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## **The sulfur cycle and hydrogen sulfide production in aquatic ecosystems with an emphasis on aquaculture**

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### **Abstract**

The sulfur cycle, the ecology and physiology of sulfate reducing bacteria, the mode of production and factors affecting the production of hydrogen sulfide and, finally, its environmental effects have been investigated in this study. The sulfur cycle is a complex biogeochemical process in aquatic ecosystems including four stages of mineralization, immobilization, reduction and oxidation. In organic matter-rich aquatic ecosystems, especially aquaculture ponds, half of organic matter decomposed under anaerobic condition by sulfate reducing bacteria, and hydrogen sulfide gas is produced as a byproduct during this process. Increasing the concentration of hydrogen sulfide (more than 0.002 mg/l) in aquaculture ponds can lead to aquatic mortality, reduced growth and reproduction, and an unpleasant odor, as well as an increase in oxygen consumption rates. The very low concentration of hydrogen sulfide is very toxic to aquatic organisms and therefore its production must be prevented. On the other hand, degradation of organic matter increases the amount of nutrients (e.g., nitrogen and phosphorus) in water, thus causing eutrophication of the ecosystems. Therefore, sulfur cycle has both negative and positive effect in aquatic ecosystems.

**Keywords:** Aquaculture, Aquatic ecosystems, Hydrogen sulfide, Sulfate reducing bacteria, Sulfur cycle

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