

## EVALUATION OF ANTHROPIC IMPACT ON LANDS FROM ROAD ZONES OF BUCOVYNA

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**Key words:** environment factors, landscape environment, road zone.

**Cuvinte cheie:** factori de mediu, mediu landșaftic, zona rutieră.

### ABSTRACT :

Due to critical ecological situations in the region, the elaboration of complex approaches to improve this situation is very actual. There are needed also mixed researches of ecological situations of all main complexes of landscape: soil, water, atmospheres and others, that allow determining the degree of their pollution because of technogenesis, to obtain integrated indicators of ecological danger.

The most active pollution factor of natural landscapes is automobiles (almost 74% from all damages). Experimental researches show that in transportation areas, the highest change in concentration of chemical substances in natural components is observed. To these are concluded automobiles high ways and the neighbourhood lines along the roads up to 100 meters on both sides. There can be noticed anomalies with increases of 2-4 times of Pb quantity in soils. In the places where high ways intersect industrial areas the quantity of Pb in soils reach 80 mg/kg.

The territorial distribution in quantity of chemical solutions, contained in soils is shown in the following way: turbulence of air stream, the direction and power of wind, air humidity, the character of landscapes substructure (relief and anthropogenical structures), the distance from the source of pollution factor it's thermal, physical, geographical characteristics and others.

For the evaluation of ecological situations of territory are important pollution indicators of geochemical and natural components, and also the integrated indicator of ecological danger of landscape in conditional units (Gutuleac, 1995).

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### 1. Introduction

Complicated ecological situation on the territory of Bukovyna is mainly determined by entropic influence on natural complexes by technogenic pollution (Gutuleac V. 2003; Dumitras, Gutuleac, 2009; Gutuleac V., Hodan G., Olaru L. 2009; Gițoiu V., Holban N. 2005; Popescu L., Popescu D. 2007). As a result, indications of ecology especially medico-ecologicalerisis are evident in particular areas, which leads to the increase of oncological, and the cardio vascular morbidity.

Geoecological studies are efficient, especially in border zones of Ukraine-Cernivtsi. Due to the implementation of the governmental and international programs, Geoecosystems of the border territories (Suceava- Cernivtsy) get European ecological importance. It determines living conditions of population

from different functional zones.

Anthropogenic impact on landscapes of road zones from Bukovina are polluted with massive toxic emissions of gases from automobile. It represents app. 80-90% from all emissions in atmosphere (in global aspect 60%). Average concentration of harmful emissions (CO, NO<sub>2</sub>, Pb, cancerous organic compounds, heavy metals, etc.) between maximum admissible limits for human health protection. From heavy metals, very toxic is the lead (I class of ecological danger).

The goal of this specific study is the evaluation of landscapes' ecological situation within zones (based on geochemical analysis of natural components-soils, water, air), which can lead to solution of environmental problems, jhat have increased during last decades from prior century due to increased level of fuel consumption (by autos) and emission of toxic substances.

## **2. Methodology**

Road landscapes represent anthropic geographical systems (in most cases-technogenic), the structure and functional character of which are determined by highways and adjacent objectives.

Factors that condition territorial distribution of toxic substances concentration on land of road landscapes are the following: turbulence of air currents, direction and the speed of wind, air humidity, the character of substrate (relief and anthropogenic constructions), distance to pollution sources, values of temperature, etc.

In zones exposed to pollution, harmful chemical substances (including toxic and cancerous) migrate according to the scheme: atmosphere- soil- water (underground and surface). A negative influence on population is complex pollution of all environments, which imposes to systematical ecological monitoring. Ecological danger increases even more when this pollution overlaps and has impact together with other technogenic sources (industrial, agrochemical, etc.).

Methodological approaches of road landscape researches consist of the study of migration and accumulation of pollutant chemical elements.

Landscape components (soil, underground water) from road zones have been evaluated during June and July of 2008-2009. Physical -chemical analysis from samples where researched and evaluated at the geochemical laboratory of the Chernivtsy National University. The results of evaluation of quality indices where compared to maximum admissible concentration and with concentration of witness-samples.

## **3. Results**

There was set the spread character of chemical elements in zones next to highways (lands near houses, forest protection strips). It was established that crops actively accumulate pollutant chemical elements. There were determined geochemical anomalies and of dispersion, the gradation of elements concentration which is in close relation to the distance from emissions sources. The results

showed, auto transportation represents a significant pollution source of all environmental components from road zones (air, soil, water).

The results of high-density metals concentration analysis in soils, that refer to road landscapes are presented in table 1.

Most concentrations of lead (exceeds of 3-4 times of maximum admissible concentration) are registered at the Chernivtsy- Noua Sulita road, which is explained by increased auto traffic on this portion of international road. On the portion of Chernivtsy – Suceava road (inclusively Chernivtsy- Kitsmani road) situation is the same (exceeds of 2-3 times). At the same time, the most little concentration of lead (13-19 mg/kg) were registered across the landscapes of Chernivtsy- Hertsa road, were traffic is more reduced.

**Table 1.** Concentration density metals in soils that refer to road landscapes.

<b>Main points of sample collection</b>	Pb	Cd	Cu	Zn
1	106,5	0,55	42,1	87,7
2	40,07	0,6	88,2	110
3	48	0,52	110	76
4	27	0,53	120	52,4
5	42	0,57	57,2	106
6	13,07	0,43	126,7	41,9
7	19,04	0,36	54,6	51,4
8	21,2	0,42	57,4	54,1
9	31	0,34	144	47,5
10	49	0,45	71,8	76,8
11	26,5	0,62	0,57	0,49
12	43,2	0,36	58,4	61,2
13	59,4	0,59	72,1	58,4
14	68,7	0,47	95,6	49,2
15	49,2	0,52	46,7	47,1
16	87,4	0,63	53,4	65,2
Maximum admissible concentration	30	1	55	100

#### 4. Conclusions

From the analysis of measurements results is concluded the existence of critical ecological situation in more road zones, exceeds of admissible limits of pollution to alert levels (Pb, Zn, and others). The impact of auto transportation has a negative effect on geographical landscape.

The ecological situation changes from road geosystems refers to concentration of chemical substances and to undesirable materials load as well, that lead to biological and microbiological processes perturbation from soil and surface waters.

The lands of forest strips from road zones have protection function as biogeochemical barriers. They should be used as objective informative blocks, in the process of geochemical evaluation of biocoenosis.

The accumulation of high-density metals in soils of road geosystems lead to local geochemistry abnormalities appearance, and to disease centers (intoxications, deregulations in nervous system, liver, kidney, brain, reproductive organs).

The results of the researches will contribute to elaboration of plans (measures) for control or stultification of environment pollution degree, although it is difficult to implement such measures now.

Taking into consideration the European tendency of Ukraine and the necessity solution ecological problems at international levels, foundation of common ( border) system for geocologic monitoring is essential.

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