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# Spatial distribution of soil quality index in saline and sodic soils

**Hossein rezazadeh, Parisa alamdari, Salar rezapour And Mohammad Sadegh asgari**

1- PHD student Department of Soil Science and Engineering, Faculty of Agriculture, University of Zanjan, Iran.
2- Department of Soil Science and Engineering, Faculty of Agriculture, University of Zanjan, Iran.
3- Department of Soil Science and Engineering, Faculty of Agriculture, University of Urmia, Iran.
4- Department of Soil Science and Engineering, Faculty of Agriculture, University of Zanjan, Iran

**Abstract**

Spatial distribution of soil quality index in saline and sodic soils of Lake Urmia using Kriging and IDW methods

Soil quality assessment plays a crucial role in sustainable land management, particularly in degraded areas such as saline and sodic soils. This study aimed to determine the spatial distribution of the Soil Quality Index (SQI) in saline and sodic soils around Lake Urmia using two geostatistical interpolation methods: Kriging and Inverse Distance Weighting (IDW).For this purose, 82 soil samples were collected from a depth of 0–30 cm, and 24 physical, chemical and heavy metal properties were analyzed. The Soil Quality Index was calculated based on both linear and non-linear approaches, and Principal Component Analysis (PCA) was used to identify a Minimum Data Set (MDS), including calcium carbonate equivalent, EC, clay percentage, Bd, silt percentage organic carbon, Pb, and cadmium, which explained more than 78% of the total variance.The results indicated that the SQI showed moderate spatial variability across the study area, with a decreasing trend from west to east. Comparison of the interpolation methods revealed that Kriging performed better in the linear model, while IDW showed higher accuracy in the non linear approach. The best-fitted theoretical model was spherical, with a range of influence varying between 6,130 and 20,610 meters.Overall, integrating the Soil Quality Index with geostatistical methods provides a powerful tool for understanding spatial variability and supporting effective planning in saline and sodic soils.

**Keywords:** spatial Distribution Soil Quality Index, Total Data Set, Minimum Data Set, kriging, IDW