УДК (502.5+574.474)/622.23

Dudar T.V., Railko V.I. (Ukraine, Kyiv)

LEVEL OF ANTHROPOGENIC TRANSFORMATION OF MINING LANDSCAPES: KIROVOGRAD DISTRICT CASE STUDY

The nuclear industry in Ukraine is an active business and research sector, producing more than 50% of its electricity in nuclear power plants of the former USSR design. Ukraine has the Europe's largest proven uranium reserves and three operating uranium mines located in the Kirovograd district of the Kirovograd oblast. So, the topic of anthropogenic stress for mining areas is considered as of high priority from the point of future impact consequences view.

Our research is concentrated on space and time peculiarities of anthropogenic transformation of the Kirovograd district landscapes using the Mapinfo software and the method developed by Shishchenko P.G. [1]. To reach this aim the following tasks were put to be completed:

1. analyzing natural and anthropogenic factors impacted the environment in the researched area;
2. calculating coefficient of anthropogenic transformation;
3. building maps of basic landscapes of the district.

During the investigation of anthropogenic load on the Kirovograd district, various natural and man-made landscapes, their ratio, as well as the intensity, diversity and types of human activities on this territory were considered and taken into account. The following landscapes were described: meadows, arable lands, roads, forests, villages, water bodies and industrial areas. Meadows occupy around 28 % of the researched area whereas water bodies and forest lands – 0,6 % and 0,7 % respectively. These data stipulate the level of comfort for the population of the Kirovograd district as 1.22 ha/person (according to Y. Odum, 1986) taking into account the population level equaled 36998 (as of 2017 data). After that, the maps of different land forms development - arable lands, roads, forests, meadows, urban settlements, and water bodies - were built using the GIS Mapinfo and Microsoft Excel.

The research itself consisted in calculating the level of anthropogenic transformation on the territory of the Kirovograd region using topographic maps, GIS MapInfo, and Microsoft Excel and the data obtained from research of landscape diversity types. As a result of calculation of anthropogenic transformation coefficient using the formula from the Shishchenko's methodic, we defined it as K_{ap}= 7,98. It means that transformation of the district is very severe. It is not a surprise since the district has been heavily loaded with anthropogenic activity for the last decades.

Landscape changes entail deformation of structure and system of connections within biogeocenoses. Our research confirmed that landscapes are heavily transformed mainly because of mining and agricultural activities developed in the district researched. The processes of erosion are developed; soils lose their fertility, the vegetation cover is gradually decreased. Anthropogenic changes lead to impoverishment of species composition and simplification of biocenotic connections in the ecosystem; simplification almost always accompanies a decrease of the stability in systems both to external influences, and to a disruption of the dynamic equilibrium of intrasystem interrelations [2, 3].

As a conclusion we can say, that the country's nuclear energy is supposed to continue developing and require uranium resources. So, careful analysis of all its negative manifestations on the environment is of high importance. Therefore, the methods considered are the best option for remote analysis of landscape changes under the influence of various anthropogenic factors. The Kirovograd district has greatly transformed landscapes, and its resources are overexploited and their usage needs to be carefully regulated. For even better improving the situation there can be suggested rational organization of the territory through synthesis of information about the natural properties of natural-territorial complexes and especially their economic usesage. A certain type of human impact on landscapes defined set of parameters, each of which directly represents the level of anthropogenic load.

References

1. Shishchenko P.G. Principles and methods of landscape analysis in regional designing. Принципы и методы ландшафтного анализа в региональном проектировании / К.: Фтосоциоцентр, 1999. – 284 с.

2. Denysyk G.I. Anthropogenic Landscape Science (in Ukrainian) / G.I. Denysyk, O.V. Timets. – Vinnitsa-Uman: Pavlo Tychyna Uman State Pedagogical University, 2010.– 165 p.

3. Dudar T.V. Landscape Ecology / T.V. Dudar.– Kyiv: Publishing House of National Aviation University, 2014.– 244 p.