Contamination of Soil Under the Influence of Extraction and Processing Industry in South-Eastern Kosovo

Environmental Sciences

Keywords: Pollution, soil, industry, factory, sampling etc.

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Abstract

Soil pollution or contamination of soil is defined as the presence of substances in soil which are harmful for living beings and when they cross their threshold concentration level. The consequences of land pollution are industrial wastes, harmful chemicals agricultural pesticides, leakage from sanitary water, sewage, acid rain, and smoke issued from industrial activity mixed with showers, fuel leaks from vehicles, being rinsed by the rain and their penetration into the soil. Soil pollution decrease soil fertility and decrease land productivity, loss of land and natural nutrients present in it. Products from contaminated soil will be harmful and unhealthy. Vegetation does not develop in such land resulting in soil erosion. In this paper is addressed the impact of soil pollution from cement factory "Sharrcem" in Hani Elezit, lime factory "Lepenci" in Kaçanik and siporex blocks factory "Silcapor" in Matlume.

1.0 Introduction

Kosovo's area is about 1.1 million ha, 53% of which is arable, while 47% is covered by forests. From 585 000 ha of arable land, 51% is cultivated wheat, 45% are pastures and meadows, 2% orchards and less than 1% vineyards. Over 88% of the land is privately owned. On average, a household is 3 ha. Kosovo is characterized by a variety of soils based on their creation genesis and pedological characteristics, physical and chemical. Kosovo's land is suitable for agricultural production. Types of soil commonly found in Kosovo are: humus, soil, alluvial, diluvial and rocky land.

1.1 The impact of extraction and processing industry in the quality of soil

The challenge is to prevent soil degradation through specific policies and measures for soil protection.One of the most common forms of loss of agricultural land conversion of agricultural land use construction land. According to the Ministry of Agriculture, Forestry and Rural Development in the Republic of Kosovo is estimated that about 400 ha of agricultural land within the year are changed by the user into construction land.

1.2 Analysis of soil

Parameters that usually analyzed in the soil are: pH, Chlorine residual, Chloride, Sulphates, Phosphates, Arsenic, Cadmium, Cobalt, Copper, Chromium, Lead, Mercury, Nickel, Zinc, organic matter, etc.

1.3 Equipment for soil testing

There are many types of analytical methods of soil testing. In this paper, we have done soil analysis with the apparatus of so-called III-SD Bruker in Hydrometeorological Institute in Prishtinë. Bruker Tracer family of XRF equipment (X-ray fluorescence) is very practical device for soil analysis and archaeological research because of its unique flexibility and can be used for analysis in the laboratory or outside.

Fig.1 Bruker equipment for soil analysis

1.4 The importance of soil analysis

Soil analysis determines inputs required for efficient and economical production. It gives ideas to determine how the use of fertilizer. Also the analysis of soil is important to identify nutrients and causes of the problems of growth and development of plants.

1.5 Audit area

In Kosovo has not monitoring system of land (soil), and therefore there is a lack of data on the quality of the soil. However, the Environmental Protection Agency of Kosovo through various projects has identified 110 sites polluted and contaminated. From them 28 facilities is high pollution potential and are proposed as environmental Hotspots. Audit area in this paper was Cement Factory "Sharrcem" in Hani Elezit, lime factory "Lepenci" in Kaçanik and siporex blocks factory "Silcapor" in Matlume.

1.6 Sampling

During the research that we have done in this paper we take soil samples in the vicinity of the cement factory "Sharrcem" in Hani Elezit, lime factory "Lepenci" in Kaçanik and siporex blocks factory "Silcapor" in Matlumë.

1.7 Parameters analyzed

1.7.1 Arsen (As)
1.7.2 Cadmium (Cd)
1.7.3 Cobalt (Co)
1.7.4 Chromium (Cr)
1.7.5 Mercury (Hg)
1.7.6 Nickel (Ni)
1.7.7 Lead (Pb)

1.8 Analysis of soil in diameter 1km of factory Silcaporit, Matlumë, Kaçanik
Table No = 1,Results of the analyzes of soil near Factory Silcapor

	Sample No=1	Sample No =2	Sample No =3	Sample No =4	Sample No =5	MVA
Cr [mg/Kg]	91.1024543	153.71965	80.63695	139.29993	97.40290487	50
Ni [mg/Kg]	49.2321508	49.254869	53.77222	51.601195	51.11437918	50
Cu [mg/Kg]	32.6853283	32.706578	32.97798	32.968726	32.7477221	100
Zn [mg/Kg]	95.999111	91.360682	101.9186	89.605765	93.12983718	300
Hg [mg/Kg]	0.337397242	0.3378218	0.3381318	0.33798732	0.3382215821	1
Pb [mg/Kg]	68.7254259	80.653807	69.45972	66.384851	75.36531377	50
Cd [mg/Kg]	4.08704868	2.4959096	2.499234	3.5033759	3.329977919	2

1.9 Analysis of soil in diameter 1km of Lime factory, Kaçanik
Table No=2,Results of the analyzes of soil near Factory Lepenci

	Sample No=1	Sample No =2	Sample No =3	Sample No =4	Sample No =5	MVA
Cr [mg/Kg]	83.435	96.1392	54.8458	86.6179	83.8773	50
Ni [mg/Kg]	49.3447	53.1009	49.7792	50.8619	49.3381	50
Cu [mg/Kg]	33.123	49.8809	34.9661	35.3805	37.7175	100
Zn [mg/Kg]	133.795	124.788	192.543	153.899	135.311	300
Hg [mg/Kg]	0.337742	0.337604	0.33844	0.338068	0.338784	1
Pb [mg/Kg]	107.561	82.1801	170.117	117.095	114.103	100
Cd [mg/Kg]	2.55372	2.50884	3.44726	3.68535	2.37665	2

1.10 Analysis of soil in diameter 1km near the cement factory, Hani Elezit
Table No = 3, Results of the analyzes of soil near Cement Factory

	Sample No=1	Sample No =2	Sample No =3	Sample No =4	Sample No =5	MVA
Cr [mg/Kg]	29.20873516	30.45072782	70.36920119	35.46046366	44.32215874	50
Ni [mg/Kg]	56.01731607	54.94108977	51.39692142	54.15287248	39.7343386	50
Cu [mg/Kg]	32.61764228	32.78779153	32.88752825	32.74812963	22.69242507	100
Zn [mg/Kg]	82.40224745	85.36457894	84.48544924	84.47190473	160.3695308	300
Hg [mg/Kg]	0.3370604103	0.3372586739	0.3380694453	0.3376351029	0.3802877391	1
Pb [mg/Kg]	61.45232525	61.49364896	62.57093317	61.81299576	147.6935233	50
Cd [mg/Kg]	3.180956238	4.459479892	3.49072348	2.445639369	5.250257586	2

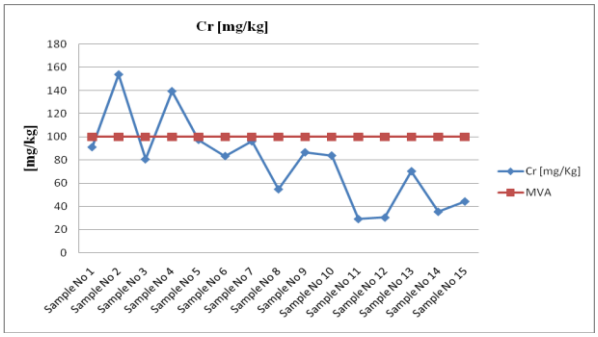

Fig.2The concentration of Cr in 15 samples

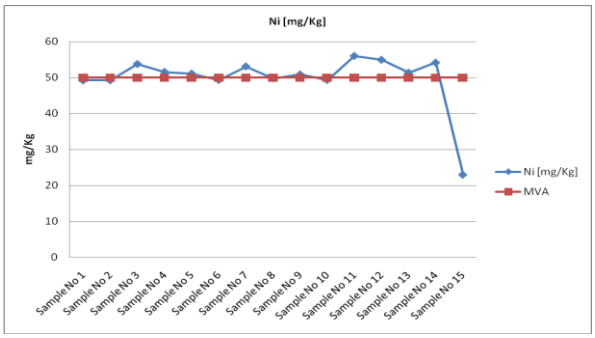

Fig. 3The concentration of Ni in 15 samples

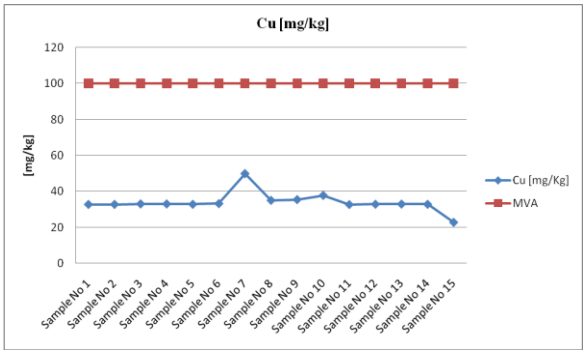

Fig. 4The concentration of Cu in 15 samples

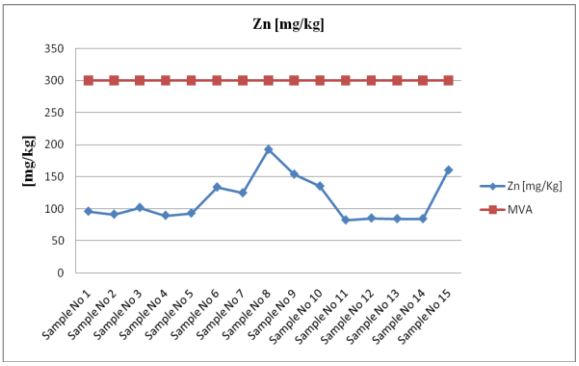

Fig. 5 The concentration of Zn in 15 samples

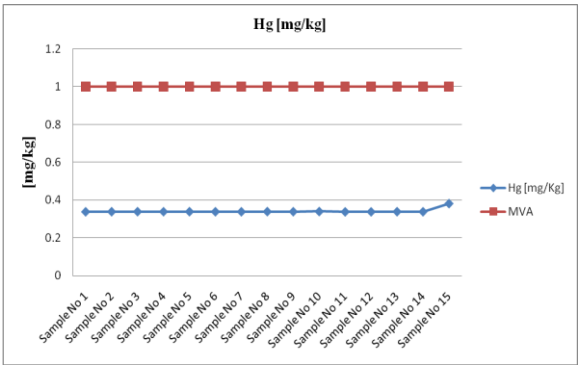

Fig. 6 The concentration of Hg in 15 samples

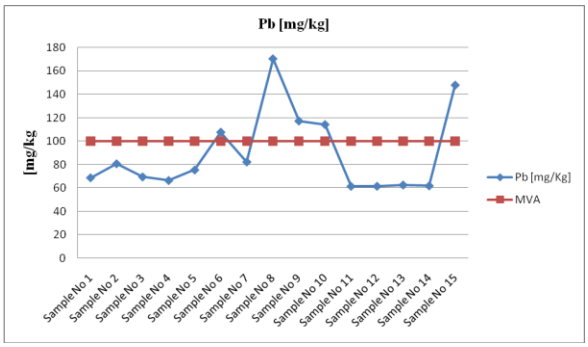

Fig. 7 The concentration of Pb in 15 samples

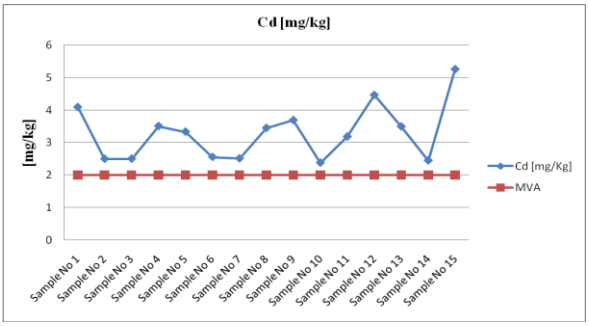

Fig. 8 The concentration of Cd in 15 samples

1.11 Discussion of results

In all samples taken in diameter of 1km above nearby factories mention before and starting from the Silcapor Factory, near which were obtained 5 samples in diameter 1km, the Lime Factory 5 samples in diameter 1km and cement factory, 5 samples in diameter 1 km, it is concluded that the amount of metals expressed in mg/kg in some cases exceeds the maximum allowed value. Thus we have the case of Cadmium (Cd) which in 15 samples exceeded the allowed value which is 2 mg/kg. Also we have Lead (Pb) which exceeds the maximum permissible value which is 100 mg/kg in samples No 6, 8, 9, 10 and 15. Nickel also exceeds the maximum value allowed in samples No 3, 4, 5, 7, 11, 12 and 14, which value is 50 mg/kg. Even Cr exceeds the maximum allowed value which is 100 mg kg, in two samples, sample No 2 and sample No 4. From this paper we will have some conclusions which will determine the impact of extraction and processing industry on the ecosystem of eastern Kosovo.

2.Conclusions

From soil analysis we are notin position to show influence of the extraction and processing industry in the chemical composition of the soil even though that some of the parameters of heavy metals exceeding the maximum permitted values.

3.Recommendations

1 Prevention of pollution from water, air and soil through the implementation of legislation for protection of environment
2 Prohibition of dumping industrial water without treatments
3 Implementation of standards on maximum permitted values of pollutants
5 Continuous improvement of the technological process
6 Establishment of integrated network monitoring soil and continuous monitoring of its quality
7 Taking legal action and sanctions of these activities according to the law on environmental protection
8 Identification of contaminated areas and designing programs for their rehabilitation

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