

NOTICE OF PUBLICATION

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Title: Dynamics of Dissolved Oxygen and Vertical Circulation in Fish Ponds

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Abstract: Dissolved oxygen dynamics and vertical water circulation in high density integrated fish culture ponds were monitored monthly at 2-h intervals for 26h from March through September at the Pearl River Delta, China. Stable thermal stratification was found almost daily in May through September. Vertical circulation began daily between 8 and 10 p.m. The average depth for this turnover in summer can be as great as 0.7-1 m. Complete vertical circulation occurs only during major storms. A convection turbulence model was used to examine the vertical mixing process and showed that light wind (<100 cm/s) and surface cooling (<2°C) after sunset can substantially influence the depth of mixing.

Photosynthesis by algae is the most important natural mechanism contributing oxygen to ponds; compared to photosynthesis, net oxygen gain and loss due to diffusion during daylight is small. The compensation depth corresponded to twice the Secchi disk depth, ranging from 50 to 80 cm. The dissolved oxygen concentration in the hypolimnion was usually less than 2 mg/l, but increased at night during the period of vertical circulation. Hypolimnion oxygen deficit (HOD) was explored with the in situ dissolved oxygen concentration. HOD was found to increase during the daylight period and decrease at night after destratification.

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