

Ammonium and nitrate contamination source and dynamics in groundwater of Kathmandu Valley, Nepal

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Groundwater quality is a critical problem in the Kathmandu Valley, Nepal. The population of the city increased by 6 times in the last six decades and more than half of water demand depends on groundwater source. Microbial and nitrogen contamination causes loss of water resources, nevertheless, understanding of ammonia and nitrate source and contamination process in groundwater system. Objective of this study is to identify the source and contamination processes of the ammonium and nitrate in the groundwater.

Groundwater samples were collected from 32 shallow dug wells, 7 tube wells and 5 deep tube wells in September 2014 and August 2015. About 87% and 60% of groundwater exceeded WHO guideline values for ammonium and nitrate concentrations respectively. Nitrogen isotope values of ammonium suggest that natural soil production from lake sediments layer in the valley is main contamination sources for deep and shallow tube wells. In case of dug wells are contaminated by soil production with sewage nitrogen. And nitrogen and oxygen isotopes in nitrate suggest the sewage is main contamination sources of shallow dug wells and denitrification occurrence in shallow groundwater.

Ammonium nitrogen isotope values are shows less than 10%. On the other hand nitrate isotope values are above 10%, these differences of ammonium and nitrate-nitrogen isotope values are suggests the nitrate contamination sources are only sewage with out nitrification by ammonium originated from natural soil. The ammonium stored in groundwater body with out nitrification and denitrifications.

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