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Spatial Patterns in Groundwater Availability and Selected Physical Properties in an Urban Area

Vithanage, P.G.[*], Wijeratne, V.P.I.S.

Department of Geography, University of Colombo, Colombo 03, Sri Lanka
*pavanivithanage5@gmail.com

Abstract

Groundwater is a vital resource for Sri Lanka, serving as a primary source of water for households, agriculture, and industries. This study aimed to assess changes in groundwater availability and quality in Pelenwatta North and East GNDs, Sri Lanka. Employing a grid-based systematic sampling approach, groundwater levels and water samples were collected during both wet and dry seasons. Spatial analysis techniques, including contour analysis and interpolation, were utilized to identify patterns in groundwater levels and water quality parameters using ArcGIS software. The study revealed that groundwater levels were highest in the western part and lowest in the upper middle portion, with built-up areas exhibiting the least availability due to impermeable surfaces hindering recharge. The average water level declined significantly from 7.8 m in the wet season to 5 m in the dry season, with an overall average decline of 2.76 m. A positive correlation between elevation and groundwater depletion indicated that higher elevations experienced greater water level declines. Furthermore, the study found that groundwater in the entire area was acidic, with mean pH values of 5.3 and 5.2 in the wet and dry seasons, respectively. High electrical conductivity (EC) levels were observed in the southeast. Additionally, the presence of total coliform and E. coli bacteria was detected in most water samples. These findings offer crucial insights for policymakers and water resource managers. By comprehending the spatial and temporal variations in groundwater availability and quality, informed decisions can be made to promote sustainable water use, safeguard water resources, and ensure long-term water security in urban areas.

Keywords: *Groundwater, Groundwater availability, Groundwater quality, Spatial analysis, Interpolation*

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