

Reduction Effects of Turbidity and Nutrients by Ponds in Agricultural Region

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The purpose of this study is to investigate roles in reduction effects on environmental loads from non-point source (NPS) by ponds located along semi-closed sea. Field measurements and a numerical analysis were conducted in order to understand the roles of ponds in agricultural region along Yatsushiro Sea, which is one of the large semi-closed bays in Kyushu Island of Japan. Recently the sea comes up against eutrophication problems.

First, outflow flux of loads was measured at gates located at the lower reach of two adjoining ponds *A* and *B*. The measured items were water level, turbidity and nutrient rich salts. In addition, field observations were conducted on Apr. 16 1999 in Pond *A* and on Apr. 15 in Pond *B*. Meteorological and tidal conditions were almost the same on those 2 days.

Second, the duration of outflow was observed for about 3 hours in each day at low tide, but different characteristics were observed in the outflow flux between 2 ponds. In the case of Pond *A*, turbidity and concentration of SS, T-N and T-P increased by 350%, 180%, 130% and 190% respectively during the starting 15 min. within an hour in contrast to the case of Pond *B* where just small changes of those concentration were observed.

Third, one-dimensional simulation model for water and turbidity movement was developed in order to explain the above-mentioned features by the differences of hydraulic properties of those ponds and it was applied to the analysis of reduction effects on turbidity and nutrients by the ponds.

Based on the model simulation, it was concluded that those ponds have the effects on effluent reduction and that the extent of this effects depends on the hydraulic characteristics of the ponds. Therefore, our suggestion is to keep retention time longer and the depth of ponds deeper in order to lessen outflow loads of turbidity and nutrients salts to the sea.

