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GEOSPATIAL ANALYSIS OF THE AQUIFEROUS POTENTIAL ZONES IN THE CRYSTALLINE BASEMENT OF BULAWAYO METROPOLITAN AREA, ZIMBABWE

Abstract

This study is concerned with the identification and delineation of aquiferous zones for potential groundwater development across Bulawayo Metropolitan from remotely sensed data and geological inference. Attempts have been made to review literatures on groundwater exploitation in the study area and the constraints to effective and sustainable management of underground water in the study area. Remote Sensing and Geographical Information Systems (GIS) is useful in recognition and delineation of aquiferous zones for potential groundwater in crystalline basement aquifers. Landsat image, SRTM data, aeromagnetic data and other ancillary data sets were utilized to extract information on the groundwater storing controlling features of this study area. Six thematic maps were produced from remote sensing data and other ancillary data - Land use/landcover, drainage density, slope map, contact density, lithology and lineament density. GIS modelling technique of index overlay method was used to produce groundwater potential map. The study revealed that the regional lineaments correlate with faults, fracture zones, and lithological contrasts along fold belts in the crystalline basement rocks, while the main direction of faulting and jointing is north-north-west to north with several faults oriented, to the north-north-east, parallel to the Great Dyke. Proximity to lineaments is highest zone of increased porosity and permeability which in turn have greater chance of accumulating groundwater. The results have shown massive spatial variability of ground water potential ranging from very good to poor. The variability closely followed variations in the structures, geology, topography/slope, drainage density and land use/cover in the project area.