effects of vibration on the stress-strain state of the base of the building, erected on subsiding soils was performed using software Plaxis. A comparative analysis of the results, carried out using the Mohr-Coulomb model and the Hardening Soil Small model are presented.

Key words: stress-strain state, dynamic loads, vibration, loess soils.

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FIGHTING AGAINST DESERTIFICATION IN SOUTHERN ROMANIA USING PROTECTIVE LAYERS WITH REMOVED OVERBURDEN ROCK IN OPEN PIT MINES

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In Southern Romania plane region, an accentuated desertification trend has been observed, due to climate change, lack of irrigation systems and non appropriate agricultural policy of the past decades. One of the possible measure to improve the agricultural production bio-productivity of the area, allowing re-vegetation and reintegration in agricultural land use , leading to an increased food security and eco-

nomic sustainability, and avoiding further desertification is by covering the land with soil removed from stripping works (overburden removal) in open pit lignite mines from Oltenia coalfield. As possible results, we have a reduction of the volumes of waste rock deposits (reducing the areas occupied by dumps) and the regeneration of the agricultural potential of the lands threaded by desertification. We gain good land in open pit mine vicinity with no waste storage, and we recover new improper land in far areas for agriculture. This advantage balances the costs of long distance rock conveying. Necessary and appropriate research to be performed prior to the implementation of such a large scale technology is analyzed in the paper.

Key words: desertification, open pit mining, soil improvement, overburden, environment.

БОРОТЬБА З ОПУСТЕЛЮВАННЯМ НА ПІВДНІ РУМУНІЇ З ВИКОРИСТАННЯМ ЗАХИСНИХ ШАРІВ З РОЗКРИВНИМИ ПОРОДАМИ, ЗДОБУТИМИ ПРИ ВІДКРИТІЙ РОЗРОБЦІ КОРИСНИХ КОПАЛИН

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У південному регіоні Румунії вже кілька років поспіль спостерігається тенденція до опустелювання у зв'язку із зміною клімату, відсутністю систем зрошення і відсутністю належної сільськогосподарської політики за останні десятиліття. Однією з можливих заходів для поліпшення сільськогосподарського виробництва та біо-продуктивності області, яка дозволяє реінтеграцію сільськогосподарських земель, що веде до збільшення продовольчої безпеки та економічної стійкості, та уникненню подальшого опустелювання є спосіб засипання землі ґрунтом, віддаленої від розкривних робіт (розкривних робіт) при відкритій розробці корисних копалин у вугільному басейні Oltenia. Як результат, простежується скорочення обсягів відходів від розробки корисних копалин (зниження площ, займаних звалищами) і регенерація сільськогосподарського потенціалу земель, які страждають від опустелювання. Ми отримуємо хорошу землю поблизу кар'єрів, відсутність відходів та відновлюємо нові непридатні землі у віддалених районах для сільського господарства. Необхідні і відповідні дослідження, необхідні для початку реалізації такої великомасштабної технології - аналізується в статті.

Ключові слова: опустелювання, видобуток відкритим способом, поліпшення ґрунту, розкривні породи, навколишнє середовище.

RELEVANCE. Southern Oltenia became a little Sahara, given the climate change, in conjunction with massive deforestation and wrong methods of crop operation, which transformed a once fertile land into a barren one. Oltenia's Sahara (Olt and Dolj Counties) are gathering over 100,000 hectares of arid land. The desertification threat is present also in other Romania's regions, mainly western part, such as Vinga Plain, in Timis and Arad counties.

To prevent desertification, several institutions (Institute of Soil Science (ICPA), Research and Development Center for Crop on Sandy Terrains from Dăbuleni etc.), have researched and implemented various technologies and methods, were sought solutions for acclimatization of new species of plants to help stopping the phenomenon, but the process continues to produce environmental and social problems, specifics to the concerned area.

The soil that was previously covered by a forest can not re-adapt once the forest is harvested. It will not deal with the huge amount of heat and sunlight in the absence of protecting trees. The remaining soil has a very poor quality, exposed to erosion, another factor that triggers desertification.

The experience has shown that combating desertification symptoms only is not a real solution and that the measures must be based on mitigation of reasons that triggered the phenomenon.

The loss of such lands by desertification have significance both at regional as well as national scale. The map of arid areas - vulnerable to desertification factors - is shown in Fig. 1.

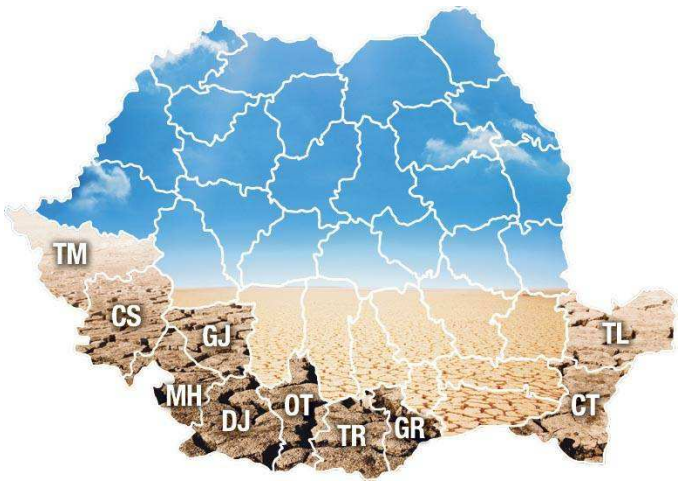

Figure 1 – Map of the most exposed counties of Romania exposed to desertification

MATERIALS AND RESULTS. The Sands of southern Oltenia, represents one of the country's areas exposed to the greatest extent of drought and aridisation. It also has one of the weakest degree of aforestation in the country.

These lands, characterized by arid climate, water deficit in soil during summer, offers one of the most difficult planting and maintaining the forest vegetation, which in turn requires special attention, both in terms of the choice of species for aforestation,

and proper application of the technology of preparing the land and soil, as well as the maintenance of agricultural crops.

Given that areas with high risk of barrenness are already known, the question to ask is about the management of these soils. I mean the adoption of measures that would result in the halting or the adoption of inappropriate management which result in expansion of the desert toward the central part of the country.

The classical known methodologies used for halting this phenomenon have not had the expected results, or there is a small percentage of improvement of soil analysed area.

The opportunity of using fertile soil from scraping topsoil in the active open pit mines, is to improve the process of reduction degradation of land and in the progressive improvement of the environment, protection of human settlements, to improve the layout of landscape, getting the lucrative crop, possibly having wood in an area heavily loss-making in wood, improve the living conditions of the inhabitants.

Identification of areas that can be covered with a layer of topsoil from lignite open pits is one of the main issues

The research refers to two types of land. The first category of lands subject to desertification is present in the southern Oltenia, namely Dolj county. Specific for this area is the sand , which despite to attempts of fixing by curtains of Acacia, the cultivation of vines, etc., continues to advance.

Almost complete deforestation of Dolj county by extending agricultural land, including sandy ones, led to negative changes, significant in terms of the stability of natural ecosystems on sandy land, destroying what just insured sand stability on large areas producing a reactivation of it under wind action.

This category is the land which is to be fixed by covering with an other type of rock.

The second category of land of which will be removed the covering rock formed from clay + preponderant topsoil is located in the mining basin of Oltenia, Gorj and Mehedinti. This rock is resulting from the stripping of coal and is stored in special places for this purpose.

Both categories of land are in excess. Arid area is great and totally unproductive, with implications on the environment. Overburden from mining area is also vast enough, if we consider that for 1 cubic meter of coal must be removed 8 to 10 m of overburden and that coal demand is 15-18 million tons/year, more than 150 million cubic meter of overburden rock results annually.

If per unit area, one square meter, it is used as stabilizers rock volume of 0.6 to 0.7 cubic meter, it follows that it can cover in one year about 23,000 hectares (230 million square meters).

This lead also to a salvage of land otherwise used for deposit of waste rock (dumps) .

Dump area besides the fact that involves special work and land expropriation require huge expenditures by category of use, it is the predominant forest, cost between

200,000 to 400,000 USD and implications on the environment (change of land geomorphology, fauna, flora, etc.).

In our research is envisaged that using a sandy clay soil layer of 60-80 cm thickness, ensures the reduction of desertification.

Lignite extraction is done by removing sterile layer located above it, with transport and storage to a new location. Dump is a special and permanent mining construction, which affects the landscape and land occupation. By using a part of overburden rock in other areas, e.g. for land fertilization and desertification avoidance, we reduce the amount of rocks deposited in dumps.

The problem is to find out an optimal removal-deposition of rock used for remediation of deserted land in order to have a less transportation cost, and subsequently to not replace waste rock produced environmental impact by a transportation produced one. In Fig 2 we present a tentative scheme of transportation as a source-destination graph.

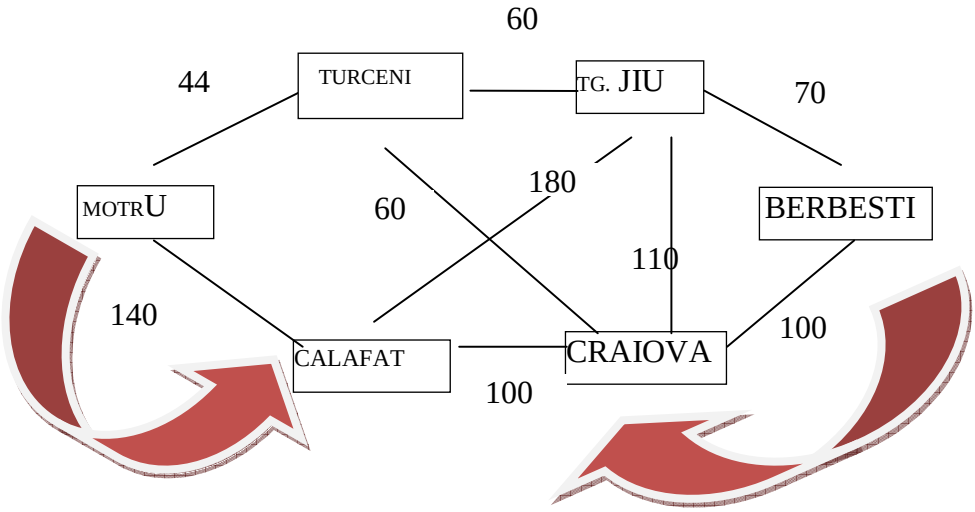

Figure 2 - The transportation scheme as a source-destination graph

Based on this, as a function of supplied and requested soil quantities, the specific transportation costs between nodes, we may aobtain tee minimal transportation costs in a dynamic way .

During extraction phase the soil can be contaminated. Throughout this phase, which will last until exhausted lignite deposit, soil tests should be carried out at regular intervals, according to the measures imposed by environmental authorities.

CONCLUSIONS. Desertification in southern Oltenia is an important issue at national level by the negative impact on agricultural production, the environment, the population in the long term. By erosion, soil surface reaches an inferior quality compared with initial soil with humus.

In this paper, we sketch a possible way to stop the area aridity using overburden soil from lignite open pits and its transfer in high-risk areas of dryness of Oltenia.

As result of the research regarding the new method of halting the desertification in Oltenia, as the following can be concluded:

1. There are a variety of methods to improve the affected soil quality, with favourable effects in order to increase its productivity. Correcting and improving arid soils in southern Oltenia with fertile soil from lignite mine overburden (northern Oltenia) is a new method with application options without high costs.

2. When choosing a measure must consider soil type, climate and plants that will grow in soil after reclamation. Because it is a cover of degraded land, with a fertile soil, the reaction between the two soil types will be accurately determined.

3. The work done in order to increase the soil quality is likely to have adverse effects with long-term implications. Subsequent recovery measures are costly.

4. Considering that nutrient losses from arid soil are high, it is envisaged the use of chemical fertilizers. Spreading chemicals will be mechanized, so it will provide important traffic on these lands.

5. As this arid land water requirement is low, it is naturally assured. In this respect, it is necessary that besides fertile soil coverage by transferring derived from lignite overburden, support with extra water. Water intake may be achieved by the implementation of irrigation water whose source is the Danube.

БОРЬБА С ОПУСТЫНИВАНИЕМ НА ЮГЕ РУМЫНИИ С ИСПОЛЬЗОВАНИЕМ ЗАЩИТНЫХ СЛОЕВ С ВСКРЫШНЫМИ ПОРОДАМИ, ДОБЫТЫМИ ПРИ ОТКРЫТОЙ РАЗРАБОТКЕ ПОЛЕЗНЫХ ИСКОПАЕМЫХ

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В южном регионе Румынии уже несколько лет подряд наблюдается тенденция к опустыниванию в связи с изменением климата, отсутствием систем орошения и отсутствием надлежащей сельскохозяйственной политики за последние десятилетия. Одной из возможных мер для улучшения сельскохозяйственного производства и био-продуктивности области, разрешающей реинтеграцию сельскохозяйственных земель, ведущей к увеличению продовольственной безопасности и экономической устойчивости, и избежанию дальнейшего опустынивания является способ засыпания земли почвой, удаленной от вскрышных работ (вскрышных работ) при открытой разработке полезных ископаемых в угольном бассейне Oltenia. Как результат, прослеживается сокращение объемов отходов от разработки полезных ископаемых (снижение площадей, занимаемых свалками) и регенерация сельскохозяйственного потенциала земель, страдающих от опустынивания. Мы получаем хорошую землю вблизи карьеров, отсут-

ствие отходов и восстанавливаем новые непригодные земли в отдаленных районах для сельского хозяйства. Необходимые и соответствующие исследования, необходимые для начала реализации такой крупномасштабной технологии анализируются в статье.

Ключевые слова: опустынивание, добыча открытым способом, улучшение почвы, вскрышные породы, окружающая среда.

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