

Abstract :

We want to examine Mazandaran plain underground water quality from about 300 wells for drinking and agriculture by statistical and geostatistical methods and using geographical information system (GIS) by considering the importance of underground water in Mazandaran plain and its high pollution potency, for many reasons such as Khazar sea, high level of underground water and the probability of pollution due to polluted water and waste water. Water physicochemical properties contain EC, SAR, Na^+ , K^+ , Mg^{2+} , Ca^{2+} , %Na, SO_4^{2-} , Cl^- , HCO_3^- , CO_3^{2-} , TDS, TH, NO_3^- and Sodium carbonate residue indexes (RSC), Sodium solution percentage (SSP), potential salting (PS), Chloride index, Penetration index (PI), Kelli indexes (KI), Mg absorption rate (MAR) and ionic equilibrium fault percentage (E). Water quality data statistics analysis is done by calculating descriptive statistics, correlation test, principal component analysis and cluster analysis. Water sample usefulness for drinking and agriculture and water hydrochemical facies are done on the basis of standard methods by Schoeller, Wilcox and piper diagrams. In this research water quality properties location changing and self-correlation degree in Mazandaran plain are examined by using semivariogram and local variance pattern. The mentioned properties are determined by using suitable geostatistical methods (like ordinary kriging, universal kriging and cokriging) in GIS. Interpolation result evaluation is performed on the basis of statistics indexes like root mean square errors (RMSE) and mean error deviation (MBE). Based on the results of this study, groundwater for drinking in Mazandaran generally does not range of hardness, sodium, chloride and sulfate is no problem but in terms of total dissolved solids in Qaymshahr-Juibar, Sari-Neka, Bandar-e-Gaz, Behshahr areas wells and water quality for drinking purposes is inappropriate and unpleasant. Based on Wilcox diagram, water of Ramsar-Chalus, Noshahr – Noor areas is almost perfect for climbing plants and the rest of the wells with salty water quality is so bad there as well. Based on the Piper diagram, water hydrochemical facies in the study area except Nushahr-Noor and Babol-Amol is the type of calcium bicarbonate, magnesium bicarbonate. The results of geostatistical analysis showed that with the exception of PI and pH data that has poor spatial correlation, the rest of the variables have moderate to strong spatial correlation and more semivariogram are spherical and exponential models. Cross-validation results also showed that ordinary kriging and cokriging interpolation methods for qualitative variables groundwater are the best.

Keywords : groundwater, hydrochemical indexes, Scholler diagram, Wilcox diagram, piper diagram, spatial variability, geostatistics



University of Zabol
Graduate School
Faculty of Agriculture
Department of Agronomy and Plant Breeding

**The Thesis Submitted for the Degree of M.Sc
(in the field of Agroecology)**

**Assessing Spatial Variability of Groundwater Quality for
Drinking and Agricultural Purposes Through Geostatistics
and GIS in Mazandaran Plain**

Supervisor:
Dr. M. Delbari

Advisor:
Meysam Amiri

By:
Somayeh Arbabi

February 2016