

Evaluation of nitrate attenuation potential in the groundwater of Jakarta metropolitan area, Indonesia

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Abstract To evaluate the nitrate attenuation potential in the groundwater of Jakarta metropolitan area, we tried to examine the mixing and denitrification process with the groundwater flow. The hydraulic potential distribution shows the direction of overall horizontal groundwater flow is from the mountainside to Jakarta Bay (south to north). Nitrate-nitrogen (NO₃N) concentrations in the shallow groundwater at depths of <100 m were more than 600 μ M⁻¹ in the mountainside. However, it declined to less than 50 μ M⁻¹ during 5 km of horizontal groundwater flow. The variation in nitrogen stable isotope ratio (δ¹⁵N) shows slightly increasing trend with groundwater flow. The relation between Cl⁻ and NO₃N concentrations, and NO₃N and δ¹⁵N suggests that the mixing and denitrification process occurs in the shallow groundwater. Based on these results, it is estimated that approx. 5% of nitrate denitrified during 1 km of horizontal groundwater flow. Compared with the result in the Yellow River Delta, the nitrate attenuation potential in the groundwater is relatively low in Jakarta. However, it is suggested that nitrate in the groundwater is denitrified before it reaches the sea.

Key words nitrate; attenuation potential; aquifer, Jakarta