

INTEGRATED SALINE WATER INGRESSION STUDIES ALONG PADUBIDRI-SURATHKAL COAST USING GEOSPATIAL TOOLS

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ABSTRACT

Keywords: *Saline water ingressión, coastal aquifers, spatial variation map, groundwater fluctuation, physico-chemical water quality, groundwater contamination, integrated geospatial mapping.*

Introduction:

Saline water ingressión is a major concern commonly found in coastal aquifers around the world. Coastal aquifers of Dakshina Kannada due to influx of intense developmental activities are under threat of saline water migration and are extending beyond the alluvial plains of the coastal stretch. The coastal stretch of Padubidri-Surathkal is one of such fragile zone along which many industrial and developmental activities are blooming up. An integrated study of various influencing parameters using advanced geospatial tools may throw some light on the cause of the problem and can be of help in monitoring and controlling the saline water ingressión along this stretch. Proper delineation and mapping of the fresh water and saline water boundary using integrated methods of modern geospatial analysis and techniques may help in the sustainable development and management of the freshwater in this area.

Objectives:

1. To analyze the suitability of groundwater used for irrigation and drinking water in the study area
2. To delineate the extent of saline water intrusion and periodical variation in the freshwater/saline water boundary in the study area through different methods
3. To obtain water quality index map of the study area
4. Preparation of a groundwater geospatial variation map of the study area.

Methodology:

In order to understand the saline water ingressión within the study area, the groundwater samples have been collected periodically for three months (January-March) from regularly placed monitoring wells located throughout the study area.

The samples were collected and analysed for about thirteen physico-chemical water quality parameters such as temperature, pH, turbidity, EC, TDS, alkalinity, chlorides, TH, Ca-hardness, Mg-Hardness, nitrates, sodium and potassium in order to understand the suitability of groundwater in the study area for drinking and irrigation purposes, and the inward flow and mixing of saltwater with groundwater in coastal aquifer of the study area. The groundwater level fluctuation also has been monitored regularly in order to understand the influence of topography and geology in the aquifer water quality. 3D variation map of these parameters were prepared using Golden Surfer 11 version software and analysed to understand the influencing factors in the saline water ingress along the stretch of the study area. Various statistical analysis were made in order to understand and delineate the salt water ingress.

Results and Conclusions:

1. An integration of various groundwater parameters in GIS platform was found to be a helpful tool in analysing water quality variation and its vulnerability in the study area on temporal and spatial domain.
2. The study of hydro-chemistry shows the influence of topography, geology and agricultural activities on the water quality of study area.
3. The monthly water table fluctuation data follows a sharp decline through the project period (January to April).
4. Concentration of contaminants is found to be increased during the study period showing the influence of climatic conditions.
5. Higher concentrations of chemicals were found mainly along the banks of the river.
6. During field studies it was found that several open wells previously yielding fresh water turned out to be completely polluted by saline water due to over exploitation.