Water Feature Quality:
Using All the Tools

Top: Aquashade dye for early-season plant-growth control is applied by pouring it in along the shoreline. Photo courtesy: Applied Biochemists Inc.

Bottom: Two 2-1/2-horsepower, high-volume, flow-fountain vertical aerators in action in a park lake. Photo courtesy: Aqua-Master.

A body in motion tends to stay in motion. A body at rest, tends to stay at rest." That's one of the cornerstones of thermodynamics, a branch of physics dealing with the conversion of energy. Yet when it comes to biological aspects of lakes and ponds, pivotal features in many parks and golf courses, that's not entirely correct. Left unattended, flat, peaceful water features will move considerably in terms of biological growth. Neglected, a soothing body of water, once a source of public enjoyment, can become an odious eyesore, full of algae and other weeds.

Like turf, lakes and ponds have balanced ecosystems. And, like turf, problems begin when that balance is upset. Fortunately, there are a number of tools that can be used to correct these problems. Getting them in place before a problem occurs is crucial, as is understanding how they begin in the first place.

Constant Battle

Consider the daily life cycle of the average park lake. In the early morning hours before sunrise, water oxygen levels are critically low. Aquatic plants stop photosynthesis after sunset and won't begin the process again until sunrise. In a balanced pond, there is sufficient oxygen to support aquatic life, such as various species of fish and plants.

Thermal stratification in lakes and ponds in the summer is common, especially if the body of water is shallow. The aerobic (epiliminion) layer of water at the surface of the feature is warmest and contains the most oxygen. Such conditions are ripe for algal blooms. Algal blooms, in turn, block sunlight from penetrating the lake or pond surface, which kills beneficial aquatic plants. These plants contribute to oxygen levels in the water.

At the bottom of the water feature is an anaerobic or hypoliminion layer of water. This cold layer has little oxygen. Dead fish and plants fall to the pond floor to decompose and further deplete the oxygen in the water. In addition, the resulting organic matter is filled with toxic gases, such as methane and hydrogen sulfide that rise to surface and produce that "rotten egg" smell.

Nutrients released from the pond floor also rise to the surface, triggering blooms of blue-green algae. The thick algae is not just unpleasant to look at — it can cause major clogging problems if the body of water in question is an irrigation source.

Ponds and lakes that are oxygen-deficient for extended periods and rich in plant and nutrient materials are defined as "eutrophic." Bringing a eutrophic body of water back to health can be accomplished through means such as aquatic herbicides, mechanical harvesters, plant-eating fish, dyes and mechanical aerators. Often, especially in cases where a pond or lake has been "let go," it may require a combination of these tools to get the job done.

Aeration Systems

Driven by wind, waves and rain, aeration of ponds and lakes occurs naturally to a certain degree. Wind whipping oxygen into the water surface sends this aerated water downward. As the aerated water moves down, it forces the deep layers of oxygen-deficient water to the surface where it is replenished.

Mechanical aeration systems give nature a hand. Types of mechanical aeration systems include: vertical, horizontal and diffused air injection.

• Vertical Aerators — As their name implies, vertical aerators throw water into the air "vertically." Although all fountains provide some water aeration, only vertical aerators provide significant aeration. They employ a pump to pull water from lower levels and send it shooting into the air. The water absorbs oxygen as it sprays into the air and creates wave action as it splashes back to the lake or pond surface. This oxygenates the water even further.

Sizes of vertical aerators vary widely and can create a number of water displays. Height and width of the water displays hinges on the size of the pump and the motor. How many aerators a given body of water requires depends on the size, shape and depth of the body of water in question. Aerator manufacturers will gladly offer assistance in this area.

A number of vertical aerator manufacturers make lighting kits for their prod-

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ucts, which add a dimension of evening brilliance. Many units also have timers, which means they can be set to start and stop at predesignated times.

• Horizontal Aerators — Horizontal aerators circulate water *below* the lake or pond surface. They usually float on the surface and remain in one location or circulate a specific area.

These units employ a submerged propeller to send aerated water to lower levels. This oxygenated stream of water helps break up stratification by sending oxygenated water to the bottom and low-oxygen water to the surface. This keeps nutrients in suspension and oxygen-rich water throughout the water feature. Aerobic bacteria and algae thrive in these conditions. They feed on nutrients and, in the process, help prevent algae blooms.

The angle of the propeller and the size of the motor determine how deeply the unit circulates the water. As a general rule, the larger the motor, the more water the propeller will move. These units are sometimes available with camouflage covers, which enable them to blend into their surroundings and discourage vandalism.

As with vertical aerators, the pond and lake size, shape and depth will determine how many aerators are necessary to provide adequate aeration.

• Diffused Air Injection — Diffused air systems use tubes, placed at the lake or pond floor, through which air is pumped by an on-shore compressor. Emitters along the tubing break up the air stream into different bubble sizes. The larger the bubbles, the more surface disturbance will occur.

As the bubbles from the emitters rise to the surface they oxygenate the water. The rising air also helps circulate the water and decreases stratification.

For uniform aeration, the length and spacing of the tubing and size of the compressor must be specifically designed for the pond in question. The operation cost of these systems depends on the size and depth of the body of water. The deeper it is, the more power it will take to send air upward.

Ozonation is a variation on diffused air injection. Instead of simply injecting air though underground tubing, the system adds ozone. Ozone gas is a powerful oxidant. Its 0_3 configuration readily breaks down into 0_2, which we know as oxygen and oxygen radical, which easily bonds with other ions. This means ozone can oxidize many organic and inorganic components.

Best Defense

Regardless of the type of aeration system you select, the key is to get it in place before the water quality becomes a problem. The restorative powers of these systems is impressive; however, restoration takes time.

Knowledgeable distributors can help you select a system — often they'll come on-site to examine your water feature. If not, make sure you know the feature's surface area, depth and rough shape so they have a few specifics on which to base their recommendations. (A diagram of the pond or lake will help.) And, of course, you must determine what will fit within your budget.

In water quality in lakes and ponds, your best defense is a strong offense. Paying attention to it now could make it the least of your worries later. ❑