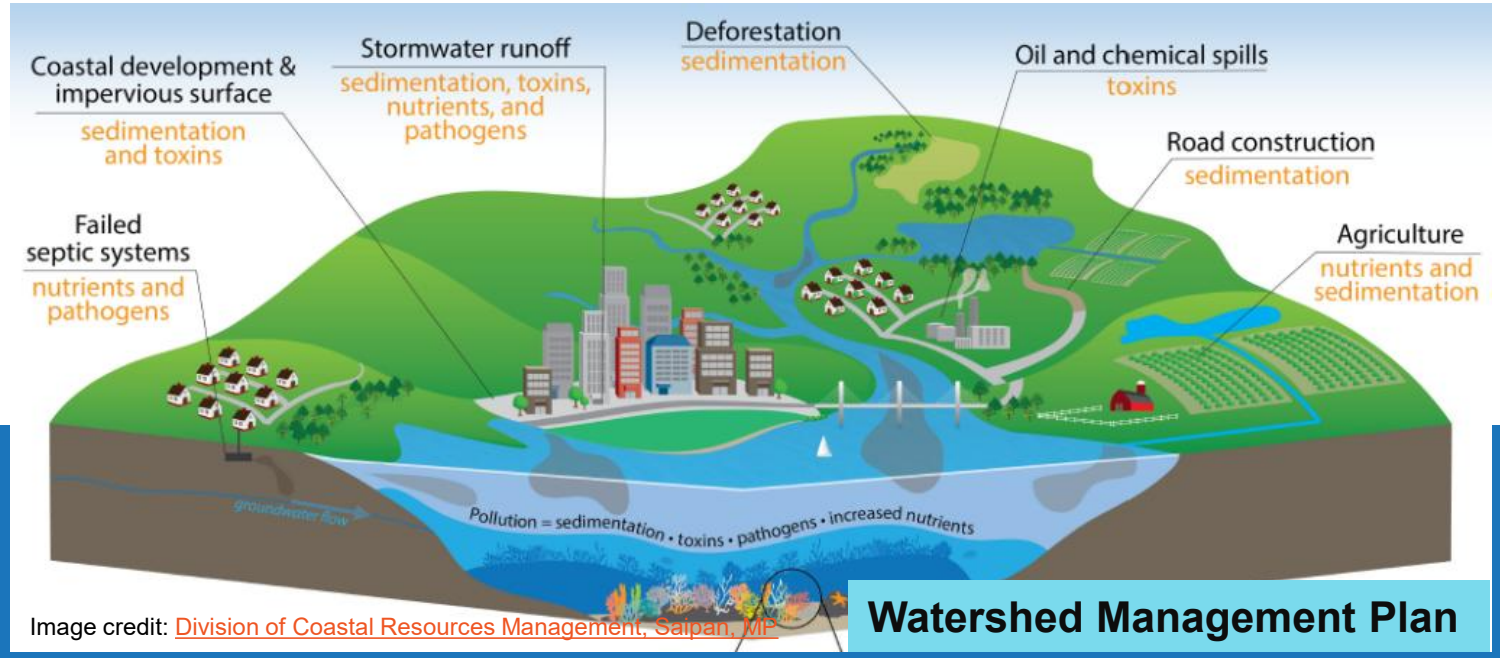

Image credit: Division of Coastal Resources Management, Saipan, MP

Watershed Management Plan

Image credit: Weeder's Digest

- **Efforts to Reduce External Nutrient Loading** are still key
- **Periodic Physical & Chemical Controls:** Aquatic weed harvesting and chemical treatments (i.e. nutrient sequestrants, herbicide, algaecide, etc.) may be needed, depending on conditions and goals.

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What this Means for You…

Cost Savings

- Reduce or eliminate dredging of accumulated organics
- Reduce or eliminate use of chemicals, algaecides, herbicides, and other treatments

Healthier Aquatic Ecosystem

- Less algal blooms
- Better fish habitat, improved food web and less fish kills
- Better water quality
- Improved hypolimnetic dissolved oxygen levels

Healthier Community

- Safer water
- No foul odors
- Lower risk of HAB toxins in water and air
- Lower levels of coliforms
- Fewer lake closures
- Better recreational experience
- Increased property values

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Thank You!

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Appendix