

Geochemical assessment of groundwater composition and evaluating its suitability of Saidpur Upazilla in Bangladesh

ABSTRACT

The chemical analysis of 44 groundwater samples in the northern Bangladesh has been evaluated to determine the hydrogeochemical processes and major ions, heavy and rare metal concentration for its suitability for agricultural and domestic purposes. The quality analysis is performed through the estimation of pH, EC, cations (Ca^{2+} , Mg^{2+} , Na^{+} , K^{+} , Zn^{2+} , Cu^{2+} , Mn^{2+} , Fe^{3+} and As^{3+}), anions (CO_3^{2-} , HCO_3^{-} , NO_3^{-} , SO_4^{2-} , PO_4^{3-} and Cl^{-}) and TDS (total dissolved solids). We also computed several variables such as SAR (sodium adsorption ratio), SSP (soluble sodium percentage) RSC (residual sodium carbonate), potential salinity, permeability index, Kelly's ratio, Gibbs ratio and hardness to evaluate the suitability of groundwater supply for specific uses. From the geochemical results, it has been found that both the cations and anions varied in the groundwater. Among the chemical budget of ions, magnesium and chloride were found to be the most predominant ions. The intense agricultural activities may be an important factor for the higher concentration of nitrates in these aquifers. Based on the total hardness, most groundwaters are moderately hard. According to EC and SAR the most dominant class is C1-S1. The major ion concentrations are below the acceptable level for drinking water. The salinity hazard is low thus, there is less chances to increase of toxic salt concentrations. Gibbs diagram indicates that all the samples fall in the precipitation dominance field. Regarding cation and anion constituents, groundwater is suitable for irrigation and drinking purposes except of few wells.

Keyword: Hydro geochemistry; Groundwater quality; Northern Bangladesh