

Site Amenities

Oxygen—

The Fix For Pond Problems

By Frank Gardner, E P Aeration

Aeration of a water feature should have three main considerations. These include preventing thermal stratification, balancing the dissolved oxygen levels throughout the water column from the sludge or benthic layer to the surface and balancing temperature levels throughout the water column. Although oxygen transfer from certain methods may be significant, the greatest amount of oxygenation takes place at the surface of the water body.

Thermal stratification is the single greatest cause of stagnation, oxygen depletion, nuisance algae blooms, and is caused by a temperature differential of three degrees centigrade or more between the surface and the benthic layer.

Therefore, an effective aeration system must move water from the sludge layer to the surface, called "turning", without roiling the sludge (which would release nutrients into the water column). A Canadian government study, conducted and copyrighted by the Prairie Farm Rehabilitation Administration (PFRA), tested virtually every known aeration method available, including systems designed and built by the PFRA. The study determined that "in order to aerate all the water...the site of air injection should be at the bottom of the deepest part...The most effective and efficient method of aeration appears to be air injection in combination with a diffuser which produces fine bubbles."*

More than 15 years ago, Mike McGee, president and general manager of E P Aeration, Inc., based in San Luis Obispo, Calif., selected proprietary fine-bubble, bottom-laid aeration diffuser tubing as the most effective, and cost-efficient method of moving water in a laminar flow (so the sludge is not disturbed), from the

bottom of the very deepest part of the water feature. This allows, most often, the use of 1/3 horsepower air compressors which operate on 120 VAC power, and which can be placed up to 1,000 feet or more from the water feature. E P Aeration uses the tubing in both linear configurations and coiled on stainless steel disks for water features with uneven bottoms or particularly deep holes.

Regardless of the method used, the principal issue in determining the amount of aeration equipment necessary to ensure an ecological balance in a body of water is the size of the lake, pond, or water feature. Size is both a function of volume

A bottom-laid aeration diffuser hose reveals its presence with a snake-like pattern of fine bubbles at the surface. This method lacks a dramatic surface show but can be very effective for deeper ponds and natural settings.





Left: A shallow pond before the installation of aeration equipment is clogged with algae, which uses up the pond's oxygen and likely kills any fish or other aquatic life.

Below: The same pond after the installation of an aerating fountain. A surface spray system is usually adequate for ponds 15 feet or less deep. Interestingly, more horsepower is needed for lakes less than six feet deep.




(width x length x depth) and the surface area of the body of water. There are a couple of rules of thumb: If the water body has a surface area of one or two acres or less, it will probably need to be "turned" about 8 times a day. A lake with a much larger surface area will require fewer "turns".

However, determining size/volume alone is not sufficient. Two other factors must be considered. First is the usage of the water feature, for example, for irrigation. This would affect retention time for treatment purposes, but may not necessarily constitute a negative factor. Secondly, the biota of the feature must be carefully evaluated.

Are there fish? Waterfowl?

The reason this matters is that each body of water has a Biochemical Oxygen Demand (BOD), which, if not met, can cause oxygen depletion. Oxygen depletion of the benthic layer

(at or below 2 parts per million of dissolved oxygen) produces such conditions as anoxic release into the water column of nutrients, metals, and other minerals, such as phosphates, release of hydrogen sulfide and other noxious gases, and the algae blooms and fish kills referred to above. Additional aeration may be necessary to offset a higher BOD. 

** Performance Characteristics of Aeration Devices, W.C. Mackay, T.G. Miller, D.R. Moore & R. Woelcke, 1999*