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Results of eco-geochemical study in the Ulaanbaatar city

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1. Introduction

In recent 10 years some negative ecological problems have been increased because of high urbanization and migration movement in Ulaanbaatar city. For example: according to the last ten-year researches on population, the number of population increased by 1.6 times and number of cars increased by 2 times. From 1990, eco-geochemical study has started in Ulaanbaatar city. Not only this study expanded in Ulaanbaatar, but also it involved in big cities of the Mongolia.

Main goal of this research is to determine soil pollution and contents of heavy metals in industrialized districts city and other outskirt areas in Ulaanbaatar comparing them to "Tolerance norm" followed by Mongolia and to identify dynamic nature and change of heavy metals in last ten years.

2. Method and materials

Thermo electro stations, main sources of environment pollution in Ulaanbaatar, utilize yearly 5 million tons coals, and over 60 thousand ger and house in the city utilize 200 thous.tons of coal and 160 thous.cubic metre of wool yearly. Today 90 thousand cars in different marks and over 250 small TES are in capital city. At the same time, main sources of the technical pollution in the capital city are created from industrial and daily life waste and waste pile from inside and outside areas of the cities and also centre of oil market. According to the research done on the Nalaikh and Baganuur coal deposits, microelements concentration as Sr, Sn, V, B, Mo, F are identified higher than other elements.

In purpose of studying soil pollution in Ulaanbaatar city, 330 samples are done in 1989, 220 samples in 1999, 195 samples in 2007 years and to determine content quantities of microelements using methods of atom absorption on the equipment spectrometer. Beside this, concentrations of heavy metals on snow in the city are determined.

3. Brief results

In 1998, over 60 samples are taken from the place of Terelj amralt over the Tuul river and near bridge Lun, which is under the river, to determine heavy metals. At that time, as heavy metals standard are not confirmed in our country, we use methods of comparing soils around cities to baselines soils determining heavy metals (Table 1).

According to our research, comparison between inside and outsides soils in the city, heavy metal elements, Ni, Co,V, are higher in 2-7 times , Zn, Cr, Mo are 2-14 times and also Pb, Sn, As elements are more than 2-42 times in these areas. But these indexes not covered all the areas in cities, as it is only involved in such areas of "Da Huree"oil market, gas stations and areas around reservation place of petrol. Moreover, heavy metals concentration on snow is determined in the soils. As a result, the following zones were dis-

Table 1. Contents of heavy metals in soils in Ulaanbaatar city, mg₩kg 1998

	Pb	Sn	Cu	Zn	Ni	Co	Cr	V	Mo	As	Cd
Average content	54	5.5	38	82	42	15	55	119	2.2	11	2,6
The highest content	500-700	120	180-467	440-500	82-115	28-58	530-694	169-270	23	200	-
Contents in soil outside the city	24	2,8	20	39	17	7,8	33	88	1,6	6,2	-
Soil pollution in the city (by times)	2-36	2-42	2-31	2-13	2-7	2-7	2-12	1,5-5	1,5-14	2-32	-

tinguished: industrial, industrial-residential, administrative-residential , the zone traditional (tent) dwellings, the green zone; and also roads were studied (asphalt and earth)(Table 2). For every distinguished zone (taxonomic level the landscape order) the total index of soil pollution (Zc) and the extent of soil pressure in the snow are obtained (Fig. 1).

Table 2. Typology of Urban landscapes in term of Pollution of natural environments

Levels of Polltion	Functional Zones		
P, g/m^2	Living Area		Industrial Area
Low: Zc<16 P<100	Administrative -Living Area	Modern Living Area	
Middle: Zc≥16-32 P≥100-200	Administrative -Living Area	Industrial and Apartment Area	Industrial Area
High: Zc≥32-64 P>200	Ger Area	Industrial and Ger Area	Industrial Area

In each of the distinguished zones , the population remaining in the respective area day and night was indicted. That made it possible to develop a typology of urban landscapes (Table 3).

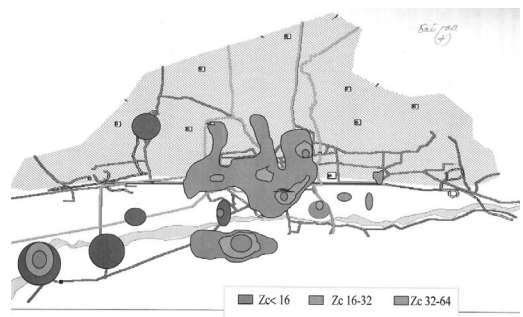

Fig. 1. Scheme of the Distribution of Total Coefficient (Zc) in the Soil of Ulaanbaatar City

4. Conclusions

According to this research, the places donesamples in the research classified as central roads zones, industrial, ger districts, big buildings and recreational

Table 3. Contents of heavy metals in soils in Ulaanbaatar city mg/kg 2007

	Cu	Zn	Pb	Ni	Co	Cr	V	Mo	W	B	Hg	Sn
F(5)	42,0	52,0	27,0	29,0	8,40	66,0	84,0	1,20	1,00	30,0	0,058	2,80
AM(9)	60,0	82,2	55,6	31,1	8,44	70,0	91,1	1,96	3,67	41,1	0,170	4,22
P(23)	47,4	60,4	69,1	27,0	7,39	54,4	71,7	1,65	3,17	35,0	0,120	4,14
U(23)	42,8	59,6	35,2	24,8	7,57	60,4	79,1	1,29	1,35	35,9	0,081	3,00
N(31)	56,5	105	59,4	30,6	8,23	72,6	85,5	1,66	3,94	40,6	0,185	4,17
R(6)	36,0	42,0	19,4	23,0	6,80	60,0	78,0	1,14	3,00	31,0	0,080	2,40

F-baselines area, AM-central roads, P-industrial zone, U- ger district, N- big buildings, R- recreational zone

zones to determine heavy metals in Ulaanbaatar city. From the research, the old central roads place is considered as the most pollution; in contrast, this observation is determined as the lowest in ger districts. The preliminary result from the research is concluded that pollution elements are higher than standards in some buildings areas in Ulaanbaatar. For instance, the following elements are; Hg, Ag and B \Kc=2.3-1.5\. In addition, the following elements in sources of brown coals are higher in ger districts; Pb,Ge, As and etc.

It is valuable to carry out this research in other big cities of Mongolia in the future.

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