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**ABSTRACT:** Due to a reported case of groundwater contamination, the present research is conducted to determine the degree of groundwater contamination present in the plain of Mitidja, North-Algeria. Selecting a suitable interpolation method to produce Piezometric maps consisting of averages sampled from 34 wells. Achieved by analyzing the effects of four spatial interpolation methods on groundwater contamination, including Empirical Bayesian Kriging (EBK), Inverse Distance Weighting (IDW), Ordinary Co-Kriging (OCK) and Ordinary Kriging (OK), with regard to the water quality index (WQI). These methods are widely used by applying numerical values to establish a range of groundwater quality data points and map the contaminated areas. They are crucial decision support tools used by managers to assess groundwater resource potential and for general management functions. The datasets used were collected from 14 aquifers across the plain of Mitidja. The evaluation is used to model the groundwater contamination areas, where the spatial uncertainty of the contaminated areas appears prominently between the transition level of one contaminated area to another. Also, cross-validation and various contaminated surface areas are used to assess the performance of each interpolation. The outcomes indicated that the performance differed slightly among different methods. The subtraction results showed a clear spatial difference amongst the contamination assessment results. Results of both the Ordinary Co-Kriging (OCK) and Empirical Bayesian Kriging (EBK) methods showed to have minor differences and the weakest RMSE values. The Inverse Distance Weighting (IDW) showed a healthy relationship between the weighting power of IDW and the groundwater contamination.

**Keywords:** Water quality index (WQI) ; Groundwater contamination ; Spatial interpolation ; Inverse distance weighting ; Empirical Bayesian Kriging ; Algeria

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