

FUNDAMENTALS OF POND AERATION

AN ARTICLE
COMPILED BY THE
TECHNICAL
TEAM OF
EVEREST TURBO

www.everestblowers.com

- **IS YOUR POND 6 FT IN DEPTH OR DEEPER?**
- **HAVE YOU SEEN YOUR FISH/SHRIMP GASPING FOR OXYGEN AT THE TOP OF YOUR POND?**
- **ARE YOU HAVING UNSIGHTLY ALGAE PROBLEMS IN YOUR POND?**
- **DOES YOUR POND APPEAR TO BE STAGNANT AND LIFELESS?**

The Benefit of Pond Aeration: If you have answered YES to any of these questions or want to improve your water quality then read this document carefully.

What is Pond Aeration?

“Aeration” is the term that we use to mean adding air to the water. Because air contains 22% oxygen, aeration adds oxygen to water.

If you have answered YES to any of these preliminary questions, then your problem may be due to insufficient levels of oxygen in your pond.

Ponds that are deeper than 6 ft simply are not capable of producing significant levels of oxygen at those depths. Below is an illustration that will show you the problem.

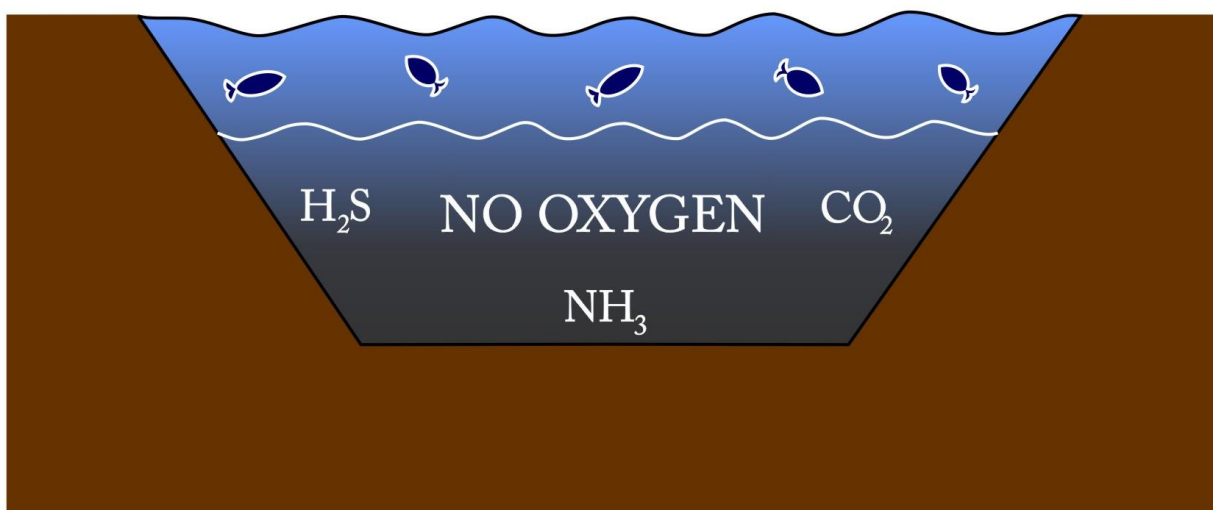


Fig: Unaerated Pond



The Good Health of a Pond is held in a **Delicate Balance**: A pond's condition deteriorates when its bottom environment cannot support animal life. The bottom is the area that runs out of oxygen first (the bottom is where the most oxygen is used and is the farthest from the surface where it is replenished). The absence of oxygen kills all the bottom dwelling animals that help keep a pond clean. The loss of these animals (snails, mussels, worms, etc.) will greatly reduce the pond's ability to clean itself.

Nutrients (fish waste, grass clippings, dead algae, etc.) cause most water quality problems. Nutrients are cleaned from a pond's bottom by the small bottom dwelling animals mentioned above. When these animals do not exist, the nutrients accumulate on the bottom forming a layer of "muck" which serves as fertilizer for weeds and algae. If a pond is allowed to get infested with weeds, herbicide treatment may be the only way to gain control. The idea is to prevent such infestation in the first place. Natural water clean-up through aeration offers preventive maintenance, reducing sediment before more serious problems arise.

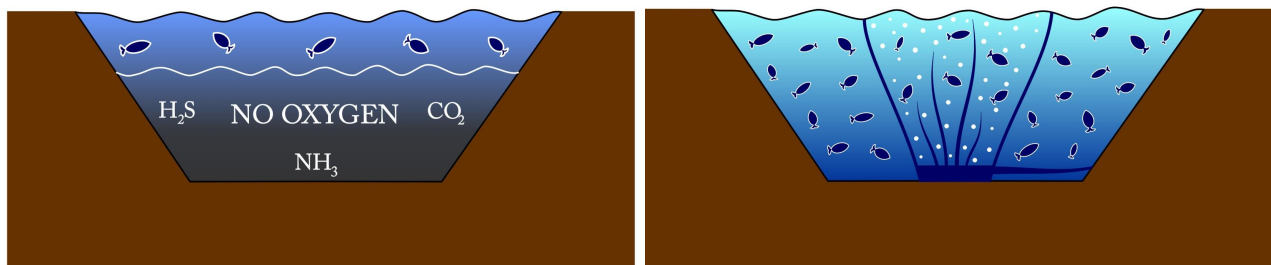


Fig: In this illustration we can see clearly that the ecosystem in the pond is positively affected by implementing pond aeration

Diffused Pond Aeration occurs by pumping blower air out into a pond or lake bed via an air diffuser that produces tiny air bubbles -- the rising air bubbles bring bottom water to the surface where it is exposed to the atmosphere. Large volumes of water thus lose bad gases to the atmosphere and the water picks up even more oxygen while on the surface.



Shallow Ponds: Many common pond problems occur in ponds deeper than 6 feet (Such as pond turning over). However, keep in mind that shallow ponds are not exempt from oxygen related issues. Up until now we were dealing with diffused aeration which can be also referred to as bottom aeration. If you are trying to aerate a shallow pond you will not want to install a diffused aeration system. Instead you will want a surface splasher or paddle aerator.

SURFACE SPLASHERS VS DIFFUSED POND AERATION

Surface Splashers include but are not limited to the following:

- Fountains
- Water Pumps
- Propeller Type (Paddle Wheel Aerator)

Fountains or "Surface Aerators" are a popular choice when a decorative aerator is desired. Fountains splash the surface of the pond and help control surface algae and duckweed, but do not aerate down to the bottom in deep ponds.

Diffused Pond Aeration is the best way to aerate, destratify and create circulation in ponds over 3 feet deep. Because the air diffuser lays on the bottom you achieve total pond aeration from top to bottom regardless of depth.

Each Diffused Aeration System has three basic parts:

- Everest Turbo Air Blower
- Everest Turbo Air Diffuser
- Air Hose

The Air Blower sits on shore and pumps air out through the hose to the air diffuser located on the bottom of the pond. The result is thousands of tiny bubbles rushing out of the diffuser to the pond surface, creating circulation and providing aeration. There are several advantages to using diffused pond aeration kits instead of surface aerator:

- Electric motor is on shore, not in the water.
- Air diffuser lay on the bottom, ensuring aeration of entire pond from bottom to top, regardless of the depth.
- Oxygen will be supplied to the bottom part of the pond where it is most needed.



POND AERATION EXPLAINED IN FOUR SEASONS

SUMMER SEASON

AERATED POND

The sun heats the surface of the water, but the aeration system keeps the dugout well mixed and the temperature uniform.

Small supply of plant nutrients limits algae growth.

The limited amount of algae floating in the water allows the light to reach the bottom of the dugout.

The aeration system and the wind combine to maintain high concentrations of oxygen throughout the dugout. A small amount of algae dies and falls to the bottom of the dugout.

The dead algae decompose and consume oxygen BUT the aeration system keeps oxygen concentrations high and the dugout well mixed.

Water quality remains good.

UNAERATED POND

The sun heats the surface water which floats on the colder deep water.

This reduces the ability of the wind to mix the water at the bottom of the dugout.

The sun continues to heat the surface water limiting the mixing to the top few feet.

The surface algae bloom becomes thick restricting light penetration to the top level of the dugout. Rooted weed growth is limited to the edges of the dugout.

Green algae consume all the available nitrogen, die and fall to the bottom, where they decompose using oxygen which is not replaced.

The absence of Oxygen in the water allows plant nutrients (eg nitrogen, phosphorous) and metals (eg iron, manganese) which are trapped in the sediment to dissolve into the water.

Water quality deteriorates at the bottom.

AUTUMN SEASON

AERATED POND

The water temperature cools, all algae die and fall to the bottom of the dugout.

The aeration system and wind continue to maintain high concentrations of oxygen throughout the dugout.

Water quality remains good.

UNAERATED POND

The surface water cools and creates a uniform temperature throughout the dugout.

All algae decompose and fall to the bottom, consuming oxygen at the bottom of the dugout.

The uniform temperature allows the wind to mix the dugout increasing oxygen concentrations throughout the dugout and temporarily improves the water quality.



POND AERATION EXPLAINED IN FOUR SEASONS

WINTER SEASON

AERATED POND	UNAERATED POND
Oxygen is carried to the bottom of the dugout by the circulating water.	Very little oxygen diffuses through the ice, water quality near the surface remains good.
Dead organic material decays aerobically at the bottom of the dugout.	Algae decay quickly consumes available oxygen and becomes anaerobic.
Water quality remains good.	Water quality begins to deteriorate at the bottom of the dugout.
Oxygen is supplied to the dugout from the aeration system and the atmosphere.	Under anaerobic conditions, the layer of poor quality water quickly grows and moves upwards.
The oxygen is carried to the bottom of the dugout by the circulating water.	Nitrogen and Phosphorous move from the sediment into the water.
Dead organic material decays aerobically at the bottom of the dugout.	Hydrogen Sulphide (H ₂ S) forms and produces a "rotten egg" smell.
Water quality remains good.	Water quality continues to deteriorate.

SPRING SEASON

AERATED POND	UNAERATED POND
Dugout water becomes at constant temperature as the heat of the sun melts the ice.	Dugout water becomes at constant temperature as the heat of the sun melts the ice.
Oxygen diffuses into the water from the atmosphere and is carried to the bottom of the dugout by the circulating water.	Wind blowing over the dugout surface causes the turn-over of the water, mixing poor quality water throughout the dugout.
Nutrients remain trapped in the sediment.	Nutrients rise to the surface.



Turbo Division of Everest Blowers have developed an innovative energy efficient aeration system, operated by a reliable Side Channel Blower with constant pressure rather than Mechanical Aeration as in a Paddle High Pulsating Aeration, rendering it completely safe, light and simple to operate.

EVERST TURBO ENERGY EFFICIENT DIFFUSED AERATION SYSTEM FOR AQUACULTURE comprise of a unique Side Channel Blower powered by an Energy Efficient Motor, combined with Microporous Aeration Hose connected in parallel through connectors. The new aerator comes with Zero Maintenance Side Channel Blower made out of high grade Aluminium alloy (ADC12) driven by an energy efficient electric motor and connected to a grid of high-grade rubber microporous aeration hose through plastic pipes. This makes it light and durable, ensuring a long product life span and enabling its deployment with ease, thereby cutting on the operating costs of fish farms.

TECHNOLOGICAL BENEFITS OF EVEREST TURBO DIFFUSED AERATION SYSTEM

1. Dissolved oxygen enriching at a faster pace
2. Lower energy consumption
3. Straight forward logistics & Installation
4. Flexibility of operation
5. 100% Oil-free air

Everest Blowers Group is the largest blower manufacturer in India producing a wide range of Positive Displacement, Dynamic Blowers, Dry Screw Vacuum Pumps & Industrial Vacuum Systems for various industries and applications. We are equipped with two in-house DSIR (Department of Scientific & Industrial Research, Ministry of Science & Technology, Government of India) approved Research & Development Centres which are engaged in innovative products, technologies and solutions for various industries and applications. All products are produced in-house at our state-of-the-art manufacturing facilities using advanced design & machining software & latest technology three axis & five axis CNC machines. Our Quality Management Systems confirm to ISO 9001:2015 standard. We also comply to ISO 14000 & OSHAS 18000 standards. Everest Group has two National Awards for Excellence in Research & Development and Energy Efficient Pumps to its credit.

Everest Blowers are committed to explore energy efficient products and technologies for various processes and industries, through their innovative engineering experience gained over four decades of presence in the Indian market.

In line with the Blue Economy Drive by the Govt. Of India and the fisheries departments of respective states, we have come-up with the system of providing quality aeration for enhancing productivity and safe working methods.

Package aeration kits, custom designed to your requirement are also available along with individual blowers & microporous aeration hose. Contact our technical team & we shall be glad to assist you with design, selection & supply of your aeration components & systems.

