Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231-6345 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jls.htm
2014 Vol. 4 (4) October-December, pp.145-148/Asl et al.
Research Article

LEAD POLLUTION IN FARMLANDS AROUND THE ARDABIL CITY WITH STATISTICAL LAND

Rouzbeh Zargari Asl[1], Roghayeh Mohamad Pour[2], Soodabeh Zakavati Asl[1] and *Reza Serajamani[3]
[1]*Department of Environmental Engineering, Ardabil Branch, Islamic Azad University, Ardabil, Iran*
[2]*Department of Natural Resources and Watershed Ardabil, Iran*
[3]*Young Researchers and Elite Club, Ardabil Branch, Islamic Azad University, Ardabil, Iran*
**Author for Correspondence*

ABSTRACT
Heavy metals are persistent and stable environmental pollutants. The aim of this study was to evaluate lead concentration in farmlands of entrance road in Ardabil city. In this study the soil sampling, SPSS and statistical analysis was also performed. The results showed that the most average concentration of lead was in entrance of Abi-Beygloo city, the Gosen model was selected as a best method for the Krijing model. According to the results of measuring lead and statistical land was revealed that the maximum lead concentration was in parts of Ardabil and distribution of statistical land was correlated significantly.

Keywords: *Lead Pollution, Farmlands, Soil, Statistical Land*

INTRODUCTION
Problem Statement
Soil is one of the most important and valuable resources. It is origin of universe and human heritage for the future; without having healthy soil, life on Earth would not be possible. 95% of human's food was obtained from land. Planning to have a healthy and productive soil is necessary for human survival; entering materials, living organisms or energy into the soil will cause changes in soil quality. During chemical process, mineral and organic materials can be decomposed and changed, and also during physical process, obtained materials displace and create different soil horizons. Soil is a complex mixture of minerals, organic matter, air and living organisms. Soil is one of the products of environment that is constantly subjected to changes. It always in dry areas develops slowly and in wet, so quickly (Khak, 2004).

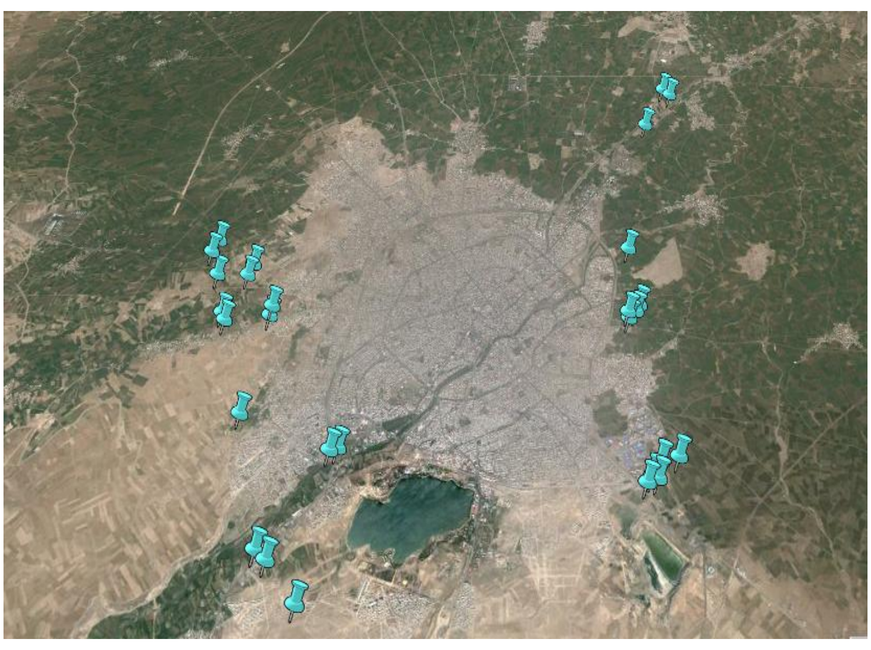
Soil pollution is made due to different industrial and productive activities. These pollution importers to the environment can be categorized as follows: industry and manufacturing pollutions, domestic and productive sources, agricultural sources, motor vehicles and building and road construction instruments (Movahedi, 2005). Heavy elements and particularly lead from various resources that may eventually reach to the topsoil, and their subsequent destiny depends on soil and their physicochemical properties. The main variables of soil that are involved in mobility of contaminants include: pH values, redox potential, organic matter, clay minerals, carbonates and salt (Probst, 2005). Also, the statistic land is a branch of statistics that the coordinate of data related to the population, and consequently the spatial structure of data is evaluated. The advantage of this branch of statistics than classic ones is its universality. This branch is based on the definition and development of area variable relation. In many common methods of classic statistics such as analysis of variance, geographical position and location of environmental samples, in addition to the determined amount of the desired characteristics, it must also be considered the geographical location of observations simultaneously (Hassani, 2010). Heavy metals contamination and their effect on the food chain, causing disruption of soil chemical and physical properties, physiological activity and reduced access to soil nutrients; environmental security disrupts through penetration in underground waters (Bisson, 1999). Heavy metals have been considered as risk factors and environmental pollutants. These metals enter into the nature cycles through water, soil and air due to various natural and artificial sources and also cause dangerous short- and long-term effects. Therefore, is considered as a serious risk to the survival of organisms. Zare-Khosh *et al.*, (2010), in their

Research Article

study in Anzali wetland for interpolation and evaluating the spatial variability of heavy metals used ordinary krijing methods. They indicated that exponential model was the best for processing of copper, lead and arsenic and so circular model for cadmium, zinc and nickel. Dyani *et al.*, (2008) in statistical land analysis of zinc lead and cadmium concentrations used ordinary krijing estimator based on matched facades change to estimate the amounts of heavy elements in areas which were not sampled. Khoda *et al.*, (2010) in analyzing the mapping heavy metals in Hamedan province indicated that copper and zinc elements have agricultural and geological origin, and arsenic is driven from maternal materials, but agricultural activities due to overuse of chemical fertilizers can increase this element in the soil. In that study, ordinary krijing and exponential models used for heavy metals like copper and zinc concentration zoning maps, and also ordinary krijing and spherical models were prepared for arsenic (Ben and Banin, 2000), studied on NIRS as a quick and simultaneous assessment for several soil components. 91 soil samples collected from occupied Palestine and were analyzed in the laboratory, near-infrared reflectance for samples in the region 1000 to 2500 nm are measured. It is due to the relationship between the intensity of absorption at 1400, 1900, 2200 nm and clay as well as between absorption at 2300 nm and carbonate components. He concluded that NIR is a promising method for rapid and non-destructive analysis of soil components. Was exposed clay soil with high accumulation potential in occupied Palestine to the simulated rain? Reflectance in the infrared range with low wavelength of 1200-2400nm SWIR was performed for these collected samples. They concluded that estimating surface layer through measuring the reflection can be monitored in soil degradation processes using hyper spectral remote sensing techniques. Therefore, collecting environmental baseline data for vital resources such as soil is necessary to achieve the sustainable developmental goals.

Procedure

Soil sampling was conducted in the fall, first, the position of the sampling points of road leading to the farmlands of Ardabil city was set, which include: Astara, Abi-beygloo, Khalkhal [Sarcham], Sarein [Tabriz], Arjestan, Sardabeh. In next step, a depth of 0 to 30 cm of topsoil was sampled, in this case were taken two samples at 10 meters and two samples at a distance of 1km from road. As a result, a total of 30 samples were taken. To prepare necessary variables to use in models for hypothesis testing has been used spread sheet of software Excel. First, collected data were entered into software, then calculations required to obtain the parameters of this study was conducted. After calculation of all required variables, these were combined in a single work page to final analyzing by Krijing software.



Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231-6345 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jls.htm
2014 Vol. 4 (4) October-December, pp.145-148/Asl et al.
Research Article

RESULTS AND DISCUSSION

Table 1: The lead amount of farmlands in entrance road margins

Distance from western road			Distance from eastern road			Location name
1km	**300m**	**10m**	**1km**	**300m**	**10m**	
2.8	3.5	2.1	2.8	3.5	2.5	road astara
3.3	3.8	3.3	3.3	4.4	4.1	road abibeglo
4.1	3.4	3.6	4.1	3.8	2.1	road sareyn
3.7	3.5	3.9	3.7	3.1	2.6	road sarcham
3.2	3.5	3.8	3.2	3.3	3.1	road sardebe
3.4	2.8	3.9	3.4	2.4	2.9	road arjstan

Lead atomic absorption analysis of farmland road at six city entrance was performed that 30 samples at time interval, 10 m and 10 to 300 m and 1 km according ppm were obtained. Results showed that the maximum amount was for 10 to 300 m away from the road, so that in farmland road of Abi-beygloo in the eastern part at 10 m and 300 m distance, the atomic absorption amount was 4.1 and 4.4 mg/kg and in western parts 3.3 and 3.8 mg/kg respectively. In this area, 1 km distance from western part of road was sampled that the amount of 3.3 mg/kg obtained, also the farmland of this area was cultivated as irrigating. In eastern part of Astara road in 10 m and 300 m distance, atomic absorption amount were included 2.5 and 3.5 mg/kg and in western parts 2.1 and 3.5 mg/kg respectively. In this area, 1 km distance from western part of road was sampled that the amount of 2.8 mg/kg obtained, also the farmland of this area was cultivated as rain-fed. In eastern part of Sarcham road in 10 m and 300 m distance, the atomic absorption amount was 2.6 and 3.1 mg/kg and in western parts 3.9 and 3.5 mg/kg respectively.

In this area, 1 km distance from eastern part of road was sampled that the amount of 3.7 mg/kg obtained, also the farmland of this area was cultivated as rain-fed. In eastern part of Sardabe road in 10 m and 300 m distance, the atomic absorption amount was 3.1 and 3.3 mg/kg and in western part 3.8 and 3.5 mg/kg respectively. In this area, 1 km distance from eastern part of road was sampled that the amount of 3.2 mg/kg obtained, also the farmland of this area was cultivated as rain-fed. In eastern part of Sareyn road in 10 m and 300 m distance, the atomic absorption amount was 2.1 and 3.8 mg/kg and in western part 3.6 and 3.4 mg/kg respectively. In this area, 1 km distance from eastern part of road was sampled that the amount of 4.1 mg/kg obtained, also the farmland of this area was cultivated as rain-fed. In eastern part of Arjestan road in 10 m and 300 m distance, the atomic absorption amount was 2.9 and 2.4 mg/kg and in western part 3.9 and 2.8 mg/kg respectively. In this area, 1 km distance from eastern part of road was sampled that the amount of 3.4 mg/kg obtained, also the farmland of this area was cultivated as rain-fed. The results of this analysis showed that in 10 m distance from road the lead amount was lower than 300 m and 1 km as well as the maximum amount was in 10 to 300 m distance.

Statistical Distribution

Table 2: Spatial distribution

Point	RMS S	MS	ASE	RM S	M	Pieces effect	Major range	Fittingmodel	Return period
6	1.04	0.00 -4	0.55	0.57	0.002 -	۰	0.06	**dayerehi**	**Pb**
8	1.04	0.00 -8	0.55	0.58	0.004 -	0	0.07	**circular**	
7	1.04	0.00 -1	0.56	0.58	-0.00	۰	0.08	**Exponential**	
10	1.02	0.01 -1	0.54	0.56	0.005 -	0	0.05	**Gosan**	

Research Article

This part of study was assessed using 5 criteria include M, RMS, ASE, MS, and RMSS of different interpolation method. So that obtained low error rate for the most appropriate method for each standard and high rank for inappropriate ones. Then the final result for each model, through collecting rank of criteria was achieved. Accordingly, a method that has a lower rating is considered as appropriate interpolation methods in the studied area. In co-krijing method to interpolation, we need to normalize the data. As can be seen, the best interpolation method is according to the total rank that the lower rank is the most suitable criterion and the high rank is adverse, therefore, Gosen model was selected as the most appropriate.

Conclusion

Conclusions from the Statistic field

Measured data in lab is processed using Gosen model. Also cases made in krijing, matched to the measurement points and as a results, due to the sampling points were around the Ardabil city with so far distance, krijing method failed to predict lead amount for the city center of Ardabil with high accuracy. With explained coefficient (%35) lead concentration zoning for input and output roads of Ardabil had enough accuracy.

REFERENCES

Ben Bor E and Banin A (1995). Near Infrared analysis as a rapid method to simultaneously evaluate serveral soil properties. *Soil Science,* Society of America **59** 364-372.

Ben Dor EN and Goldshleger F (2000). The relationship between spectral reflectance of soil s physical crust and soil degradation. *International Conference on Applied Geologic Remote Sensing*.

Boisson JA, Ruttens M, Mench A and Vangronsveld J (1999). Evaluation of hydroxyapatite as a metal immobilizing soil additive for the remediation of polluted soils.

Dyani M, Mohammadi J and Naderi M (2008). Statistical analysis of the concentrations of lead, zinc and cadmium in soils located in suburbs of Sepahan Shahr in south of Isfahan.

Hassani Pak A (2010). *Principles of Land Statistics* (Tehran University Press).

Khak Ryan F (2004). Soil contamination and environmental impact. *Science Magazine, Agricultural, Environmental* **2**(18).

Khoda Karami L, Sefanyan A and Mohammadi Tofigh N (2010). evaluation the concentration of heavy metals Copper, Zinc and arsenic in soil using GIS and RS, *Journal of Applications Remote Sensing and GIS in Natural Resources*.

Movahedi Rad Z (2005). Spatial analysis of zinc, lead, nickel, cadmium in soils of Qom province. MA thesis soil Science, Faculty of Agriculture, University of Technology Isfahan.

Probst G, Hernandez L and Probst JL (2005). Distribution of heavy metal in some french forest soils, natural and anthropogenic origin. LMTG_OMP, UMR5563 CNRS_IRD_UPS.

Zare Khosh Eghbal M, Ghazban N, Sharifi F and Khosravi-Tehrani KH (2010). Using statistics land and GIS inzoning for heavy metal contamination in sediments of Anzali wetland.