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Assessment of impact on the groundwater quality due to solid waste disposal site southeast of Pune City, Maharashtra, India

Wagh G. S.

Department of Chemistry, Sharadchandra Pawar Mahavidyalaya, Lonand (M.S.) India- 415521.

e-mail-waghgs@yahoo.co.in

Water, one of the precious natural resources available on earth and when its quality or composition is changed due to natural or anthropogenic causes is unsuitable for drinking and domestic purposes. Pune City has been experiencing urbanization due to rapid economical development resulting in dramatic changes in the land-use pattern imposing a negative impact on groundwater quality. The unplanned disposal of solid waste on land surface leads to downward movement of pollutants from the surface causing degradation of groundwater quality. In this study assessment of water quality using various methods is an important mission. To assess the contamination of groundwater in the dug-wells SE of Pune City (India) 37 physico-chemical parameters were determined for 156 water samples collected. The study was undertaken in three consecutive seasons i.e. rainy, winter and summer (from June 2007 to May 2008). The results indicate that there is a good temporal variability in the pollution parameters as revealed by the NDDI values. Based on the hydrogeochemical facies it has been found that the groundwater regime is severely deteriorated by anthropogenic activities. Although the area of Manjari, Hadapsar and Uruli Devachi show high influx of pollutants in rainy season the Mantarwadi and Fursungi area have strong influence of leachate downward movement, as reflected in parameters like EC, TDS, Alkalinity, CO₂, Cl, SO₄, NO₃, PO₄, HCO₃ Ca, Mg, Na, K and Hardness. Thus the groundwater chemistry in the area is controlled not only by the chemical weathering of the basaltic rocks but also by anthropogenic sources. The use of simple statistical analysis, frequency histograms, Q-Q plots, hierarchical cluster dendograms and Pearson correlation coefficients has revealed that different areas have different pollution levels. The Manjari area is affected by effluents carried by river and the fertilizers used for agriculture while the unplanned solid waste disposal practice has strong influence on groundwaters from Mantarwadi, followed by Fursungi and Uruli Devachi.

Keywords: Major ion chemistry; Hydrogeochemical analysis; Normalized Difference Dispersal Index (NDDI), Statistical analysis; Solid waste disposal; Groundwater pollution; Pune, Maharashtra (India).

