

## ASPECTS OF THE EVOLUTION OF A GREENED TAILING DUMP

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### Abstract

*It has been proven that the tailing dumps and tailing dams affect the environment both through agro-forestry sealing of significant areas of land and, especially, through the negative effects they produce on ecosystems and human health in the surrounding areas. In the Baia Mare Depression there have been identified dozens of such inactive "artificial anthills", but which store millions of tonnes of tailings material removed from the channels of natural biogeochemical mater.*

*This paper presents issues relating to the greening area of the former dump "Meda", an area located in the west of Baia Mare, on the Săsar River bank. This plateau with a stretch of 21.4 hectares is, in fact, a warehouse area that was isolated by sterile seal, the work being completed in 2004. Freeze-thaw phenomena that have taken place on a little congealed substrate and high rainfall throughout the year have led to degradation of surface layers, respectively transforming it into a swampy area and, also, they have led to the emergence of micro-basins, which have, at times, depths of up to 10 cm. On the surface these micro-depressions occupy about 15-20% of the total rehabilitated area, being positioned especially in the centre of the plateau.*

*Greening the mining perimeters closed lines is necessary and it also is a priority on the agenda of EU Member States, but field data show that these activities should take into account the particularities of the natural environment and the specific of the polluting substances.*

### INTRODUCTION

Waste dumps and tailing dams affect the environment both through agro-forestry sealing of significant areas of land and especially through the negative effects that they produce in ecosystems and human health in surrounding areas [2, 3].

In the Baia Mare Depression there have been identified dozens of waste dumps, some that have impressive dimensions. Most of these "artificial anthills" are inactive, but they store millions of tons of material and have more or less content of known heavy metals. In contact with atmospheric precipitation the metals in the dump form toxic compounds that flow into the nearby lands, affecting groundwater

and/or nearby water courses [1]. These facts fully justify the environmental and ecological monitoring activities of the mining perimeters close.

The place of research is the area of the former dumps "Meda", located on the West of Baia Mare, on the left bank of the Săsar river. This site was originally known as the "Săsar Preparation Pond", the first deposit of waste from the UP Săsar (1962). This store has occupied an area of approx. 21.4 ha [5] and functioned until 1971, then went into storage. The city expanded and developed closer to the dump site since 1975-1980. The dust particles carried by air currents represent a risk factor for the health of the inhabitants in the neighbouring district.

In 1992 technical documentation was prepared for the reprocessing of tailings dumps, the operating mode being the excavation of the material. It was seen as an opportunity to reprocess the precious metals that remained in the tailings and the resolution of environmental problems, the priority for a city in full expansion (Figure 1).



**Fig. 1. Site of "Green Dump Meda"(source: Google Earth)**

Tailings operation were completed in 2002, the site being ecologically restored. The technology used for the rehabilitation of soil and groundwater was that of isolation by sealing. This technology had the purpose of creating a vertical barrier sealing perimeter and side the area on its lowest topographic level, a "funnel gate" system, a permeable reactive barrier, allowing the discharge of groundwater remediation and also inside them.

The rehabilitation works were completed in 2004, monitoring post-rehabilitation being done until the end of 2005.

After a lot of local controversy on the use of the land, the owner supported the idea of making a residential area. An urban plan was developed, considering how the commercial networks would cross the veil of sealing without affecting its functionality, but the project was never realized. Although it was perceived as an

area with great economic and social potential, now presents itself as an open space on which many question marks hover.

## **MATERIAL AND METHODS**

Quantification the transformations that took place in the coating of the rehabilitated site has been made on the following program:

- documentation that preceded the study of greening works and some works of literature on the specifics of the area [2, 5];
- consulting the technical execution of the works projects and final acceptance;
- measurements and geomorphologic observations, periodic flora and fauna monitoring;
- systematization and analysis of data collected.

## **RESULTS AND DISCUSSION**

From the geomorphologic point of view, the area looks like an open plateau, studded with positive and negative microforms relief. The humps of the plateau are of entropic nature. They are located mainly on the Eastern side of the plateau, near the residential area and are the result of storage of demolition waste. On the North side of the plateau various domestic waste is stored.

Micro-depressions shelves are the result of natural evolutionary processes and human impact. Natural processes lead to the degradation of the surface layers (creating swampy areas) and are predominantly influenced by the prolonged stagnation of rainwater and freeze-thaw phenomena of a little congealed substrate.

Field observations have shown that there have outlined micro-basins in which water stagnates and which communicate with each other through water channels that have irregular geometric shape. Their depth has not yet passed the first coating (15 cm of soil), but sometimes is up to 10 cm in depth. These micro-depressions cover about 15-20% of the total rehabilitated area, being positioned especially in the centre of the plateau. There has also been observed that the margins of the micro-basins tend to transform into swamps.

As an anthropogenic impact, is distinguished the kneading hooves created by the animals that grazed this area regularly. Here graze horses, cows and sheep, belonging to the community placed in the south-southwest of the plateau. Also, on East-West direction, in the centre of the area, there has been formed a path, linking outlying communities to the residential area.

In terms of vegetation cover, the surface is well covered. On the North side of the site, on the bank of the Săsar River, vegetal cover includes, besides local specify vegetation (willow, poplar, birch), oak and Austrian black pine (*Pinus nigra*

*austriaca*), planted decades ago to protect the adjacent areas. Among herbaceous plants the dominant species on the North side is *Reinutria japonica*, invasive species that we find, moreover, throughout the middle of the Săsar river. The predominant species covering the lower places is *Juncus effusus*.

## CONCLUSIONS

Greening the closed mining perimeters is a necessity and a priority on the agenda of EU Member States. Field data show that these activities should take into account the particularities of the natural environment (geological, chemical-toxicological and also the weather factors) [4]. For better following results we recommend special attention on the following factors:

1. Priority consideration of the tope-climatic factors in the area where the site is located.
2. Consideration in the design phase of the project of self-sustaining mechanisms for the newly formed ecosystem.
3. Additional measures and drainage works for large plates, like hundred of hectares.

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6. \*\*\*Google Earth.