

IMPACT OF URBANISATION ON GROUNDWATER REGIME WITH SPECIAL REFERENCE TO ITS QUALITY IN CRYSTALLINE BASEMENT OF HYDERABAD CITY, INDIA

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Abstract

Groundwater regime in Hyderabad city is undergoing a change due to (i) deep well drilling extending to more than 300 metres, (ii) high rate of groundwater withdrawal, (iii) decreasing recharge, (iv) poor sanitation and industrialisation, (v) introduction of artificial recharge measures, etc. The first three factors have caused regional lowering of water table by about 2 to 5 metres and also led to change in geometry of aquifer as fractures at different levels got connected, which is aptly referred to as "short circuiting of fracture system". Short circuit of flow system is possibly a local phenomenon as at some locations deep wells intersect multiple fractured zones and rejuvenate comparatively shallow wells in the surrounding areas. The fourth factor has led to general deterioration of groundwater quality. Artificial recharge measures in their neighbourhood have contributed for the improvement of recharge. In an effort to assess the water quality variations due to rapid urbanization, the water chemistry of both surface and groundwater of Hyderabad city is studied in detail and the ionic assemblage of groundwater of Hyderabad is compared with a rural watershed for a precise impact assessment of unplanned city development on sub-surface water. Groundwater within the city area is either sodium chloride type (at higher total dissolved solids) or mixed type and in the rural watershed it is mixed-bicarbonate type. Surface water of freshwater lakes is calcium bicarbonate type and that of the river water is sodium chloride type. It also shows that groundwater in Hyderabad has higher fluoride and nitrate content compared to that of other area and surface water of freshwater lakes. Nitrates above permissible limits, in few areas, are associated with chloride levels higher than 220 mg/L which indicate sewage-contamination. Magnesium type water at low and high total dissolved solids is intriguing and needs further studies.

Keywords: River Musi, Hyderabad city, Groundwater quality, Nitrates, Maheshwaram watershed.