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Physicochemical and Biochemical Characterization of Ground waters near point Sources for Assessing their Quality for user End Application

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ABSTRACT

The present proposal research study is mainly focused on evaluation of quality of ground waters around Sugar and Sago industrial units (Point Sources) to assess their potential for end use applications. The study includes the characterization of ground waters collected during pre and post monsoon seasons for physicochemical parameters viz., pH, Electrical Conductivity(EC), Total Dissolved Solids(TDS), Total Hardness(TH), Total Alkalinity(TA), Calcium(Ca^{+2}), Magnesium(Mg^{+2}), Sodium(Na^{+}), Potassium(K^{+}), Fluoride(F^{-}), Chloride(Cl^{-}), Sulphate(So_4^{-2}), Nitrate(No_3^{-}) and Phosphate(Po_4^{-3}) for estimating the chemical contamination status. Irrigation parameters like Percent Sodium(%Na), Sodium Adsorption Ratio(SAR), Residual Sodium Carbonate(RSC), Magnesium Hazard(MH) and Kelly's Ratio(KR) are also determined to verify the quality of ground waters for utilization for irrigation purposes. The parametric values of groundwater near sugar industry pH, EC, TDS, TA, Ca^{+2}, K, So_4^{-2}, No_3^{-} are observed at higher levels compared to the ground waters collected around sago industrial unit. The parametric levels TH, Cl^{-}, Mg^{+2}, Po_4^{-3} in waters near Sago Industry are comparatively higher than the parametric values of ground waters near Sugar industrial unit. Dissolved Oxygen(DO) levels of groundwater are observed at BDL near sugar industries while the DO levels of ground waters near Sago industry are observed at 1.7mg/l. Majority of parametric values of ground waters near sugar industrial unit indicate the higher levels of chemical contamination of waters Sugar Industry compared to the waters near sago industry. DO levels indicate their unsuitability for utilization of these waters for aqua cultural purposes. The physicochemical parametric values indicate that the contamination of ground waters near sugar industry are higher than the contamination of ground waters near sago industry. The irrigation parametric values viz., %Na, SAR, Kelly's Ratio are within the permissible limits of irrigation standards while the RSC and MH values are higher than the permissible limits of irrigation standards. Ground waters near both industrial units were analyzed for bacteria and the research results revealed that the ground waters were identified not only with MPN count in majority groundwater samples but also with other pathogenic bacterial species like E.Coli, Klebsiella, Pseudomonas, Proteus and Enterobacter indicating the bacterial contamination of ground waters near both the industrial units. The research results confirmed the unsuitability of the ground waters near both the industrial units for drinking and domestic purposes. The waters are to be properly treated even for consideration for irrigation purposes or otherwise the higher levels of Magnesium Hazard levels deplete the soil quality and consequently the crop yields will be minimized.

Keywords: Ground water, Industrial area, Quality, Drinking, Bacteria, health.