

Assessment of heavy metal pollution in tropical unconfined aquifers in Southwestern India and its impact on human health: A GIS approach

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Groundwater is a primary resource of drinking water and agriculture in India. Reports of heavy metal pollution in groundwater are a matter of public concern as it is affecting human health and the ecosystem. This study assesses heavy metal pollution and its risk to human health in the unconfined aquifers of southwestern India. Twenty five groundwater samples were collected from the open wells during the pre-monsoon season. Heavy metals were determined using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Spatial variation in heavy metal distributions and its potential health risk was analysed using geo-statistical interpolation tool GIS. United States Environmental Protection Agency (USEPA) method was used to calculate pollution index and human health risk. The results revealed the presence of the heavy metals in the groundwater with mean dominance in the order Mn > Al > Fe > Zn > Cu > Ni > Co > Cr > Pb. North-western part of the study area has significant concentration of heavy metals due to intensive agricultural activity. Densely populated area showed high concentrations of Ni and Zn which was probably sourced from the sewage treatment plant effluents. Human health risk assessment findings revealed that children are more prone to carcinogenic and non-carcinogenic health risks than adults and infants. The study recommends regular monitoring of groundwater to control heavy metal pollution from anthropogenic activities. Mapping of pollution and health risk in the study area using GIS is useful for policy makers in making informed decisions. The findings of the study will aid in the development of site-specific remediation measures to control the heavy metal pollution