

ASSESSMENT AND EVALUATION OF GROUNDWATER QUALITY USING
AN INTEGRATED WATER QUALITY INDICES AND GEOSTATISTICAL
APPROACH

by

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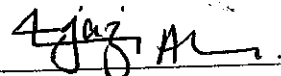
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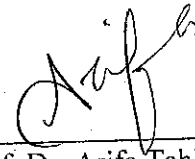
in

WATER RESOURCES MANAGEMENT

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ABSTRACT

Groundwater is an important source of freshwater. Although, anthropogenic activities, in particular, industrialization, urbanization, increases in population growth, and excessive application of fertilizers are some of the major reasons for groundwater quality deterioration. Therefore, present study is conducted to evaluate the groundwater quality status by using an integrated water quality indices and geospatial approach to identify the different water quality zones and proposing management strategies for the improvement of groundwater quality.

The groundwater quality was evaluated by taking the 24 physio-chemical parameters at more than 1100 sites to compute the water quality index within the study area, i.e., upper and central Punjab. After collecting the data of physio-chemical parameters, the analysis of data was initiated to compute the water quality index for groundwater quality, the four-step protocol, in which, the Analytical Hierarchy Process (AHP) was used to determine the weights of selected parameters. By generating a pairwise matrix, on their relative importance using the Satty's scale and the index was classified into different classes. After computing the index values for drinking as well as irrigation purpose, the values were interpolated and various maps were developed to identify the status of groundwater quality in different zones of the study area. Moreover, different mitigation strategies were proposed to improve the status of groundwater quality.

The results indicated that the issue of heavy metals is obvious in Lahore division and microbiological contamination is an emerging problem in all studied divisions that

might be due to the discharge of untreated industrial effluent and ill-managed sewerage system. Calculated values of indices for Lahore, Sargodha, and Rawalpindi divisions were found within the range of marginal to unfit whereas the rest of the divisions these values fall within the medium class and may be considered suitable for drinking purpose. Moreover, microbiological contamination (27%) was found as the primary challenge for water supply agencies. It is believed that the primary treatment before the disposal of wastewater could rehabilitate/ improve 9% of the study area followed by secondary (35%) and tertiary (41%) treatments. With the current pace of water quality deterioration, the access to drinking water is major problem for the public. Therefore, the government agencies should take appropriate actions to maintain/improve the overall conditions of water for sustainable development.