Lake and Pond Aeration Techniques

Bulletin Brief

Lake ponds may suffer some form of quality loss or degradation as they mature. This loss of quality may include low dissolved oxygen concentrations, excessive algae concentrations, odor or other nuisance conditions that need to be remedied.

Technical Presentation

Application of aeration and mixing in lake ponds is often modest in horsepower but location of diffuser units and proper design of the system is mandatory. Aeration is a common method for enhancing the quality of ponds and lakes by minimizing eutrophication and/or minimizing stratification.

Improve Lake and Pond Quality

For small lakes and systems suffering quality loss from aging (eutrophication), aeration can be helpful to reverse this trend and improve the pond or lake quality for continued use and enjoyment. Aeration in these systems would normally be accomplished for the following purposes:

a. Aeration to limit the growth of algae and minimize algae concentrations in the pond.
b. Increase the Dissolved Oxygen (D.O.) level in the basins in order to allow fish propagation.
c. Increase DO levels in the basin to eliminate odors and gasses escaping from the bental (sludge) deposits.

Designs of systems for each of these applications requires a review of the basin geometry, depth of the basin and what loads or what organic material is being contributed to the pond or lake. EDI technicians can offer suggestions on upgrading and rehabilitating lakes and ponds that experience these types of difficulties. Most aeration systems require a nominal amount of energy with proper distribution of the energy for proper operation of the system. If major organic loads are contributed to the pond it may be necessary to perform a specialized design as a waste treatment facility.

Deep Lakes and Stratification

Lakes or ponds that are very deep sometimes require destratification. Thermal stratification is common in very deep basins or large and deep basins. Stratification can cause major difficulties as indicated below:

1. Below the hypolimnion (thermolcline) in deep lakes the dissolved oxygen content will frequently go to zero. This area is unmixed and a dead zone occurs.

2. Reservoirs, lakes or ponds used as water supplies can have buildup of undesirable chemicals such as manganese, hydrogen sulfide, iron, and create water treatment problems and/or taste and odor problems for the finished water.
3. Stratified lakes tend to turn over in the spring and in the fall from natural causes. This turn over is induced by temperature changes and creates major quality deterioration in the reservoir and can result in fish kills and nuisance conditions.

Proper application of aeration mixing techniques in stratified lakes or reservoirs can eliminate most of the difficulties and nuisance conditions outlined above. By introducing a modest amount of energy and pumpage at deep locations in a basin, a hole can be pumped through the hypolimnion layer creating a vent for hydraulic or air lift pumping action which causes the entire lake to be mixed and maintain a uniform quality throughout.

Summary

Aeration is a common method for enhancing the quality of ponds and lakes by minimizing eutrophication and/or minimizing stratification. Diffused aeration systems are the premier method for accomplishing this objective and EDI advanced technology diffusers can be properly engineered for these duties. Please contact EDI for suggestions on these types aeration-mixing applications for ponds and lakes.

For specific information on aeration system selection considerations, contact Environmental Dynamics, Inc. at 573-474-9456.