Perspective
Volume 13:3, 2022

Hydrology: Current Research

ISSN: 2157-7587 Open Access

Validation of Two Most Widely Used Hydrogeological Mapping Techniques

Huian Lyee*

Department of Hydrology and Environment Science, Chang'an University, Xi'an, P.R China

Introduction

Many nations across the world, particularly in arid and semi-arid zones, rely on coastal aquifers as a key supply of fresh water. The Sfax–Aghereb–Chaffar–Mahres areas, where this study was conducted, have low rainfall, resulting in intermittent rivers. The research location receives little renewable recharge and has seen an increase in human activity, making the demand for fresh water even more pressing. Indeed, overuse of water resources for drinking water, agriculture, and other purposes puts them at risk. This increased demand leads to higher pumping and the risk of contamination by salt water; as a result, many wells have become saline and have had to be abandoned, especially those near the shore. As a result, salinization of the coastal aquifer has lately emerged as a major limitation to groundwater consumption, and hence one of the most pressing water management challenges. As a result, it is suggested that regions prone to pollution, particularly those sensitive to saltwater incursion, be identified.

About the Study

Groundwater vulnerability was initially presented in France towards the end of the 1960s as a way to raise awareness about groundwater pollution. It is described as the likelihood of pollutants percolating and diffusing into the groundwater system from the ground surface. Vulnerability is typically seen of as an inherent quality of a groundwater system that is determined by its susceptibility to human and/or environmental influences. The term "groundwater vulnerability" refers to the hydrogeological context and excludes pollutant attenuation. This study presented two strategies to do this: DRASTIC and GALDIT. The DRASTIC approach was chosen because it is widely accepted as the most prevalent way for assessing pollution sensitivity across the world. GALDIT was used to determine the contaminant transmission time and to assess the aquifer's seawater intrusion status.

A systematic geological, structural, lithological, and physico-chemical study programme was conducted for vulnerability evaluation. This study's practical, site-specific goal is to describe and identify the most susceptible zones using transdisciplinary data and mapping. Another purpose was to evaluate and compare the two methodologies and the produced maps, as well as to validate the vulnerability assessments by comparing them to maps of nitrate and chloride concentrations. In addition, the geographic information system approach provides an efficient environment for achieving this goal. With a total surface area of 1,899 km^2, the research area is located in the centre east of Tunisian Sahel. This research focuses on three areas in Southern Sfax. Arid to semi-arid Mediterranean climate with considerable temperature and rainfall variability characterises these locations. Annual rainfall and temperature average around 225 mm and 19.7 degrees Celsius, respectively [1-5].

Conclusion

In addition, the geographic information system approach provides an effective environment for achieving this goal. With a total surface area of 1,899 km^2, the research area is located in Tunisia's Middle East Sahel. This research focuses on three areas in the Sfax region. Arid to semi-arid Mediterranean climate with substantial temperature and rainfall variability define these locations. The yearly rainfall and temperature averages around 225 millimetres and 19.7 degrees Celsius, respectively. A 3100 km^2 region along the Saskatchewan-Alberta border was mapped using the AVI approach. Groundwater protection zones may be defined with AVI maps, and screening sites for land use selection can also be done with them. AVI maps may be contrasted or integrated with other GIS-referenced data, such as land use and water quality, inside SPANS.

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***Address for Correspondence:** Huian Lyee, Department of Hydrology and Environment Science, Chang'an University, Xi'an, P.R China, E-mail: huianlyee@chd.edu.cn*

Received: 19 March, 2022, Manuscript No. hycr-22-64375; **Editor Assigned:** 21 March, 2022, PreQC No. P-64375; **Reviewed:** 26 March, 2022, QC No. Q-64375; **Revised:** 04 April, 2022; Manuscript No R-64375; **Published:** 08 April, 2022; 10.37421/2157-7587.2022.13. 397

How to cite this article: Lyee, Huian. "Validation of Two Most Widely Used Hydrogeological Mapping Techniques." *Hydrol Current Res* 13 (2022): 397.