Geochemistry and groundwater quality assessment of Farah city, west Afghanistan

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In the light of progressive depletion of groundwater reservoir and water quality deterioration of the Farah city, hydrogeochemical investigation on dissolved major constituents in 27 groundwater samples carried out. The main objective was detection of main processes for the geochemical assessment throughout the study area to assess the quality of groundwater for its suitability for drinking and irrigation purposes. Groundwater samples are collected from both shallow and deep wells to monitor the hydrochemistry of various ions. The groundwater quality of the area is adversely affected by urbanization as indicated by distribution of EC and nitrate. In the groundwater of study area, Ca^{2+} is the most dominant cation and Cl^- and HCO_3^- are the dominant anions. Majority of the samples have total dissolved solids values above desirable limit and most of them belong to very hard type. As compared to deep aquifers, shallow aquifer groundwaters are more polluted and have high concentration of NO_3^-. The analytical results reveal that most of the samples containing high nitrate also have high chloride. Major hydrochemical facies were identified using Piper trilinear diagram. Alkaline earth exceeds alkalis and weak acids exceed strong acids. Shoeller index values reveal that base-exchange reaction exists all over the area. Based on US salinity diagram most of samples belong to high salinity low sodium type. A comparison of groundwater quality in relation to drinking water standards showed that most of the water samples are not suitable for drinking purpose.

Key words: Geochemistry, Groundwater quality, Farah City, Afghanistan