ISSN:2372-0743 print
ISSN:2373-2989 on line
International Journal of Ground Sediment & Water
Vol. 08
2019

◆Research Paper

DOI: 10.5281/zenodo.3065618

Multidimensional Approach for Groundwater Quality Assessment of Miocene Rocks: A Case Study of Gulistan-e-Johar Area, Karachi, Pakistan

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Abstract: The main objective of present study is to evaluate the groundwater quality of Gulistan-e-Johar town for drinking purpose. Groundwater samples (n= 50) were collected from shallow boring wells at various depths (9-15m). The groundwater pH is acidic to basic (range: 6.7-7.8; mean: 7.2) where a large number of samples (80%) are alkaline. Geochemical data revealed that groundwater samples are highly saline (90%) where highly variable TDS content (range: 408-48192ppm; mean: 58192ppm) is reported. Major cation and anion varied in the order of Na (453 mg/l) >Ca (238 mg/l) >Mg (223mg/l) > K (29mg/l) and Cl (1435 mg/l) > SO_4 (1086 mg/l) > HCO_3 (318 mg/l) > NO_3 (17 mg/l) respectively. Na and Ca have more than double the concentration of corresponding WHO guideline values. On the other hand, Mg content is four times higher than its recommended value. Elevated Fe content is also detected about one third in samples (0.1-0.67mg/l). About 60% of collected samples are sewage impacted as indicated by the occurrence of fecal coliforms. Principal component analysis explained five principal components (PCs). PC1 is suggesting rock water interaction and sewage mixing.PC2 shows prevalence ofanoxiaproperties.PC3 indicates strong Fe, Zn and turbidity relation which suggests ion exchange process.PC4 and PC5 have shown strong relation of nitrate with sewage indicating the prevalence of reducing environment. The study has concluded that intense geochemical processes and anthropogenic activities are altering the ground water quality of shallow aquifers in Gulistan-e-Johar area where high salinity and hardness are major menace.

Keywords: Groundwater, geochemistry, drinking quality, Gulistan-e-Johar, Karachi.

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