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Assessment of natural radioactivity groundwater samples of high background area using GIS and Remote Sensing programs

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The Kingdom of Saudi Arabia (KSA) has prepared many strategies and plans that will be implemented to conserve natural resources according to the Kingdom's 2030 vision which promotes 17 sustainable development goals; the 6th goal of this strategy focuses on ensuring water quality for all. Several regions within the KSA were reported to have higher radionuclide concentrations in groundwater. The concentration of the radioactive radionuclides in groundwater depends mainly on the prevailing geochemical, geological, and hydrogeological conditions. This study aims to investigate a high background area of Natural radioactivity in Kingdom of Saudi Arabia (KSA) in Hail and Qassim by using Geographic Information System (GIS) and Remote Sensing (RS). An integrated approach that combines remote sensing data and tools, hydrogeological investigations, field observations, and geochemical analyses will be developed and applied to answer these four research questions over Hail and Qassim regions in central parts of KSA: (1) How do the geological conditions (e.g., lithology, structures) affect the radioactivity of groundwater? (2) how can we using Land use and Land Cover (LULC) tools to calculate the natural resources area, (3) how can we using Geographic Information System (GIS) to monitor radioactivity, (4) assess the risk of exposure due to natural radioactivity to estimate (radiological effects like the radium equivalent (Raeq), the absorbed dose rate (Dr), external hazard index (Hex), internal hazard index (Hin), representative gamma hazard index (Iγ) and the total annual effective dose equivalent (AEDE)) according to the following expression (UNSCEAR, 2000). Results from this research will be reported in a GIS format (e.g., raster and shapefiles) and will be available, upon request, for locals, researchers from universities and institutions, and decision makers in different KSA's governmental agencies.

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