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Groundwater susceptibility assessment of Kala Oya Basin, Sri Lanka

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Among Sri Lanka's River basins, Kala Oya basin is the third largest, and it is one of the most widely used sources of water for irrigation, water supply, and other diversions. North Central and North Western provinces are known to be having bi- seasonal climates: dry season and rainy season. In the dry season, people tend to rely on groundwater resources as surface water fails to fulfill their needs. In the dry season, the most important water source of the Kala Oya basin is the groundwater for both domestic and agricultural purposes. Natural and anthropogenic activities can adversely affect the quality of groundwater. Using the DRASTIC model in a GIS platform, the current study assisted in evaluating the vulnerability of groundwater. DRASTIC is an index method that considers the main hydrological and geological factors with a potential impact on groundwater pollution, in which each of the hydrogeological factors was assigned a rating from 1 to 10 based on a pre-set range of values. Its acronym stands for Depth to groundwater, Recharge rate, Aquifer, Soil, Topography, Impact of Vadose zone, and Conductivity of Aquifer. To map the groundwater vulnerability of the study area, the DRASTIC indices were calculated in the GIS environment by overlaying seven layers for dry and wet seasons in ArcGIS. The study shows that most of the watershed area comes under moderate groundwater vulnerable zone ($121 < DI \leq 135$) because of the high use of fertilizers for agricultural purposes, which led to the pollution of the groundwater in this watershed. This is a major cause of concern as the Kala Oya area is prone to drought and groundwater pollution. The study produced a valuable map for management personnel because it gives a very comprehensive indication of vulnerability to groundwater contamination. The high vulnerability of groundwater contamination makes it necessary for local authorities to manage groundwater resources, monitor this problem closely and to act accordingly. Vulnerability maps are good tools to make local and regional assessment of groundwater vulnerability potential to identify areas susceptible to contamination, to design a monitoring network, and to evaluate groundwater contamination, particularly nonpoint contamination.

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