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The Effects of Serial Impoundments on Dynamics of Water Temperature and Conductivity

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In the trends of spatial and temporal dynamics, temperature and conductivity were analyzed to examine the effect of serial impoundments in the north Han-river watershed using the long-term data base from 1992 to 2000. The study sites were altered from lentic(Paro, Chuncheon, Euiam, Cheonpyeong and Paldang lakes) to lotic systems over the serial impoundments, and this condition resulted in longitudinal gradients of temperature and conductivity. Hydrodynamic fluctuation reflected the intensity of rainfall, which became heavy mainly during the summer monsoon in July-August, resulting in the largest water quality variation.

The Spatial distribution of temperature and conductivity showed distinct difference along the serial impoundments and varied with the hydrodynamic conditions. Surface temperature in the lentic systems, based on the mean of 8-year period, was 1°C higher than in the lotic systems. Mean temperatures declined from the headwaters to downstreams. Higher annual temperature in drought year attributed to less precipitation, and the seasonal difference between the premonsoon(Jan.-Jun.) and the postmonsoon(Sep.-Dec.) was minor.

Conductivity decreased in the reach from the headwaters to Euiam Lake, but increased abruptly near Paldang Lake. Conductivity values were the highest during summer monsoon and decreased rapidly in September, indicating that dilution occurred after summer due to a time-lag phenomenon of water column mixis. In addition, the time of conductivity declining was delayed as it goes to the downstream reach. This indicates that the serial impoundments affect the mixing regime from the headwaters to the downstreams. Overall data suggest that the time and the amount of dam releasing influenced the thermal regime and ionic contents in the serial impoundment systems.

Key words : Serial Impoundments, Water Quality, Temperature, Conductivity