OP-07

Applications of Two different Water Quality Models to Daechung Reservoir

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WASP5 and CE-QUAL-W2 were used to simulate the water quality behavior in Daechung Reservoir. The WASP5 was linked to the DYNHYD5 using 25 segments, and constituents simulated are seven parameters such as organic phosphorus, organic nitrogen, and algal biomass. The CE-QUAL-W2 was composed of 122 longitudinal segments and 33 layers, and simulated 10 constituents such as water temperature, suspended solids, nitrate-nitrogen, total phosphorus, and algal biomass. These variables were calibrated to the actual data, measured at the dam site, and the predicted values showed good agreements of actural data between the two models. It was turned out that the CE-QUAL-W2 model was better than the WASP5 model for the reservoir. It may be due to high vertical gradients in water quality in this system.

Regression analysis of algal biomass against log-transformed nutrients showed that algal biomass is suppressed due to short hydraulic retention time and light limitation bu high inorganic solids. Trophic state deviations, based on Carlson's approach (1993), were also evident during the period of July to August. Physical factors, such as thermal stratification, water column mixing, inflow pathway, and light availability were considered as a key factor controlling algal growth in the system. The ratio of euphotic depth to mixing depth averaged 0.38. At this time, algae may spend a relatively short period of time in the light condition and its growth could be suppressed. The CE-QUAL-W2 predicted well seasonal patterns such as the stratification during summer periods, the destratification during autumn periods, and the sub-surface plunging of inflow waters. Conversely, the WASP5 did not showed a sensitivity like the CE-QUAL-W2 model due to a assumption of non-vertical gradients between epilimnion and hypolimnion. The comparisons of two simulation models suggest that the calibration of the WASP5 is not reliable in the simulations of the deep reservoir, and the CE-QUAL-W2 have greater advantages than the WASP5.