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Nitrogen and sulfur isotope analysis of anthropogenic nitrate pollution of river at the Tatebayashi city

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To identify anthropogenic sources of nitrogen in the Tsuruuda river of the Tatebayashi City, Gunma Prefecture, stable isotope composition of nitrogen ($\delta^{15}\text{N}$) and sulfur ($\delta^{34}\text{S}$) as well as the nitrate concentration in eleven river water were determined. The high proportion of $\text{Cl}^- + \text{SO}_4^{2-} + \text{NO}_3^-$ in the total anion concentration suggests strong influence of human activities on the groundwater quality. The $\delta^{15}\text{N}$ values of NO_3^- in the river range from +7.9 to +11.2 permil, suggesting that the NO_3^- contamination (2.4 to 7.9 mg L⁻¹) was caused by domestic sewage. The $\delta^{34}\text{S}$ values of sulfate in the river were in the narrow range from +1.4 to +2.8 permil, and suggest that the contaminant sulfur was also originated from domestic sewage and detergents (-2.9 to +3.6 permil). These results demonstrate that simultaneous analysis of $\delta^{34}\text{S}$ and $\delta^{15}\text{N}$ is very useful for reliable estimation of the origin of NO_3^- in river.

Keywords: pollution of river, stable isotope, Tatebayashi