

## THE LANDSCAPE DEGRADATION IN THE MINING SITES WITH SUSPENDED ACTIVITY

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**Key words:** landscape, mining site, pollution, mining waste, quarry.

**Cuvinte cheie:** peisaj, sit minier, poluare, steril, carieră.

### **ABSTRACT:**

The extracting industry, through its extraction activities, of shipping the ores, of breaking the ores, of preparing the practical substances, of stowing the useless rock, of transporting the practical substances, etc. might modify the area's relief and the quality of ground, of the surface waters and of the air. Suceava County has an old tradition of mining, where the results of this activity are visible, especially the visual point of view, and where not taking certain measures of ecological remediation will emphasize the disappointing image of the landscape within the areas of mining activity performing.

The predominant mountainous landscape, in which mining activities have been held, is being affected also by the abandoned industrial and administrative buildings, in an advanced degradation state.

The hydrographic system, very rich in mining areas, has its water quality affected by the acid rock drainage- phenomenon which appeared in many mining waste deposits.

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Within *The strategy of mining industry during 2004-2010*, considering the politics, instruments and resources point of view, necessary for the strategy of mining sector, the measures that have to be taken into consideration as concerns the politics are presented, as concerns the rebuilding and security of environment for the viable mining objectives and of the mining objectives, that are concluded and made ecological, meaning:

- continuing the exploitation of mining resources, within the conditions of protecting the environment by taking into consideration the international standards;
- restoring the environment affected by the mining exploitation;
- improving the environment and the infrastructure by means of public working programs.

After carrying out the studies related to documents and international legislation existing up to present within the mining sector, the aspects of environment and especially, the strategy of mining industry for the next years of activity regarding the environment, are based upon two conclusions, meaning:

- the mining sector of Romania has the inheritance of an extended environmental demotion and of certain serious problems, continuing into degradation. There is an increasing awareness of these issues, but there are few activities effectively concerning their solving or prevention;

- continuation and the exacerbation of these problems is not caused by the lack of instruments, related to regulations or standards, or by the lack of some institutions, but due to the lack of implementing and applying the existing stipulations. The resources are poor, and the awareness and competences within the environment management are low as concerns the mining sector.

Among the industries having a huge impact over the environment components, *the extracting industry*, by the specific extraction activities, of shipping the ores, of breaking the ores, of preparing the practical substances, of stowing the useless rock, of transporting the practical substances, etc. might modify the area's relief and the quality of ground, of the surface waters and of the air.

The mining exploitation deeply modify the landscapes, by the high intercession of those areas taken into consideration, meaning exploited to their surface, as well as by means of stowing the useless rock, named dumping useless rocks – derived from the exploitation of mineral useful underground substances, of those existing at surface area or those derived from the activity of ores preparing (so-called mud-setting pond).

The mining activity is one of the oldest pursuits of the human being. One of the first materials used by the prehistoric human was the rock – used as weapon, as a tool in order to build and the clay – used for crockery and bricks.

According to Dumitru Fodor, prof. PhD: “one might affirm that wealth of useful ores from surface and earth shell, as well as the need of tools, used in order to survive, determined the human being to become a mineworker, before being an agriculturist and animals grower”.

Therefore, besides the silex processed for tools, the first “metal” exploited by the primitive human being, from the rivers' alluviums, was represented by the gold, and the first molten metal was the copper.

But, simultaneously with the evolution of exploitation techniques of both useful ores substances, and of other branches of mining industry: that of preparing the ores and the metallurgical extractive branch, the negative part related to this activity came into sight, meaning the pollution of environmental factors, having repercussions over the people's health, also.

One of the most visible aspects of the mining activity is represented by the modification of area's geo-morphology, where this is carried out.

The mining exploitation firstly leads towards taking out a certain area of terrain from the normal use (growing or agricultural stock, with essential rooting out). Suceava County presents an old tradition of mining. The main deposits and storages of practical ores exploited within this County are the following:

- The copper ores deposits of Lesu Ursului - Brosteni and Dealu Negru-Fundu Moldovei.
- The poly-metallic ores deposits of Manaila, where the ores are exploited of quarry.
- The manganese deposits of Dornelor basin (Oita, Dadu, Arsita, Dealu Rusului, Tolovan, Ulm). An activity also exists at Ulm quarry and Oita underground.
- The deposits of cawk of Ostra. Both the activity of exploitation and that of preparation of cawk are suspended.
- The uranium-bearing ores of Crucea area.
- The rock-salt of Cacica deposits, with the preparation by re-crystallization, into the industrial enclosure of Partestii de Jos.

- Practical rocks, used for building: andesites at Dornisoara, Dorna Burcut and Poiana Negri quarries, limestone to Paraul Cailor and Botus, etc.
- Sand and broken stones of river. There are essential resources of sand and broken river stones, mainly at Suceava, Moldova and Bistrita rivers, as well as concerns their tributary streams.
- The natural gas of Frasin and Todiresti structures.
- Mineral waters. The territory of the County contains high reserves of mineral and mineralized waters, well known by their therapeutic effects.

As concerns Suceava County, there are 71 (seventy-one) mining areas, having their activity suspended, among which 36 (thirty-six) derive from the geological research-exploitation activity, 32 (thirty-two) mining areas, where the activity of ores exploitation was carried out, 3 (three) units of practical ores substances preparation.

As concerns the quarry activities, a high quantity of vegetable soil is taken off, mixed with the useless rock taken out, until the practical ores is reached, being destroyed in this way. When the deposits are extended by deepness, the descending material is excavated, resulting “pots” of important dimensions, having the form of a funnel, with roof falls, streams and water storage of extreme mineralization. In Suceava County, two essential examples are represented by the quarries of Calimani – until 1997, when sulphur was exploited and Manaila, where copper is being exploited (fig. 1, 2).



**Fig. 1.** Mănăila quarries.



**Fig. 2.** Călimani quarries.

Exploitation of deposits by daily exploiting produce huge quantities of solid residua – the so-called useless rock taken out – which creates problems, as regards the necessity of great area surfaces for storage, where the rock once dislocated and broken exposed to the new physical-chemical factors produces the pollution of air, by powder and overhead suspensions carried by the wind, therefore leading to affecting the vegetation within that area. The pollution of waters streams is also produced, by carrying the useless rock by rain waters.

The useless rock quantities extracted from quarries often exceed the ores quantities.

The repositories of useless rock derived from the activity of exploitation – exploitation of practical ores substances, occupy an area of about 280.0 hectares, with a volume of over 45.5 millions of cube meters, where the mud – setting ponds occupy an area of about 95.0 hectares, having a volume of over 14.6 millions of cube meters.

Storing the useless rock is usually carried out within a hollow, on a valley, coming into sight on different height peaks, from few meters up to over 100 meters, if the dumping sites are not earth-worked, generally considering the under-metrical aggregate grading of the storage body, where the possibility of forming in time the vegetation becomes slow, although subsequent working of becoming overgrown with grass within programs of ecological rebuilding, after suspending the activity within mining area was used.

The aggregate grading has varied a lot, starting from few millimeters up to more cube meters, depending upon the blasting method. Considering the mineralogical point of view, these deposits have the rocks composition from which they derived, to which the taken out soil is added.

High quantities of useless rock also result from the activity of starting underground mining working. For the mining sites being within the exploitation process, the solid deposits do not quantitatively exceed the extracted ores, being therefore used towards filling up the built pit spaces (fig.3).



**Fig. 3.** Pârâul Căinelui Dump.

The reddish tint of the ADR receiving waters, emphasizes their „lifeless” appearance. The acid rock drainage on the abandoned surfaces, from the mining waste deposits or from the abandoned concentration deposits represent a serious problem, mainly because they create acid conditions in the courses of the collecting waters and transport big quantities of dissolved metals, toxic for plants and animals.

ADR can make receiving waters become unusable for domestic and industrial consumption, depending on concentration, total acid charge, the nature of the receiving waters and their ability to dissolve and to stipple ADR.

A comparison of the exfiltration pH from the waste deposits that grow from the preparation of mineral substances, useful in Suceava County between the active period and after the activity cessation, is represented in the graphic below:

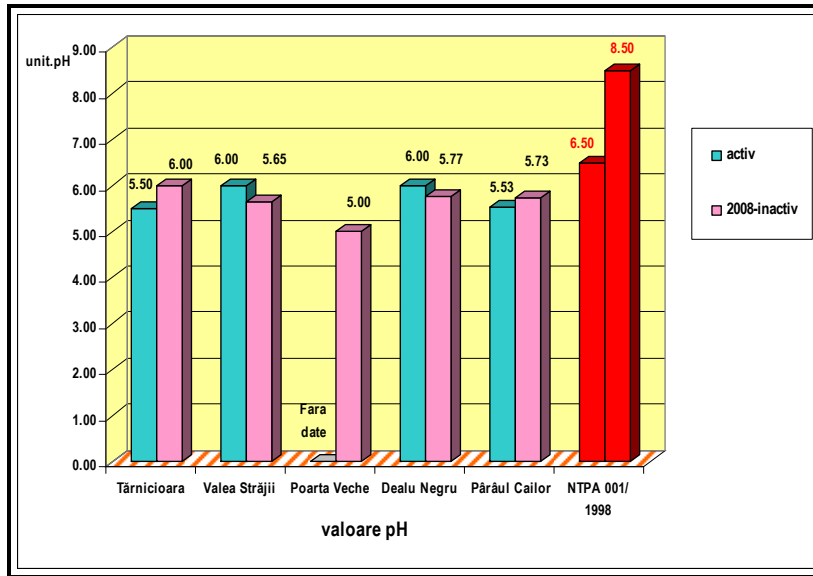


Fig. 4. Evolution of the ADR pH from the tailing pond.



Fig. 5. Abandoned buildings from the mining area Mestecăniș.

At the ceissure of mining activities, the industrial and administrative buildings remain, and because of the lack of maintenance and advanced degradation, besides the danger of collapse, they also give a stark aspect to the landscape.

### **Conclusions**

The mining activity, either related to research, exploration, exploitation or preparation of useful ores substances, produces certain essential modifications within the geographical landscape, both by changing the area's geo-morphology, by means of overhead suspensions "clouds", especially carried by the yard useless rock, by the explosions practiced in order to break the materials, which might lead towards acid rains, affecting the vegetation, as well as concerns the streams of acid drainage to rocks or acid drainage of mining sites waters, offering barren areas, "selenian" to mining areas.

At the planning of the ecological rehabilitation works in the mining sites, the re-integration of the degradation area in the natural landscape must be taken into consideration, through deposit remodeling, revegetation with woody and herbaceous plants, specific to each area. The buildings, if it cannot be given an utilization for the local community to them, must be unrigged in ecological conditions.

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