EVALUATION OF AN ECOLOGICAL CONDITION OF COMPONENTS OF AN ENVIRONMENT IN AN ORB OF INFLUENCE OF POLYGONS RIGID HOUSEHOLD AND INDUSTRIAL WASTES OF THE LVOV AREA

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Environmental protection issues are of a high importance both for Ukraine and for Lvivska oblast, as environmental safety is a prerequisite for national security of the country.

The main causes for a critical man-caused state of the environment in Lvivska oblast include excessive anthropogenic pressure on living environment (the level of anthropogenic pressure on living environment in Ukraine is 4-5 times higher than that in developed countries); unsatisfactory level of storing, utilization and disposal of waste; inefficient work of waste water treatment plants, their overloading and in some raions the complete breakage; the low level of production standards and violation of project technological regimes; financial difficulties that limit the capacities of enterprises to carry out environmental measures and insufficient budget allocations.

The waste from industrial and household human activities is one of the main pollutants of the environment. Quite low level of waste utilization (in average 10-15 %) results in excessive accumulation of waste and increasing level of anthropogenic pollution of the territory.

Depending on the physical, chemical and biological parameters of the total quantity of the waste or its individual ingredients the waste divides in 4 hazard classes: I – extremely hazardous, II – highly hazardous, III – temperate hazardous, IV - low hazardous.

Mostly waste of the IV hazard class is disposed at landfills. There are 545 municipal waste landfills in Lvivska oblast, including around 50 landfills in cities and small towns. The research included the landfills impact investigation on the ecological state of soils as depository and buffer medium on the way of man-caused streams of dangerous substances – heavy metals.

The research was aimed at the assessment of soils pollution level by heavy metals in the affected zone by solid municipal and industrial waste disposal sites in Lvivska oblast.

To determine heavy metals migration from soils into plants the investigation of their mobile forms has been done. The mobile forms were extracted from soil by acetate – ammonium buffer solution with pH 4.8. The metals in the extract were determined by atomic absorption spectroscopic method. The experimental data are shown in table 1.

Table 1

The place of soil sampling	The metal content (mobile forms), mg/kg / excess (numbers of MPC)					
	Cu	Zn	Pb	Cr	Ni	Cd
Lviv landfill (30 m NE)	3,45/ 1,15	11,34	9,85/ 1,65	2,86	3,75	1,52/ 3,04
Drohobych landfill (15 m W)	1,57	5,21	4,08	0,75	1,2	0,32
Pustomyty landfill (50 m S)	4,7/ 1,57	78,0/ 3,39	39,1/ 6,52	5,8	8,8/ 2,2	0,37
Radekhiv landfill (50 m S)	0,3	3,2	1,2	0,8	1,1	0,21
Sambir landfill (50 m W)	10,8/3,6	14,0	6,3/ 1,05	0,9	2,0	0,35
Maximum permissible concentration in soils (mg/kg)	3,0	23,0	6,0	6,0	4,0	0,5

The issue with accumulation of different types of industrial waste and the necessity of their utilization is becoming more urgent in the recent years. The necessity of improving the waste management mechanisms taking into account the international standards and norms, first of all for big cities and industrial enterprises, is determined on the specific economic structure with significant parts of fuel and energy sector, metallurgical and chemical industries, that have the biggest volume of waste production and accumulation.

The biggest amount of industrial waste in Lvivska oblast is accumulated on mining sites of JSC "Lvivsystemenergo", ash disposal sites of Dobrotvirska Heat Power Plant, disposal sites of Rozdilske State Mining and Chemical Enterprise "Sirka" ("Sulfur"), Stebnytskyj State Mining and Chemical Enterprise "Polimineral", disposal ponds of JSC "Lvivskyj research oil plant", JSC "Refinery Halychyna". The conducted research (see table 2) helps to assess the impact of the industrial waste disposal sites (mobile forms of heavy metals).

Table 2

The place of soil sampling	The metal content (mobile forms), mg/kg / excess (numbers of MPC)					
	Cu	Zn	Pb	Cr	Ni	Cd
JSC "Lvivskyj research oil plant" (1000 m SW from disposal sites)	27,3/ 9,10	5,3	35,92/ 5,99	2,11	4,33/ 1,08	0,20
Stebnytskyj State Mining and Chemical Enterprise "Polimineral" (200 m W)	1,51	1,4	2,36	0,94	0,9	0,39
Rozdilske State Mining and Chemical Enterprise "Sirka" ("Sulfur") (30 m E)	1,50	7,32	3,36	2,05	1,95	0,16
JSC "Lvivsystemenergo" (5 m from the pipeline)	4,33/ 1,44	3,65	2,58	0,66	5,48/ 1,37	0,68/ 1,36
JSC "Refinery Halychyna" (10 m S from disposal pond)	4,25/ 1,42	4,76	20,09/ 3,35	3,44	1,05	0,62/ 1,24
Maximum permissible concentration in soils (mg/kg)	3,0	23,0	6,0	6,0	4,0	0,5

Analyzing the research results it can be concluded that maximum permissible concentrations are exceeded in the affected zone of different sources of environmental pollution - municipal and industrial waste disposal sites.

Having in mind that the mobile forms of heavy metals in soils were investigated, namely those that can migrate into living organisms in the environment, one can draws a conclusion, that in order to choose the place for waste disposal site the following criteria should be taken into account: the distance from the object boundary to settlements and recreational areas; water streams, water supply sources and the other agricultural and urban zones; the availability of underground waters, coastal waters and protected zones on the territory; geological and hydrogeological conditions of the territory; a danger of floods, soil subsidence, landslides or avalanches on site; nature protected zones and cultural monuments on the territory.

Landfill or the other disposal site can be permitted only under the conditions that characteristics of the area meet the above mentioned requirements, or special measures have been taken and the landfill does not pose any serious threat to the environment.

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