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Methods of Rehabilitation of the Power Plant Settling Ponds Paroseni

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Abstract

One of the environmental problems caused by Thermal Power plants in Romania is the waste generated from the combustion of fossil fuels. The ash produced from the combustion process is stored in settling ponds associated to the plants. Paroseni Thermal Plant ash is deposited in tailings ponds of Caprisoara Valley. Upon completion of these tailing ponds, they have to be rehabilitated and reintroduced in the natural cycle. In this paper we present some natural methods of rehabilitation of tailing pounds and reintroduction of them in natural circuit by re-cultivation.

Keywords: rehabilitation, thermal power plant, ash

1. Introduction

The main source of electricity generation is represented by Thermal Power Plants which operate with coal as fuel base (Fodor & Lazăr, 2006; Fodor, 2008). About 23% of the electricity used is produced from burning coal in power plants (figure 1).

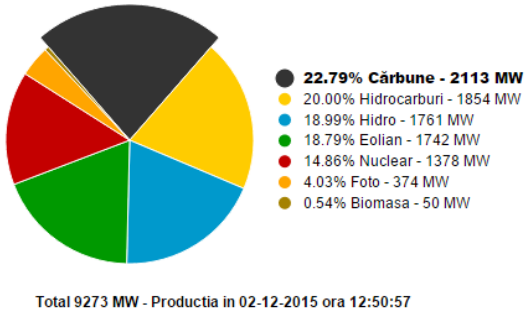

Fig. 1 – Instant consumption in Romania

In Romania there are several Thermal Power Plants, and among them is also Thermal Power Plants Paroseni.

Thermal Power Plan Paroseni is a cogeneration power plant supplying heat and power generation. [3] Works with coal as fuel base and provide heat for the residents of the four mining towns in the area, namely: Petrosani, Vulcan, Lupeni and Aninoasa.

For the electricity production, as the primary energy source, the Thermal Power Plant Paroseni, is using solid fuels, coal base from the Jiu Valley.

Solid fuels, in addition to fuel, contain more sterile, which will be found after the combustion process in the form of slag and ash.

In of Thermal Power Plant Paroseni, ashes from the burning of coal is accumulated and transported hydraulically and deposited in ponds associated to the plant.

Paroseni Thermal Power Administration has in administration several tailings, slag and ash ponds derived from burning coal. Part of tailings ponds is decommissioned and some are operational. At the moment it is functional emergency pond and one of tailing ponds Caprisoara Valley (figure 2).

Fig. 2 - Caprisoara Valley pond

Upon completion of deposition ponds they should be rehabilitated and reintroduced in natural circuit for lowering the level of environmental pollution.

2. Theoretical Considerations

Ponds of Thermal Power stations are a major source of pollution.

Due to very fine particles of slag and ash, they are carried by wind. To reduce air pollution levels they have to be rehabilitated and reintroduced in natural circuit (Petrilean, Irimie, Băleanu & Stănilă, 2014).

Need of redevelopment of areas affected by ponds is given by the following factors:

- improvement of environment by reducing air pollution
- elimination of negative visual impact
- the need to reintegrate these land surface into production or ecological region that are leading to a potential economic regeneration of the area [2].

Choosing a green reuse depends on available resources, and the attitude of the owners and the local community. Depending on the distance to the local community, he's requests, technical possibilities, we can distinguish some types of reuses, such as:

- naturalistic recovery;
- recreational and leisure recovery;
- productive recovery;
- residential recovery;
- cultural recovery;

- other recoveries (Fodor, 2008).

Due to the location of ponds of the Thermal Plant Paroseni, the best ways to rehabilitate of ponds is the naturalistic recovery or productive recovery.

Naturalistic recovery comprises all reuses aimed at adapting to the most generous ecosystem that must be within the affected area (Dima & Man, 2015)

. Naturalist recovery is a recovery that is used both in mountain areas and in places away from urban areas.

Production recovery involves the use of land for crops or fruit trees and vines.

3. Results and discussion

To set the reintroduction to natural circuit of the tailings ponds of the Thermal Power plant Paroseni, we conducted a study on two specific types of vegetation: lawn grass – for the naturalistic recovery, and wheat - for the production recovery.

In this study we used wheat and grass seeds that were planted in the ashes taken from the tailings pond of Thermal Power Plant Paroseni. To have the control plants, these were sown in gardening soil.

Wheat and grass samples were watered with spring water at room temperature and one of sample from each plant for each soil were helped with complex fertilizers. The conditions of temperature, humidity and light were identical and watering was done once every 3 days with 120 ml of water.

In figure 3 is observed increasing wheat support of fly ash compared to natural growth in garden soil.

Wheat in ashes

Wheat

Grass in ashes Grass

Fig.3 - Germination of wheat and grass

Germination of wheat grain was more pronounced in the case of wheat sown in the garden soil, in comparison width the wheat grain sown in the ashes. Although humidity of ash was higher due to small granulation that retains water, germination was lower due to soil radioactivity. A similar effect occurred and on the grass seed.

During the growth and development of the studied plants may be seen influence of the lack of biological natural nutrients of the ash. Plants grown in the ashes from the ponds of Thermal Power Plant Paroseni are short and thin, reduced vegetal mass compared to those grown in garden soil (fig. 4).

Wheat Grass

Figure 4 - Plant growth and development

Wheat in ashes

Wheat

Grass in ashes

Grass

Fig. 5 - Germination of wheat and grass in the presence of complex fertilizer

In Figure 6 you can see the growth and development of wheat and grass vegetation in the two supports used, but this time being used complex fertilizer.

Due to nutrient inputs from fertilizer, may be observed a difference in mass of plant produced during plant growth and development. In the same time we observe that wheat grown on sterile this time, has a thickness comparable to that of wheat grown in garden soil but without fertilizer.

Wheat

Grass

Fig. 6 - Germination of wheat and grass in the presence of complex fertilizer

From studies conducted in the laboratory it can be seen that the two types of plants can grow in support of ash from the ash ponds of the Thermal Power Plant Paroseni, but for better development is necessary that the soil be helped a complex of fertilizers to compensate lack of nutrients.

The analysis of rehabilitation of the tailings ponds of the power plant can be achieved both by: naturalistic recovery and productive recovery (Mangra & Dumitru, 2015; Šoltés & Nováková, 2016; Paget, Daniell, Rubio Zuazo & Barreteau, 2016).

4. Conclusions

Ponds of the Thermal Power Plant Paroseni is a source of pollution and demands rehabilitation measures and reintroduction in natural circuit after completion of the deposition of ash and slag.

For reintroduction in natural circuit tailings ponds, we have proposed two methods, namely naturalist and productive recovery.

The plants used in the experiment is wheat for the productive recovery and grass that was for naturalistic recovery, and for better growth and development is required to be helped with a complex fertilizers.

References

Dima, I. C., & Man, M. (2015). Econometric Models Used in the Management of Production Costs. In Modelling and Simulation in Management (pp. 377-434). Springer International Publishing.

Dumitru, Aurelia, Avram, Marioara, & Siminică, Marian (2015). Four Theories with Potential for Success Within the Relation Practice with the Touristic Products Consumer. Tirgu Mures: Arhipelag XXI. In I. Boldea (Ed.), Discourse as a Form of Multiculturalism in Literature and Communication (pp. 429-439). Tirgu Mures: Arhipelag XXI.

Fodor, D. (2008). Exploatarea în cariere a zăcămintelor de substanţe minerale şi roci utile. Deva: Corvin.

Fodor, D., & Lazăr, M. (2006). Ocuparea şi reabilitarea ecologică a terenurilor în zona Olteniei. Buletinul AGIR, (3), 27-31.

Mangra, M. G., & Dumitru, A. (2015). Insurance, Reinsurance and General Inventory of Economic Entities. Saarbrucken: Lambert Academic Publishing.

Negrea, Xenia, & Teodorescu, Bianca (2015). Pathways of Social-Political Communication Infusing Societal Environment. In Sandu, A; Frunza, A; Ciulei, T; et al. (2015), Rethinking social action. Core values (pp. 889-892).

Paget, N., Daniell, K. A., Rubio Zuazo, A., & Barreteau, O. (2016, May). Environmental information sharing: a means to support the legitimization of oyster

farmers' stewardship over water quality management in NSW, Australia. In Natural Resources Forum. Blackwell Publishing Ltd.

Petrilean, D. C., Irimie, S. I., Băleanu, V., & Stănilă, S. (2014). Multicriterial analysis of environmental impacts in thermoelectric power station areas. Environmental Engineering and Management Journal, 13(6), 1383-1388.

Šoltés, V., & Nováková, B. (2016). Assessment of Material Living Conditions by the Means of Integrated Indices in the Visegrad Group. Polish Journal of Management Studies, 13(1), 157-167.