

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

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**Abstract** This research aims to clarify the nutrient exchange processes within the reservoir of a suburban river by considering the interaction between subsurface water and river water. The vertical distributions of nutrient concentrations in the water column and sediment pore water indicate a large concentration gradient of dissolved nitrogen and phosphorus across the water–sediment interface.  $\text{NO}_3^-$ -N dominates in the water column, whereas  $\text{NH}_4^+$ -N and  $\text{PO}_4^{2-}$ -P dominate in the sediment pore water. The hydraulic gradient between the surface water and pore water in the sediment indicates that advection from the water column to the sediment occurs throughout the year, hence confirming surface water infiltration in this reservoir. Estimation of diffusive and advective nutrient flux showed that diffusive fluxes of  $\text{NH}_4^+$ -N and  $\text{PO}_4^{2-}$ -P are larger than advective fluxes and that this reservoir acts as a source of these components for the river system. However, diffusive fluxes of  $\text{NO}_3^-$ -N and  $\text{NO}_2^-$ -N indicated a downward (water column to sediment) flux (i.e. same direction as advective fluxes) as  $\text{NO}_3^-$ -N and  $\text{NO}_2^-$ -N are attenuated by denitrification near the surface sediment. This result suggests the reservoir works as an attenuation zone for nitrogen.

**Key words** small reservoir; nutrient; diffusion; advection; suburban river