ECOLOGYCAL RECONSTRUCTION OF TAILING DUMP

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Abstract. Technological dumps tailings upstream of Valley Şesei respectively Sălişte dump rocks consist of chemically active. However, degradation is the gradual removal of sterile layer, followed detached particles entrained water to be stored as colluvium colluvial and was subsequently taken over by currents and gild proluvionate, alluvial or decanted into the container.Sites (Sălişte dump, dump Gura Rosia respectively TMF Şesei Valley) is located in an area classified as a temperate continental climate with strong topographic influences.

Keywords: water balance, steril layer, afforestation, soil erosion

INTRODUCTION

Productive capacity of the land is equal to zero waste dumps being discharged acidic waters with high iron and copper, resulting from oxidation of minerals contained.
To reduce the acidity of these waters are discharged into the pond tail Şesei Valley and the reduction of metal ions is required commissioning of plant chemical neutralization with hydrated lime, located upstream of the pond.

As discussed in previous publications about dump Sălişte regarding the effect of deep erosion, reducing the opportunity to install vegetation currently showing instability phenomena, which can be exacerbated by heavy precipitation (common area) and can flush with undesirable consequences for the downstream and Aries Valley.

To prevent these phenomena must be installed for stabilization of stockpiles and lower acidity, such as:

- dams to stop sliding phenomena
- diversion channel coast in the slip
- location of treatment plants;
- use low grade ore of copper.

Knowing the highly acid and high load metaliei ion will follow correct pH and precipitation of metal ions effectively. The neutralization reagent is an aqueous solution of 10% CaO. The dose depends on the acidity of the initial reagent and quality of lime used in the preparation of milk of lime.

The main objective of ecological restoration is to prevent erosion, to reintegrate rehabilitated areas with deciduous or coniferous forests surrounding and restore local and regional biodiversity.

MATERIAL AND METHOD

In this context it is noted that during the operation, still going to dump and tailings dam Sălişte Şesei Valley, dump Gura Rosia being in post operation, test surfaces were installed to obtain specific information for designing the cover tailings, waste dumps that, in relation to:

- Water balance;

- Transport of oxygen in the coating;
- Optimal depth at which vegetation grows roots;
- Depth of frost.

Spatial perimeters test was done after the platform and slope terraces characteristic variants:

- Different slope angles;
- Different coating thickness;
- Various degrees of compaction;
- Seeds mixed herbaceous perennial plants;
- Mixed tree species and individuals.

After the rules in force on the revegetation of waste dumps and tailings were observed the following:

- Planting took place when the weather was hot and humid and moist soil;
- Operation of clearly demarcated contours revegetation planting areas;
- Tree planting took place at the beginning of spring;
- Plants with exposed roots were planted in moist soil immediately after their receipt,
- After planting, the plants were watered to prevent drying out, and when the case was frost.

Planting works took place following rules:

- The plants were arranged in rows according to drawing pad project.
- Planting was done in a well balanced position;
- Topsoil was carefully added around the roots and lightly compacted to the original soil level traces of the strain.
- Deadwood, damaged or diseased, were removed;
- Pits arranged for planting trees had the following dimensions:
- Size: 300 x 300 mm
- Depth: 300 mm

During planting pits were taken into account:

- The plants are positioned in the center hole, vertical and at the same depth in the same direction of the wind beating, as in the nursery;
- Entered the pit soil compacted thoroughly to eliminate air pockets and Pentre not destroy the roots;
- Deadwood or broken ones have been removed and destroyed crust area were treated with fungicides insulating substance;
- Trees were watered immediately after planting with sleeves, low to the ground does not wash.

Within the perimeters of reconstruction of waste dumps and tailings dams using tree species (forest species), met a number of situations:

- In terms of degradation, erosion ranging from strong to very strong;
- In terms of edaphic substrate has no fertility;
- In relation to orographic, microrelief dumps showed stability only dump, Gura Rosia, revegetated with herbaceous species, to dump Sălişte respective terraces Şesei Valley dam was needed to intervene with other works stabilization and hydro consolodare substrate.

From the point of view of afforestation schemes chosen for high densities of seedlings at planting due to difficult soil conditions.

RESULTS AND DISCUSSION

Overall technical solution involved a set of photographs and ameliorative measures, which were aimed at reducing expansion, intensification or reactivation of degradation processes. Also took into account the adoption of a complex harmonic improvement, which in economic terms is cheap but technically effective.

The dump site located on the mouth red test surfaces was intended effect it is geosynthetic material herbaceous vegetation installed on the site, ie the soil water balance, transport of oxygen in the coating, the depth at which develops roots, frost depth.

Fig. 1. Revegatation of Gura Roșiei tailing dump – Roșia Montană

Studies have concluded that acidic water, water derived from precipitation fallen on land requirement dumps located upstream shall not affect herbaceous vegetation installed for the following reasons:

- The canopy and made sterile slurry discharges only basic pH over 10;
- Water samples from water seepage had pH between 7.0-7.05;
- Coastal water channel, natural creek bed eliminated is not affected;
- Channel is not affected by silting coastal tailings or rocks;

In a study of this site may be advised on the development effectiveness of geosynthetic herbaceous plants.

Monitoring vegetation in this area has involved the following:

- The growth of plants - normally slows during drought;
- Annual growth of biomass - between 2 to 3.5 kg;
- Leaf colors - from deep green to light green species specific in color because of mineral deficiencies;
- Weeds or unwanted species - unwanted species found on the site are insignificant, less than 1 % per m2.

From the observations and measurements made during the growing season (spring - autumn) culture is considered successful, developing normal (ground cover 85% of the soil), requiring minimal maintenance.

As a result of erosion and surface erosion depth was identified degraded following categories:

- Badlands;
- Very highly eroded land;
- Formations eroded by deep ruts and gullies type.

Forestry crops that were created on the terraces to dump Sălişte fulfill a mixed role: aesthetic, ameliorative and future production. Afforestation using cultures mixing and presented avanteje order ameliorative, hydrology, aesthetics and health.

When selecting species for revegetation ecological norm used for improving degraded land, taking into account the stationary conditions and environmental requirements of the species and fulfill the role.

For perimeters located on dump Sălişte chosen for the following species: Scots pine (PiS) and birch (M). For each type of state afforestation formula was applied in bands:

- T1 - 100 % PiS
- T2 - 100 % M,
- T3 - PiS 70 % + 30% M.

Perimeters studied degradation affecting multiple consequences, damages the order pedological, hydrological, climatic and aesthetic. Degradation processes are dynamic, upward, environmental aesthetics are altered aesthetic value of the landscape being diminished health.

Improving forest pursuing a number of objectives:

- Stopping the degradation process;
- Improvement and soil protection;
- Protection of water and other objects;
- Aesthetics and enhancement of degraded lands.

Issues to be resolved in concrete situations functions within the perimeters studied to achieve the objectives are:

- Restoring Emvironmental progressively in recent years and will start operating on the steps completed to toe;
- Control of meteoric water infiltration through their evacuation from the coating;
- Erosion control dam and embankments;
- Reducing water exfiltrării minimizing water infiltration and oxygen;
- Ensuring optimal conditions for the growth of vegetation;
- Reducing the visual impact after the appearance of vegetation.

Scots pine was used because of skills deosebitede situation degraded vegetation and slopes with sunny Expositor, while achieving productions wood and resin, exploiting maximal reduced nutrition of tailings.

Preliminary development percentages of species used in ecological restoration, depending on the specific type within each station are:

- T1 - 70 % - PiS - heavy duty - degraded land from erosion surface of the substrate on slope instability, upstream accumulation of sterile cultures natural pine seedlings (Fig. 3);
- T2 - 45 % - PiS + Me - under very heavy - very degraded land from erosion depth of the substrate on slope instability, leaks to downstream sterile cultures of pine and birch natural seedlings (Fig. 4.);

- T3 - 45 % - Me - in extreme conditions - very degraded land from erosion depth of the substrate on slope instability, natural cultures of pine seedlings (Fig. 5.)

Based on the above considerations necessary ecological reconstruction opportunity interference resulting from accelerated deployment and dynamic nature of erosion.

Fig. 2. aspects of the site regarding stationary types from Poaiana Roșiei tailing dump

Fig. 3. Pine alignment on tailing dump slopes (T1)

Fig. 4. Pine and birch alignment on tailing dump slopes (T2)

Fig. 5. Birch alignment on tailing dump slopes (T3)

CONCLUSIONS

Commencement of planning depends on the final blanket tailings consolidation and reorientation stage works to alleviate the water drainage channel outlet.
Building coating is so tailings are in contact with rainwater as less and tailings coating has the following purposes:

- Elimination of ARD generation of sterile
- Removal of the runoff and direct them to discharge channel;
- Elimination of direct contact with people or animals tailings;
- Reduced wind erosion;
- Ensuring the environment for the growth of vegetation;
- Reintegration into the local landscape by vegetation growth.

Downstream slope of the dam will be terraced early stage of operation, to decrease erosion and to facilitate access to the monitoring apparatus. Concomitant is laid a coating similar to that deposited on dumps careers.

Completing work had a decisive role in maintaining seedlings and achieving solid state, thus ensuring full success of the crop.

Maintenance consists of shoes, despotmolirea seedlings, cover with soil bare root surface erosion and gradual removal of spontaneous vegetation is installed along.

Experimental works were carried out in order to strengthen the advanced degradation of land and ensuring minimum conditions for planting seedlings. Such works (single, local materials) gave very good results, so I think it would be used more widely in action very highly eroded land improvement / Raven.

Cultures forestry development project supported by vegetative develop much better and fulfill their protective role quickly, as demonstrated by the massive closing in a shorter period and the current state of forest cultures.

Recent researches have shown that the effectiveness of these types of work are reflected in structural biology and stands achieved their status vegetation etc.

The testing ranges from dump Sălişte increases the diameter of Scots pine and birch mixed bands 3-5, installed on reinforced vegetable terraces were about 6.4% higher than average, thus ensuring a increased efficiency dissipation / brake fluid leaks and stopping soil erosion.

Increasing the diameter of mixture individuals pine and birch from those made on the terraces where only pine planted in strips was 1.1 % higher, respectively, 29.28 % higher than those achieved on the terraces where planted only grouse in bands.

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