

Singapore Fish Farm Minimizes Adverse Effects of Algae Buildup with DPAsys.

Challenge

A leading fish producer in Singapore rears a variety of fish such as giant snakeheads, grouper and red tilapia. Their major customers include well-known restaurants and hyper-marts in Singapore. However, maintaining quality of water in aquaculture activities is a challenge for the fish farm owners.

Common water quality issues faced by fish farm owners include: Excessive nutrients, such as Nitrogen from municipal wastewater, farm runoff and fertilizers as well as Phosphorus from fertilizers and detergents; Pathogens from untreated or poorly treated sewage; Toxic organics originating from pesticides and herbicides; Toxic metals, especially Arsenic, Cadmium and Mercury; Suspended solids (siltation) as a result of soil erosion and various industrial processes.

Having excessive nutrients in breeding ponds is the most pressing problem. When fishes excrete or left-over fish feed decompose, organic nutrients such as nitrate/ phosphate in water increase and pollute water in ponds. Pollution in surface waters is measured in terms of their aggregate potential for oxygen depletion.

This is termed the *Biochemical Oxygen Demand (BOD)*.

Substances contributing to BOD become food for bacteria, and the more the bacteria feed on these, the more they also take in oxygen. Furthermore, if temperature and nutrient levels are optimum, there will be rapid algae growth, leading to "algae bloom." Algae blooms are likely to cause depletion of Dissolved Oxygen (DO) in fish ponds.



Figure 1: Before DPAsys treatment (above) – occurrence of "algae blooms" leads to heavy buildup of algae in surface waters of the pond.



Figure 2: Before DPAsys treatment (above) - algae buildup scooped from a breeding pond and placed under closer observation

Solutions

Using SIF Technologies' proprietary technology, appropriate Environmental Engineering solutions were developed to reduce the adverse impact of serious algae buildup. Environmental Engineering refers to a discipline of engineering dedicated to the development and application of scientific knowledge to minimize detrimental effects associated with human activities. It operates at four different levels: remediation of contaminated sites, treatment of effluents, pollution prevention and care for future generations.

Firstly, site survey and engineering audit were conducted by SIF Technologies to identify key problems. Subsequently, on 30th August 2006, a full-scale trial was initiated to introduce DPA system into a pond which measures 30 m x 18 m x 2.5 m and contains approximately 1, 500, 000 liters of water. Optical recording equipment was used to document the effects of DPA system on the quality of water.

Results

In October 2006, more than a month after DPA system was installed in the water circulation system, it was observed that algae buildup in the outdoor breeding pond has been mitigated. The thick layer of algae is no longer present. In contrast, the water surface displays much higher transparency and clarity as shown below.



Figure 3: After DPAsys treatment (above)- Edges of the pond free of algae buildup and water surface displays higher transparency.



Figure 4: Right-hand-side shows a unit of the DPA system employed in the circulation flow.