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Ecological bases of land reclamation in the mining regions of Ukraine

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The mining production is situated in the several provinces of Ukraine. Specification of the problem coal and mixed sulfide mining activities in Ukraine have resulted in the generation of hundreds of millions of tons of hazardous wastes consisting of rest of manganese and iron oxides, traces of rare elements, sulphur bearing minerals, such as pyrite. These wastes have been / are still deposited, throughout the years, in huge stockpiles and dams. Land restoration in the mining region takes several forms. One of the ways is land reclamation. This way includes forest, recreation and agricultural reclamation. Land reclamation in industrial regions is conducted in one technological cycle with the process of ore mining. The soil mass is taken off, piled up and heaped onto the land after the rock has been replaced.

The ecohydrogeological background of reclaimed lands forming and exploration was worked out. It foresee an environment restoration of disturbed lands to manage flow down, atmospheric precipitations taking aside, the process of the reclaimed profile biogenetic horizons formation and promotion with total depth 1.0-1.2 m and involvement of more suitable rocks and artificial drainage building.

The effectiveness of different models of land reclamation and heavy metals migration through the rock-soil-plant system was investigated. Field experiments were carried out to study the adaptive potential of plants having different requirements for substrate fertility, with the main task to assess the prospects of land management for the rocks of the Nikopol manganese basin. The rocks exposed to the surface after manganese ore mining, first technical stage of landscape restoration, and plant melioration stages pass into other geochemical conditions and change their physical-chemical properties. During long-term melioration crops have dramatically improved some processes as following: bioweathering of rocks, phytomeliorated rocks fertility growth, etc. Meantime some rocks cannot be recommended for agricultural reclamation. Due to profile assessment the underlying layers of dark-gray shale still can be considered as object for heavy metals neutralization or phytoextraction.

In Western Donbas the waste is stored in spoil dumps (19 million tons), and it is also used for the reclamation, for construction of the dams protecting the new bed of Samara river and artificial reservoirs. In a definite extent the ecological problems of Western Donbas are typical for the coal deposits, where the extraction is made by the closed way. The arrangement of used mine fields under the bottomland of Samara river leads to the earth surface subsidence. Due to chemical weathering from rocks (aqueous extract with <5) such macro components (nickel, copper, cobalt, chrome, nickel), but also micro impurity of rare metals (gallium, germanium, zirconium) come to environment. This environmental situation requires new technologies of phyto- and biomining. At this time seeds and rhizomes inoculation with arbuscular micorrhiza with some geochemical barriers (mechanical, sorption, oxidizing and rehabilitating) are subject for making decision.

New ways are connected with agroforestry approaches development to grow energetic crops in the reclaimed minelands. Prospect results were obtained after first portion model field experiments with sorghum, miscanthus and swichgrass.