Bren A.,
student
Zhytomyr Ivan Franko State University, Zhytomyr
Khomiak I.,
PhD, docent at the Department of Ecology and Geography
Khomiak O.,
researcher at the Department of Mine surveying,
TU Bergakademie Freiberg, Germany

APPLICATION OF A COMPREHENSIVE ANALYSIS OF RENEVABLE VEGETATION OF SAND QUARRIES

People are changing the environment for greater safety and comfort. We can observe how often we get the opposite result. We want to build settlements that are convenient for our living. We violate the integrity of the biosphere cover for the extraction of mineral resources from which we build settlements and connections between them. We are creating new types of ecosystems in the mining areas. We make different decisions about the future of these ecosystems. We have to adjust this decision depending on the situation. A systematic approach should be the basis of our decisions about the future of such ecosystems. The basis for this is a long and comprehensive study of the dynamics of ecosystems that are formed after the stop of mining activities. We must combine studies of vegetation dynamics with studies of the environmental conditions in which it occurs. This is a expensive and time consuming study. The latest image analysis technics can reduce the cost and speed up this work. On the one hand, we can combine the analysis of satellite or aerial photographs with the location of vegetation on the Earth's surface. On the other hand, we can combine the analysis of the physicochemical composition of the substrate (eg, sand) and the multispectral image analysis. We can combine these two blocks of information if they have certain GPS coordinates and describe the same area. This opens up great opportunities for us in theoretical research and practical activities. From an environmental point of view, there is a need for reclamation and evaluation of the effectiveness of its implementation. We can get a lot of opportunities to obtain information in ecosozological theory or the theory of ecosystem dynamics. We also get new opportunities in mine surveying if we use such combined analysis. We can carry out some geodetic surveys using specific changes in vegetation. For example, we often need minerals that are close to the surface, can affect the dynamics and typology of vegetation. Often minerals or associated rocks, which are slightly deeper below the surface, affect the formation of soil of higher horizons or its water-salt regime. We can determine the contours of promising deposits and the thickness of the rocks, using the interpretation of satellite or aerial photographs associated with a particular type of vegetation.

This method will be effective only after a large series of similar studies. The results of such an analysis can be influenced by a large number of environmental factors or characteristics of the objects under study. For example, analysis of satellite photos can give slightly different results, depending on weather conditions and the effect of weather on vegetation. Sand clogging or it moisture can change the results of the analysis of its macro images. We can get the desired result only after creating a large database of comprehensive analysis. After creating such a database, observational error in the analysis of new territories will be minimal. This will allow to use this data in practice. Comprehensive analysis will have an economic effect because it requires less time and resources. This will allow us to reduce the time and cost of traditional geological exploration and physicochemical analysis of many samples.

Our research started in 2020 on a sand quarry near the village of Berezichi, Volyn region. At the time of the study, the area was no longer used on an industrial scale. We could see only minor signs that locals were engaged in illegal sand mining. Such conditions contribute to the gradual restoration of natural vegetation. It is in various stages of recovery. Vegetation in the early stages of development is highly dependent on the quality of the substrate. This makes phytocenoses good indicators of sedimentary rocks located close to the soil surface.

We created standard geobotanical descriptions, which were used to determine the phytocoenotic diversity of the object. We collected sand samples and took macroscopic photographs of the sand at the site of each geobotanical description. Analysis of macroscopic photography of sand has identified many of its characteristics. This allowed us to establish a relationship between the characteristics of the substrate and the type of vegetation or its dynamics. All geobotanical descriptions have certain GPS coordinates. This allows us to establish their position on satellite or aerial photographs. Analysis of satellite images allows to determine the spectral characteristics of the depicted plant communities. After that, we were able to combine four blocks of information. Now, we can determine the state of vegetation by satellite or aerial photographs, and through it some physicochemical characteristics of the substrate and its spatial location.