

Nitrogen cycling in Lake Honghu

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1. Introduction

Eutrophication of inland water has been progressing in China since 1990s. And rapid increase of nitrogen may be one of the factors (Sato et al., 2003). China is the largest fertilizer user in a world, and the rate of increase rises to 5% per year (Christopher, 2001). So we are anxious about pollution originated from the increase in nitrogen. The purposes of this research clarify the water chemistry and the condition of nitrogen in Lake Honghu, Hubei Province. The water level of Lake Honghu is controlled at the altitude of 26m, and the outflow waterways to Changjiang River are also adjusted through the sluices. Fish cultivation is active and some 40% (ca. 138km²) of the lake are surrounded with the nets of fisheries farm. Since 2000, crab is mainly cultivated (talk at Honghu Wetlands Nature Reserve Office At Hubei Province).

Field survey were 20 sites at Lake Honghu, 3 sites inflow waterways, 7 sites outflow waterways, and 2 sites at Changjiang River in September 5-8, 2003.

2. Methods

Total Nitrogen (DR LANGE LASA20) and NH₄⁺, NO₂⁻, and NO₃⁻ (Shimadzu co. LC-10, Ion Chromatography) were measured. And organic nitrogen was calculated a formula inorganic nitrogen (total nitrogen - inorganic nitrogen) here inorganic nitrogen are NH₄-N, NO₂-N, and NO₃-N.

3. Results and conclusion

3-1. Characteristics of the water chemistry in Lake Honghu

The surface waters in Lake Honghu have high pH (average of 8.91), dissolved oxygen is super saturated (average of 150%), and COD are comparatively high (average of 17.8 mg/L). We considered why photosynthesis by phytoplankton was more active in the lake than in the outflow waterways.

All water chemistry showed Ca-HCO₃ type at all points. but HCO₃⁻ concentration in Lake Honghu (average of 1.7 meq/L) showed lower than inflow waterways (average of 2.7 meq/L). These suggested the reduction by photosynthesis by phytoplankton were active in Lake Honghu. Moreover, organic nitrogen showed were made from inorganic nitrogen by photosynthesis through phytoplankton.

3-2. Nitrogen cycling in Lake Honghu

According to inorganic nitrogen in Lake Honghu, NH₄-N were dominant inorganic nitrogen, but outflow waterways had higher NO₃-N. Moreover, outflow waterways had low COD and organic nitrogen concentration. By Lake Honghu, I think that reproduction of NH₄-N by reduced organic nitrogen and absorption of NH₄-N by phytoplankton kept dynamic balance. In the rate of reproduction of NH₄-N had restricted production by phytoplankton and lower COD and organic nitrogen in outflow waterways suggested the reduction of the organic nitrogen by phytoplankton. In Lake Honghu, NH₄-N supplied by decomposition of organic nitrogen was predominant. In outflow waterways, assimilation and absorption of NH₄-N through phytoplankton lowered excessive NH₄-N, and it was nitrified, so NO₃-N was predominant.