

Application of Groundwater Model for Optimization of Denitrification Strategies to Minimize Public Health Risk

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Abstract : High-nitrate concentration in groundwater of unconfined aquifers has been a serious issue for public health risk at a global scale. Various anthropogenic activities in agricultural land and urban land of alluvial soil have been observed to be responsible for the increment of nitrate in groundwater. The present study was designed to identify suitable denitrification strategies to minimize the effects of high nitrate in groundwater near the Mahi River of Vadodara block, Gujarat. There were 11 wells of Jal Jeevan Mission, Ministry of Jal Shakti, along with 3 observation wells of Gujarat Water Resources Development Corporation have been used for the duration of 21 years. MODFLOW and MT3DMS codes have been used to simulate solute transport phenomena along with attempted effectively for optimization. Current research is one step ahead by optimizing various denitrification strategies with the simulation of the model. The in-situ and ex-situ denitrification strategies viz. NAS (No Action Scenario), CAS (Crop Alternation Scenario), PS (Phytoremediation Scenario), and CAS + PS (Crop Alternation Scenario + Phytoremediation Scenario) have been selected for the optimization. The groundwater model simulates the most suitable denitrification strategy considering the hydrogeological characteristics at the targeted well.

Keywords : groundwater, high nitrate, MODFLOW, MT3DMS, optimization, denitrification strategy

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