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Nutrient exchange between surface water and subsurface water in ponded shallow reservoir of a suburban river catchment

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This research aims to clarify the nutrient exchange processes within the reservoir in a suburban river with considering of interaction between subsurface water and river water. The vertical distribution of nutrient concentration in the water column and sediment pore water indicates there was large concentration gradient of dissolved nitrogen and phosphorus across the water-sediment interface. $\text{NO}_3\text{-N}$ was dominated in the water column although $\text{NH}_4\text{-N}$ and $\text{PO}_4\text{-P}$ were dominated in the sediment pore water. The hydraulic gradient between the surface water and pore water in the sediment indicates that this reservoir has advection from the water column to the sediment throughout of a year. As a result, it was confirmed the surface water infiltration in this reservoir. Based on the estimation of nutrient flux by diffusion and advection, diffusive fluxes of $\text{NH}_4\text{-N}$ and $\text{PO}_4\text{-P}$ was larger than advective fluxes. Totally, it was confirmed that this reservoir worked as a source of on the material transport in the river system. However, diffusive fluxes of $\text{NO}_3\text{-N}$ and $\text{NO}_2\text{-N}$ indicated downward (water column to sediment) as same as advective fluxes, because $\text{NO}_3\text{-N}$ and $\text{NO}_2\text{-N}$ would be attenuated by denitrification near the surface sediment. This result suggests the reservoir works as attenuation zone for nitrogen.

Keywords: Lentic water, Nutrient, Sediment, Diffusion, Advection, Takaya River