TELKIBANYA - EDUCATIONAL AND TOURISTIC POTENTIAL OF MEDIEVAL MINING

Éva, Seresné Hartai¹, János, Földessy², Tibor, Zelenka³

ABSTRACT

Telkibánya is a significant mining place in Hungary, where gold and silver was mined for centuries. It is an important medieval industrial and cultural heritage, which has never been protected before and we don’t really know its real size and condition. Within the framework of a PHARE CBC project the University of Miskolc and Technical University Košice made a study about the environmental impact of ore mining and worked out a plan for the educational and tourist utilization of the area.

INTRODUCTION

Telkibánya is one of the most beautiful villages in the Tokaj Mountains. In the geographical descriptions from the 19th century it is frequently mentioned to be similar to the "villages of the snowy mountains in Switzerland". It has not only a rich cultural and historical heritage but outstanding natural values as well. The name "Aranygombos (Golden Button) Telkibánya" refers to the once rich precious ore mining. In these days, the village is becoming a more and more popular destination for tourists as the most beautiful mountain trails start from there. Also, the geological points of interest and the remnants of the former mining activity just attract even more tourists.

In 2005 the University of Miskolc, in co-operation with the Technical University of Košice made a study in the framework of a PHARE CBC project. The following objectives were examined: (a) the environmental status and impact of former mining activities, (b) surface and underground mining facilities and database creation, (c) safety assessment of mine facilities for future education and tourist purposes, (d) educational tools and information about geological and mining monuments for a field training centre.

GEOLOGY OF TELKIBÁNYA

Telkibánya is located in the north-eastern part of Hungary, 20 km from the Slovakian border. The area is a part of the Miocene volcanic arc stretching from Tokaj in the south to Prešov in the north and called Tokaj Mts. (southern part) and Slanské vrchy Mts. (northern part). Most of the mountains are built by volcanic rocks such as andesite, dacite and rhyolite. The thickness of the volcanic mass is nearly 3000 m.

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The centre of the Sarmatian volcanism was in the northern part of the mountains, near Telkibánya. The volcanism took place partially on dry land, partially in a marine environment. As a result, there is an alternating series of marine clay, andesitic hyaloclastite-breccia, rhyolitic tuff, ignimbrite and conglomerate. In the central part of this series an andesitic stratovolcano was formed, about 8 km in diameter. In the stratovolcano the lava rocks are dominant, and the whole mass underwent a strong propilitization. The uppermost part of the volcano collapsed and a caldera structure formed. In the peripheral part of the caldera andesite and dacite parasitic volcanoes, in the central part of it rhyolite and rhyodacite domes are found (Gyarmati, 1977).

After the collapse of the caldera, in the southern part of it subvolcanic andesitic bodies intruded, which thermally contacted the stratovolcanic andesite, marine clay and rhyolitic tuff. The subvolcanic andesite underwent a strong potassium-metasomatism with an enrichment of the adularia (Székyné, 1970). This process took place 12-12.5 million years ago, according to the radiometric age determination (Pécskay & Molnár, 2002). The subvolcanic rocks outcrop by erosion in the Gyepü Hill, Jó Hill and Medve Hill.

The final products of the volcanic activity are represented by unaltered pyroxene andesite veins with a N-S strike. These veins were formed at the Sarmatian-Pannonian boundary.

MINERALIZATION OF TELKIBÁNYA

In the potassium-metasomatised subvolcanic bodies epithermal low-sulphidation-type gold-silver mineralization occurs. During the mineralization 14 veins were formed, with a strike of N-S and NE-SW (Fig. 1).

![Fig. 1 Situation of the hydrothermal veins (black lines in the middle) near Telkibánya](image)
The veins are 40-80 cm in width and a few km in length. The vein-fillings are siliceous on the top, but they are dominated by argillic then carbonate material in the deeper sections. In the upper 300 m of the veins the ore minerals are dominantly disseminated native gold and silver sulphides (argentite, pyrargyrite, freibergite). In the deeper parts a polymetallic Pb-Zn-Cu mineralization occurs represented by galenite, sphalerite and chalcopyrite. Above the hydrothermal zones, siliceous precipitations of the postvolcanic warm-water lakes are deposited, with Hg, As, and Sb in prints (Molnár, 1997).

MINING IN TELKIBÁNYA

There are some obsidian tools from the prehistoric times proving that the early men already executed a primitive mining in the area.

The gold and silver mining in Telkibánya goes back to the beginning of the 14th century. At that time, mining took place at the surface, in open pits. The pits (actually, shafts of a few meters in diameter and 6-8 m deep) followed the quartz veins, which were harder than the surrounding rocks, and outcropped on surface. The pits were deepened along the veins (Fig. 2).

Miners went to below on ladders and took out the mined ore in baskets. The intensity of the open-pit mining is given by several thousands of dish-like depressions (called “horpa” in Hungarian) in the area of Kánya-Hill and Gyepű-Hill.

Telkibánya was given a rank of "Mining Town" by King Károly Róbert in the 14th century. At that time, Telkibánya was on the fifth place in the rank of mining towns of the Western Carpathians.

The underground mining started about two hundred years later, as the near-surface parts were exhausted. For underground mining, starting from the hillsides, adits were excavated. Today we know about 80 adits in the area. Vertical shafts solved the ventilation in adits. In the early times, miners used only chisels and other hand tools. The excavated ore was processed in ore mills, the remnants of which we can find close to the "Mátyás király kútja" (well of King Matthias) spring.
The flourishing mining was interrupted by a catastrophe: probably due to an earthquake the Lipót Shaft collapsed and – according to a contemporaneous description – 360 miners lost their life in the Veresvíz (Red Water) Adit. The place of the Lipót Shaft now is marked by a depression 30 m in diameter.

The catastrophe was followed by a 200 years long break in mining, then started to prosper again in the 18th century, during the reign of Empress Maria Theresa. That time the adits were driven using explosives and the gold and silver ore was carried to foundries in Selmecbánya (Banská Štiavnica, Schemnitz) and Körmöcbánya (Kremnica, Kremnitz). Its prosperity was ended soon after the discovery of the huge silver deposits in Mexico as the price of silver considerably decreased. Finally, the mines were decommissioned in the 1850’s (Benke, 2001).

<table>
<thead>
<tr>
<th>Drillhole</th>
<th>Au ppm</th>
<th>Ag ppm</th>
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<td>TKB-29</td>
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<td>TKB-33</td>
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</tbody>
</table>

*Table 1. Mean values of gold and silver content in recent drillcores*

In the 1950’s ore exploration started again in order to open the former gold and silver mines. However, the ore reserves didn't prove to be economic (*Table 1*). Since then, explorations were re-started then stopped for the last time in 2001. Still, Telkibánya is a special example of the gold occurrence in the Carpathians, where the documents of the one-time mining can be seen; we can even walk through them and recognize them.

**ENVIRONMENTAL ASSESSMENT OF THE AREA**

In any kind of utilization it is very important to know whether the former mining activity made an environmental impact on the affected area. In order to clarify the nature and degree of impact, we examined the toxic heavy metal content of surface and subsurface waters, and that of the soil, the heaps and tailings.

According to the hydrogeological examinations, the water of springs and streams is neutral, the pH values vary a little depending on the surrounding rocks. The toxic heavy metal content is always below the critical limit (according to the 10/2000 KVVM regulation) except for arsenic. It is probable that the higher arsenic content doesn’t result from the mining activity but from natural sources, and appears as a naturally higher-level diffusive background. In the formation waters zinc contents exceeds somewhat the given limit.

The results of a former soil-geochemical sampling indicate that there is a higher arsenic content in the soil above the potassium-metasomatized subvolcanic body. The As, Ag, Zn, Cd and Pb contents is higher just in the very close surroundings of the ore veins.

Today, the acid-producing capacity of the old heaps is not significant. The pH of waters coming from the heaps near shafts and adits is neutral, as the original sulphides have been oxidised. There is a small-scale local enrichment in heavy metals right around the heaps and
tailings, but it is still below the limits. In the tailings, the iron-oxides are more abundant and the clay mineral contents is lower than in the heaps. The latter ones contain sulphates, which are absent in the tailings.

Summarizing the results it can be concluded that the former mining doesn’t pose any kind of hazard to the local environment.

**UTILIZATION PLANS**

Within the framework of the PHARE CBC project the University of Miskolc and Technical University of Košice we studied and selected those mining objects, which can be used for educational and tourism related purposes. The target groups of the project are quite diversified: tourists, primary and secondary schools, universities, professional organisations etc. As a preparation for the utilisation, we worked out the plan of the subsurface and surface educational trails, determined the GPS coordinates of the industrial monuments, geological points of interest, made a virtual multimedia training about the underground mining works and prepared Hungarian, Slovak and English brochures on Teklibánya.

The safety of those mining objects that could be potentially opened was also analysed, as well as those geological, mining and historical values that can be exposed to the public. The experience with former mining areas in Slovakia, which are open to the public were also collected and valorised. We also measured the type and magnitude of works necessary for the opening of the former mining areas, and estimated the possible costs of these works.

The geotouristic potential of Telkibánya is comparable with that of the Slovakian mining areas. The potential already exists – surface and subsurface educational trails, geocaching, a mining museum, exposition rooms etc. – but important investments are needed for the transformation of these separated objects into a complex tourist attraction. Košice has an important role in this question, due to the proximity of its international airport.

As for representing the former underground mining, the Mária adit systems could be shown to the public. It can be used even at its present state for smaller professional groups. However, major investments are necessary if we want to make this place safe and comfortable for the general public (passways, at least two entrances, etc.). It is also necessary to ensure good ventilation. The facilities connecting the adit to the surface should also be built and the energy supply of the place should be solved. The estimated costs of the basic safety program for educational purposes (for small professional groups) with some rock stabilization is about 60.000 euro. The costs of the realisation of the whole complex plan are about 800.000 euro.

In addition to the geological and mining values, Telkibánya has favourable infrastructure conditions. In case of the realisation of the above mentioned project, a development of Slovakian and Hungarian geotourism, an increased protection of the mining monuments and an improvement of environmental education at the two universities can result.

**REFERENCES**