Modeling Spatiotemporal Changes in Groundwater Levels: Case Study of Lahore, Pakistan

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Abstract—For planning and sustainable use of an aquifer, monitoring groundwater is important. Understanding the aquifer response to water level information is very important. In this study, the data on groundwater levels for the summer and winter seasons from 14 observation wells were collected. This data was for the period of 2003 and 2018 and used to model the groundwater level changes spatially and temporally in the Lahore division. Inverse Distance Weighing, Radial Basis Function, and ordinary Kriging Interpolation techniques were used to model these changes. The accuracy of these different interpolation methodologies was assessed by Coefficient of determination (R2), validation, Root-mean-square error (RMSE), and Mean Absolute Error (MAE). Results show that the radial basis function techniques give more satisfactory results than the other two techniques. While on the other hand, the Inverse Distance Weighing (IDW) techniques show the least promising results. It has also been observed from results that the decline in groundwater levels is because of excessive pumping from drilled wells in the city center. This decline in groundwater levels was also seen in the study area where irrigation pumping wells were installed.

Keywords—Groundwater, Spatial Interpolation, IDW, RBF, OK