Vulnerability of Salinity Intrusion for Groundwater in Coastal Line from Negombo to Galle

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Abstract

Coastal groundwater systems are at risk of saltwater intrusion caused by excessive pumping and rising of sea levels. To address this, vulnerability assessments of coastal aquifers is crucial. This study aimed to use a model with Geographic Information System (GIS) to assess groundwater vulnerability of seawater intrusion in coastal line from Negombo to Galle, observe salinity distribution patterns, predict salinity intrusion, and examine the influence of geology and population. The GALDIT model considered factors influencing vulnerability to seawater intrusion, including groundwater occurrence, aquifer hydraulic conductivity, depth of groundwater level above the sea, distance from the shore, impact of existing seawater intrusion, and aquifer thickness. For the purpose of this study groundwater data from 2016 to 2019 in both during and off monsoons for above factors were measured in addition to the data on population and geology. The used model demonstrated high explanatory power and showed that the existing status of seawater intrusion was the most influential factor. The study found lower salinity intrusion during monsoon seasons compared to off-monsoon periods. No significant relationship was observed between salinity data and population. Vulnerability maps categorized divisional secretariats, identifying Beruwala, Colombo, Ambalangoda, Hikkaduwa, Bentota, and Balapitiya as the most vulnerable areas. Leucocratic rock type majorly affects, and Alluvial Lagoonal Clay formations have minimal impact on salinity intrusion. The findings offer valuable insights for sustainable management of coastal groundwater resource. Future implications suggest including transient population in assessments for a more accurate understanding of water demand.

Keywords: *GALDIT Model, Geographic Information System (GIS), Regression Analysis, Salinity Intrusion*