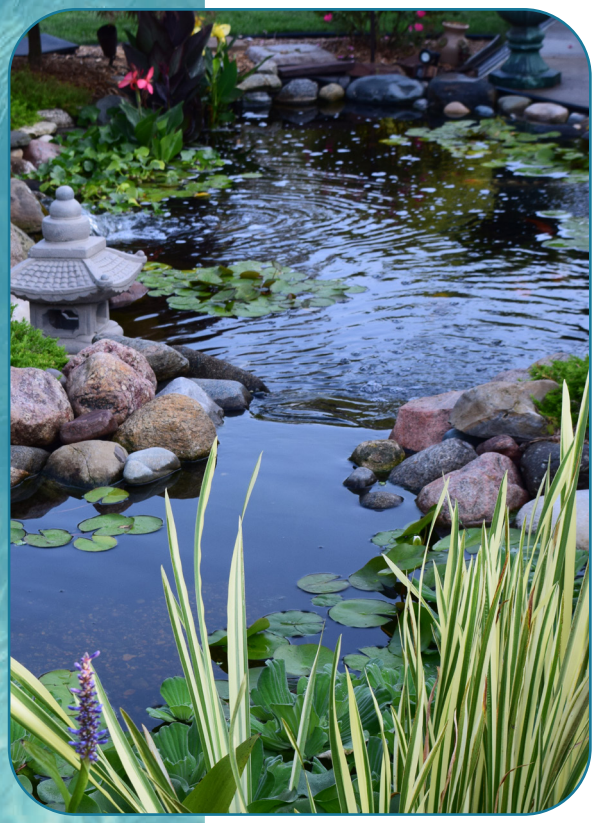
"How To" Series:
Pond Aeration for All Seasons
The Important Role of Oxygen

By Rick Smith, EasyPro® Pond Products



For a healthier eco-system, and healthier fish, proper oxygen levels are essential. We refer to this as Dissolved Oxygen Concentration or (DOC) in the water. This is measured by weight or milligrams in a liter of water.

Oxygen production and consumption varies depending on the season, oxygen producers like waterfalls and plants, water temperatures, and the amount of all living things depending on the oxygen supply. Think of it as your checking account. If the demand (monthly bills, number of dependents, and then emergencies) exceeds your deposits to your checking account balance, things become very stressful.

Similarly, there are natural processes in a pond that creates healthy oxygen levels that all living things draw on (the oxygen account balance) to thrive. When the demand exceeds the created oxygen supply, all living things in the eco-system become stressed and may even die. This can happen very quickly or silently over a period of time. We'll explain how everything is inter-related in this article.

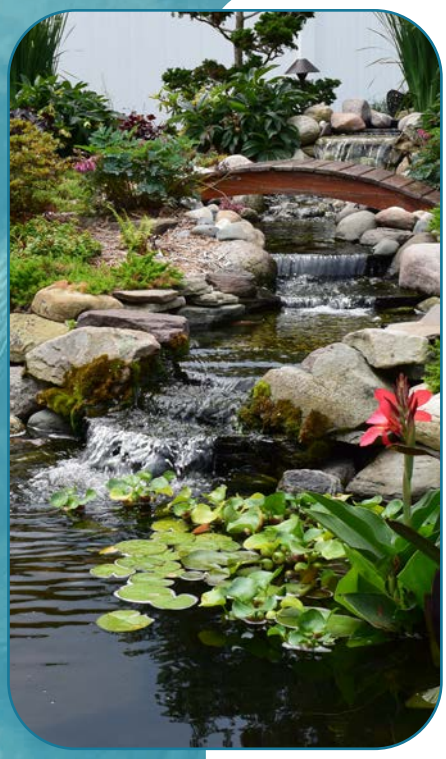
We will also touch on the year-round importance and benefits of a bottom diffused aeration system in your pond, like the EasyPro® Koi Loving Care Aeration System.

Think of an aeration system as the shock absorber.

While everything else fluctuates, the aeration system is there constantly supporting the natural life-giving oxygen production while mixing the water top to bottom.

In the winter the aeration system serves another function of keeping the ice open so toxic gases can escape. We will touch on this important role and application as well.

The Role Oxygen Plays



Dissolved oxygen supports the life of microscopic organisms, the levels and efficiency of beneficial bacteria, which in turn greatly impacts filtration and water quality. Most of the bacteria used in a water garden or koi pond for filtration are aerobic (meaning they thrive on oxygen). Their population count and efficiency depend on available nutrients and oxygen levels in order to actively break down and convert toxins like ammonia and nitrites to nitrates.

A higher level of (DOC) would be 15mg per liter, and many experts recommend at least 6mg per liter for koi. Anything below this level and koi will start to show signs of struggling for oxygen. They will either be gathering at the waterfall or gasping for air at the surface.

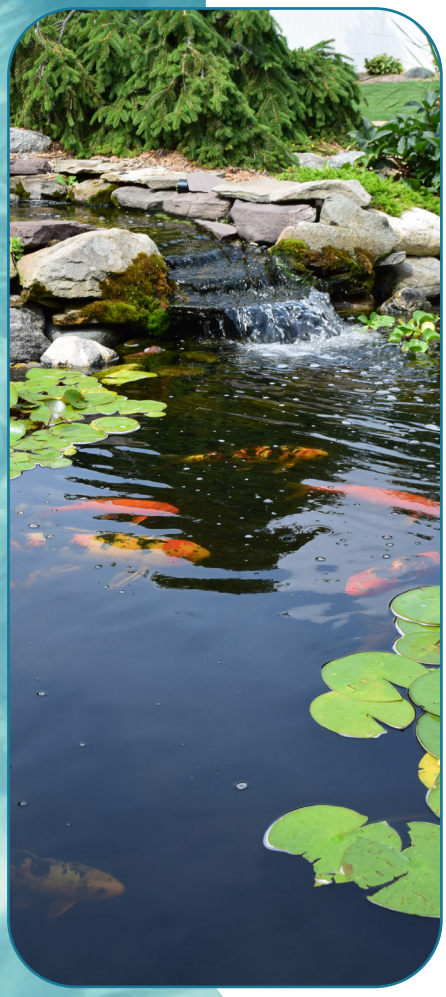
Oxygen Contributors

Water absorbs oxygen through the agitation at the surface of the water, like a waterfall, and oxygen producing plant life.

Waterfalls contribute to oxygen levels through agitation of the water. This agitation also aids the pond in releasing carbon dioxide and any hydrogen sulfide gases if present from anaerobic breakdown of decaying matter and muck build up.

Plants are oxygen producers during the day. The plant's photosynthesis process absorbs carbon dioxide and releases oxygen into the water. However, they are oxygen consumers during the night. Since oxygen levels can drop at night, an aeration system is a huge benefit.

Oxygen Consumers that Tax the System



In its simplest form, we know that all living things in the eco-system require a healthy supply of oxygen. So, let's now take a look at what consumes the oxygen. And, what places extra and/or a dangerous demand on the oxygen supply. In many cases, stressing the system and resulting in a list of negative situations. Keep in mind all of these situations can be prevented with proper understanding and planning.

The Decomposition of Decaying Matter

This includes leaves, fish waste, decaying plants, muck build-up, uneaten fish food and dead algae

- Leaves and decaying plants consume a lot of oxygen and contribute to an increase in toxins and a muck build up. This combination can exceed the ability of the filtration system to keep up.
- Algae die off, if left in the pond after a natural die off or after the use of an algicide will also decompose and releases phosphates back in the water. This will contribute to more algae blooms.
- Uneaten fish food also adds unnecessary pressure on the eco-systems balance. Again, releasing an overload of nutrients and phosphate into the water. The rule is: Provide only what the fish can eat in five (5) minutes once a day.

These are some of the reasons why we recommend removing all decaying matter and regularly cleaning mechanical filter pads, especially in early spring as well as 3 to 4 days after using an algaecide or EasyPro® Water Clarifier.

Deeper Ponds Have Less Oxygen on the Bottom

There is less oxygen at the bottom of the pond than near the surface. A bottom drain pulls the lower oxygenated water off the bottom and mixes it through the filtration system while waterfall agitation adds oxygen.

- Bottom diffused aeration also helps mix the water providing a good oxygen mix top to bottom in the pond.

Oxygen Consumers that Tax the System cont'd.

Warmer Summer Water Holds Less Oxygen

Cool water holds more oxygen than warmer water. In the hot summer months, available oxygen levels drop dramatically. Keep in mind that oxygen levels also drop at night.

Floating Plants & Diffused Aeration is Just Plain Prudent

Plants should cover 25 to 30% of the pond surface. This aids in keeping the water cooler, which then hold more oxygen, and provides the fish a stress-free cover.

There is a challenge for ponds with koi to have sufficient plants. The reason is, koi fish can destroy plants. The upper pond is a solution I have incorporated in my ponds so I have the benefits of the plants and still enjoy my koi.

The Benefits of an Upper Pond

By building a mini pond that dumps into the main pond, you can place most of your plants where Koi can't get to them. Place some in the lower pond as well.

Excessive Fish Load is All Too Common

It is what I call the "Silent Killer". There are a couple of general rules for what is a safe fish load. Provided that we have proper filtration for good water quality, we can either go with 1 inch of fish per 10 gallons of water for non-koi, or 1 (18" or larger koi) per 250 gallons of water. So, with a 2,000-gallon pond we could have up to 8 koi.

Fish Show Signs Of Stress & Low Oxygen Levels

They will show signs of being lethargic, even though koi love the movement of water by a waterfall, they may be hanging out there on a more regular basis. Or, at extreme levels they will be gasping for air at the surface. In this case, we need to take immediate action, and make long term corrections.

Adding Water Treatments

Make sure you have excellent aeration when adding certain water treatments like algaecides and/or water clarifiers

For Winter Months - Move the Aeration Diffuser

If you live in a cold winter area, stop aeration from the deepest part of the pond. This is where the warmest water will be for the fish to over-winter. Continuing to aerate the depths will super cool the pond water and fish will lose the warmer water they need to over winter.

Move the diffuser to one end of the pond and place it, say a foot under the water so it will be below the freezing ice. This will keep the ice open for toxic gas to escape. Even if that area "looks" frozen over – the ice is actually honey combed and air will escape. You can hear it! In the photo, the rising air actually has created hollow high rise vents.

None of this is complicated or hard to do. However, by arming yourself with the understanding of how everything works together and taking action to do the right things at the right time, you will reduce your stress and cost while increasing the time spent enjoying your pond and fish.

Also see: Diagnosing an Ailing Pond, and for plants, see our Water Garden Plant Guide.