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Geographical Information System Based Sensitivity Analysis Accurately Predicts Hydrocarbons Contamination Using Drastic Index and Multicriteria Analysis

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Among the numerous groundwater vulnerability assessment methodologies, the geographical information system-based DRASTIC model is the most widely used and have been found to achieve reliable results even in complex areas. However, hydrocarbon contamination cause by Anthropogenic activities has not previously being considered within these groundwater vulnerability assessment model. This study proposes a new flexible approach for optimizing the identification of input data layers that can help identify vulnerability to hydrocarbon contamination through the principles of sensitivity analysis. The single-parameter (SA) and map removal analysis(MA) was employed to obtain effective weights for the modified model, which were then implemented to improve efficacy Multi-criteria evaluation (MCE) techniques are part of a decision-making process for assigning weights of significance to each input layer to the DRASTIC model. The application is illustrated through a case study focussing on the city of Kano located in Northern Nigeria within west Africa .DRASTIC index model have seven paramters ,Depth of water table,net recharge ,Aquifer media ,soil media, Topography ,impact of vadose zone and hydrlaic conductivity. The most sensitive parameters are depth of water (22.92%), net recharge, (25.98), impact of Vadose zone (27.07%), The borehole data includes groundwater samples that were analysed for benzene, ethylbenzene and xylene (Betex) components of crude oil. Accordingly, the results presented the highest hydrocarbon content (51.66477mg/l) in Dala (western Kano) due to the significantly high number of hydrocarbon sources such as under-storage tanks within the petroleum stations and automobile garages.