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LANDSCAPE VALUE AS A CRITERION FOR RECLAMATION AND SPATIAL ORGANISATION OF DEGRADED AREAS (AS EXEMPLIFIED BY THE ABANDONED SITES OF SULPHUR MINING IN THE CITY OF NOVY ROZDOL, LVIV DISTRICT)

WARTOŚCI KRAJOBRAZOWE JAKO KRYTERIUM REKULTYWACJI I ZAGOSPODAROWANIA PRZESTRZENNEGO OBSZARÓW ZDEGRADOWANYCH (PRZYKŁAD KOPALNI SIARKI W MIEŚCIE NOWY ROZDOŁ W OBWODZIE LWOWSKIM)

Streszczenie

Spośród stu obiektów ekologicznie niebezpiecznych położonych na obszarze Ukrainy sześć znajduje się w obwodzie lwowskim. Problemy zagrożenia środowiska i możliwe metody przeciwdziałania przedstawiono na przykładzie nieczynnej kopalni odkrywkowej „Siarka" ulokowanej w dolinie Dniestru. Brak należytych zabezpieczeń pozostałości kopalni grozi skażeniem rzeki. Przedstawiony autorski projekt zagospodarowania przestrzennego zdegradowanego obszaru o powierzchni 20 km^2 dotyczy przekształceń funkcjonalnych i krajobrazowo-estetycznych. Sukces całego procesu przywracania wartości zdegradowanego terenu zależy jednak od staranności i jakości prac rekultywacyjnych.

Słowa kluczowe: *park krajobrazowy*, *wartości kulturowe*, *rewitalizacja*

Abstract

There are about 100 environmentally dangerous objects in Ukraine, six of which are located in Lviv Oblast (district), of which two – a Rozdol mining and chemical company "Sulphur" and "Mykolaivsky Cement" – in Mykolaivsky Raion (county). In water bodies of the "Sulphur" company, located in the Dniester river bed, a critical amount of mine waters has been collected, which are sometimes dumped into the river. A long period of raw material exploitation is a characteristic feature of this mining and chemical company. After the cessation of mining operations, the processes eroding the pit slopes are still active. There is a threat of disturbing dams and the flow of chemical waste do the Dniester river – a water artery of Western Ukraine and Moldova.

Keywords: landscape park, *cultural values*, *revitalisation*

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A difficult environmental situation in the region coincides with an economic crisis. Its impact on the surrounding environment is dual – on the one hand, because of a decrease in production, pollution of the natural environment has decreased; but on the other hand, toxic waste dumps and degraded postindustrial landscapes are still there. This poses a threat to the surrounding natural environment. Some of the negative effects of sulphur mining and processing can be now eliminated through land reclamation, the aim of which is to restore original qualities to the degraded areas, and, in some cases, to restore their original view.

Experience shows that in such an activity, the main interest is focused on geological and biological components of the degraded areas, while landscape values are not sufficiently analyzed (cohesion, attractiveness of an area and its anthropological transformations). Therefore, the aim of this paper is to evaluate landscape values and to develop projects of reclamation and spatial organization of the degraded areas.

The area being analyzed is located in the south of Lviv region, in the piedmont zone of the Carpathian Mountains, 60 km away from Lviv. Within the borders of the area there are local housing estates of Novy Rozdol (over 50 km^2). A detailed analysis of the lots where the mine, sulphur processing companies, the site of its storage, sedimentation tanks and the sanitation area were located (overall surface: 20 km^2).

Time range. The works were initiated in 2003, during the development of a project "A demo project of spatial development of Mykolaivsky Raion", and are still being carried.

Methods. In a part of the paper an analysis of urban cohesion within the borders of the degraded areas and also a cartographic analysis of a change of the environment structure and function were used. For an attractiveness analysis a method of comparing positive and negative elements of the environment was used. The size of increase of anthropogenic changes in the areas was determined by using a method of comparing anthropogenic and environmental elements in different parts of the area. It was significant that the peculiarities of visual perception and the choice of experts were included in the landscape evaluation. Visual perception took place along the routes of vehicle and pedestrian traffic. The authors of this article took up the roles of experts.

First, the environment was described in detail and technical parameters of particular elements which appeared during the process of establishment and development of the sulphur plant were defined. Until 1952, the area of today's Novy Rozdol and the sulphur mine was not populated and consisted of farmland and pastures. Shallow deposition of sulphur provided favourable conditions for open-pit mining. In 1952, the Ministry of Chemical Industry of the USSR decided to build there a sulphur plant and a housing estate for its workers. The researched area connects the city of Novy Rozdol with its local settlement system: Rozdol, Berezowscy, Granki, Kuty, Gorishni, Dolyshni, Ilov, Krupskoye, Podgorcy and Stankowscy. The area is characterized by hilly relief, cut across with a dense network of valleys and gorges. The suburban zone covers ca. 13 000 hectare; green areas, which include forest parks, suburban woods and others, are located beyond city borders. The main interest is focused on the area of the "Sulphur" company, enterprises in the industrial zone, and also on sanitation areas. In general, these are the zones where spatial planning is limited and which are traditionally not sufficiently analyzed in spatial planning projects. In the present article, they are the object of detailed analysis. They comprise ca. 20 km^2.

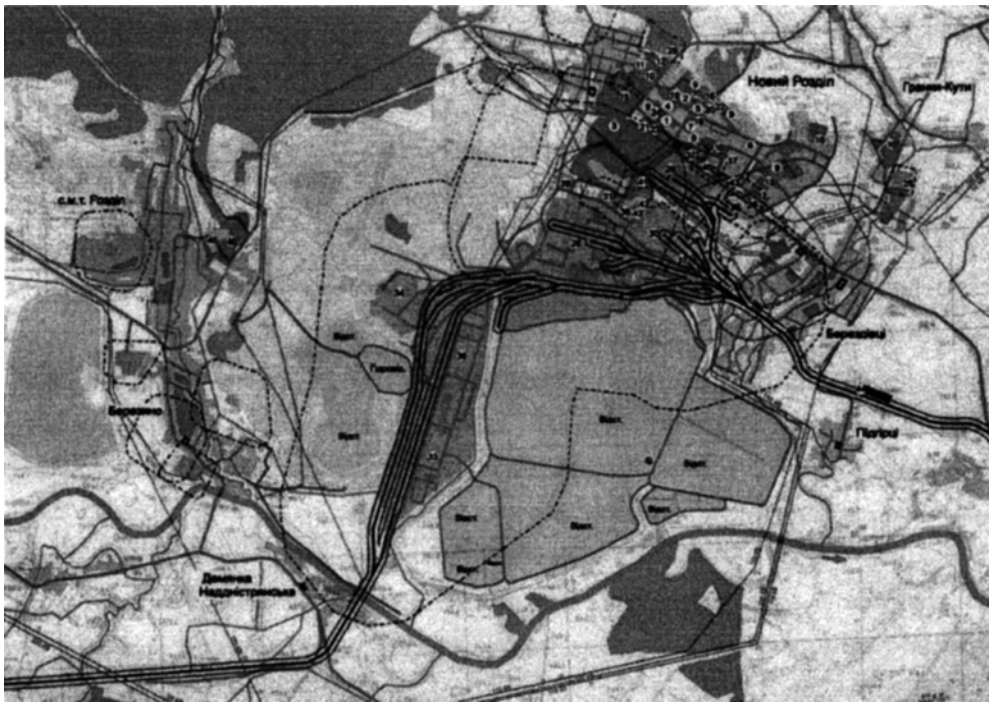

Fig. 1. A base plan of the areas degraded as a result of sulphur mining in the city of Novy Rozdol
Ryc. 1. Plan ogólny terenów zdegradowanych w wyniku działalności kopalni siarki w mieście Nowy Rozdoł

At the next stage, the system of urban cohesion in the described area was analyzed. Cohesion of the area was determined on the basis of the level of development and the stability of function, and interrelation between the two. Cohesion of the urban system determines two different qualities: balance and interrelation between the elements of a "horizontal structure of the system", that is, territorial interconnections between functional elements (inhabitants, enterprises, services, transport, etc.). It is difficult to present this data in numbers due to insufficient criteria of cohesion. The present paper uses expert reviews and analogy methods (comparison with other areas).

Degraded areas are an important urban source. Functional cohesion of such areas is determined by their location in relation to the centre of the existent buildings and the functional structure of the territory, the level of development of a transport network and engineering infrastructure, relief and also other landscape features. An analysis of the degraded areas showed that there is a certain type of areas which are functionally suitable only for certain modes of use, while with other areas, there are many possibilities, which depend on a general concept of reclamation of the areas, and a plan of their future spatial development.

Each mode of use of a particular area depends, in a different way, on the requirements concerning spatial organization, geometrical characteristics of the landscape, and the intensity of land use. The analysis of urban cohesion of the elements of the degraded

environment included the number of the elements and the distance between them, the ratio of the surface of the zones to their circumference, and also a configuration analysis of these units. It showed a high level of dispersion and small cohesion of these elements. These elements are of irregular shape, and the lines of contact between them are short.

The existent and new interconnections between: work, existence, socio-cultural, ecological, and socio-technical processes, and the natural environment actively influence the intensity of these interconnections and the level of development of the degraded areas. For example, waste dumps development is conducive to create new enterprises, and to develop new functions. The greater the size of the developed areas and the higher the number of employed inhabitants, the more interconnections are being created within the borders of these areas, and between them and the surrounding areas.

The attractiveness evaluation shows that the most attractive areas are those located in the river valley and in its neighbourhood. They have the greatest environmental value; no signs of degradation or negative anthropogenic influence have been found there. Former mines, now reclaimed and developed as woods and farms, are also considered highly attractive. Wastelands and abandoned industrial plants are the least attractive.

Difficult access constitutes a serious problem of most of the areas. When elaborating land reclamation projects, it should be assumed that this situation will progress, which will have a positive effect on the quality of the landscape. The authors compared the use of the land in this area in the 60s (the beginning of the plant development), 80s (the peak of its development) and 2004 (abandonment of the site and cessation of sulphur mining operations). The changes analysis drew attention to the fact the structure of land use has changed dramatically. Over 50 years, many new forms of land development appeared. In the years 1955–1980, the share of industrial areas increased considerably; after 1990, the areas degraded and in 2005 they were partly reclaimed and partly became wastelands. Due to liquidation and flooding of the mine, the area covered with waters increased significantly. A forecast for 2020 projects a change of wastelands and afforestation of the plots.

The level of anthropogenic activity in the area was determined by comparing the anthropogenically altered areas with the areas where the features of the natural environment were preserved. The analysis showed that the highest level of change was characteristic of former industrial plants. There are no elements of the natural environment in their surrounding, and the level of technical infrastructure development is high. A low level of change is characteristic of rural landscapes. It is worth emphasizing that the objects reclaimed 10–15 years ago are today new ecosystems and the level of anthropogenic activity there is medium.

Due to a considerable degradation of this area, the landscape of the premises of the former mine and surrounding objects has changed completely. The reclamation process enabled restoration of some of the features to the degraded areas. The introduced rural and forest and farm functions are correspondent to the functions of the original landscape. The completion of reclamation works and a gradual elimination of the objects of technical infrastructure will lead to a lower level of anthropogenic influence. Owing to reclamation, the attractiveness of the landscapes increases. This concerns those parts of the area, which have been fully reclaimed and developed. The quality of land reclamation works is important.

Fig. 2. A project of reclamation and spatial development of the areas degraded as a result of sulphur mining in the city of Novy Rozdol
Ryc. 2. Projekt rekultywacji i rozwoju przestrzennego terenów zdegradowanych przez kopalnię siarki w mieście Nowy Rozdoł

At the final stage, approaches to reclamation and spatial organization of the degraded areas were developed on the basis of cohesion, attractiveness and the environment changeability criteria. In part, it is worth designating the postindustrial areas for industry, in particular construction, light and food industries, which are less harmful. This will result in smaller sanitation areas. It is worth designating other part of the former industrial zone, located closer to open pits, for a recreational function and a didactic function focusing on the natural environment preservation. We suggest dividing the entire area into five main functional zones (industrial, short-term and long-term vacation, scientific and research centres and a scenic park). The industrial zone will be confined in the part located between the housing estates zone and sedimentation tanks in the south. The long-term vacation zone will be created in the southern part of the industrial and technological water tanks zone. The short-term vacation zone will be formed in the south-west part and based on artificial water reservoirs, created on the spot of former open pits. In the geometric mean of the zone, it is necessary to locate a customer service centre, with culture and sports facilities, and parking lots. We are planning to create there scientific and research centres, to monitor changes taking place in the area, for rapid reaction, and to develop further proposals after the balance of the natural environment has been restored. The scenic park zone will be located in the western part of the area. Waste dumps create its hilly landscape. It is worth adapting well preserved buildings, formerly used as utility rooms, to new functions (flats, trade and

services, sports), and pulling down disharmonious, badly preserved buildings, i.e. using them to establish greenery and sports areas. In consideration of the above, it can be said that in near future, it will be possible to create a large health and recreation resort in the area of Lviv Oblast.

Conclusions. Structural and functional changes of the area, which took place during the last century, had a negative effect over the character and the state of the environment of the Novy Rozdol local settlement system. Except for considerable changes of the landscape in some parts of the area, the landscapes are still highly attractive. This is owing to land reclamation. Forecasting the use of the former open pits and the adjacent areas for water recreation and leisure, one can say that the attractiveness of those landscapes is going to increase.

Reclamation and spatial organization of the areas should aim at increasing cohesion of the elements of the environment, increasing their attractiveness and restoring their environmental values.

Literature

[1] Urbanistyka, *Planowanie i zabudowa miejskich i wiejskich osiedli*, DBN, 360-92,
[2] Ł o b o w I., *Efektywność urbanistyczna wykorzystania terenów zdegradowanych aglomeracji Doniecko-Makiejewskiej*, 2000.
[3] *Projektowanie architektoniczne obiektów przemysłowych*, Strojizdat 1993.
[4] Rekomendacje metodyczne z organizacji architektoniczno-planistycznej terenów krótkotrwałego odpoczynku, K.: NMDIP Budowy Miast, 1992.