Mining Activites in the České Středohoří Mountains Protected Landscape Area

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Abstract

The České Středohoří Mountains Protected Landscape Area (hereinafter the ČSM PLA) is no doubt exclusive because of its volcanic relief, living nature and, of course, human activities – especially quarrying ones. There are two kinds of quarries here, according to their status, i.e. both abandoned (a huge majority) and still active ones, Concerning the brand of stone, we can find three substantial types – volcanic (crystalline) rocks, the Cretaceous sediments and even the Tertiary coal. Most of mining activities, especially related to building medieval towns and villages, were abandoned really long ago but some of modern quarries are still active as the source of superior construction and crushed stone which is utilized for building and maintaining roads and railways. Being in private hands, these quarries considerably harm the countryside and even endanger close environs, damaging buildings and public transportation ways. This situation leads to installing safety barriers, especially over railway lines and roads. On the other hand, the PLA suffer from transportation. Before the D8 highway was finished (and repaired after the 1914 landslide) almost the whole international transit had been concentrated along the river Labe. From the environmental point of view, it had been "in order", but the highway led through the least valuable part of PLA has initiated persisting animosities.

Keywords: *the České středohoří Mountains, Protected Landscape Area, volcanic relief, quarrying, human induced damages, D8 highway*

1. Introduction

The ČSM PLA was proclaimed in 1976, still being our second largest one (1068,9 km2). There are three typical parts which differ in their relief: The Louny Mountains are isolated hills or ridges which rise from their Cretaceous bedrocks, the Milešov Mountains (isolated hills rise from a huge mass of volcanic series) and the Verneřice Mountains in the form of volcanic "traps" (sills) with deep valleys formed by rivers and brooks. The border between the ČSM PLA and the neighboring Lužické Hory Mountains may be considered rather formal. The natural axis of the whole complex is formed by the Labe river flowing northwards to Saxony (Fig. 1).

There are several subjects of protection here: In fact, the PLA landscape is a unique combination of the nature-close and cultural countryside. The relief was formed by volcanic eruptions, later deeply eroded, and uplifted. Among particular hills people have been living and intensively managing all accessible places since medieval times, so forests are preserved in higher positions only. As the result we can say that this PLA is the least woody in the Czech Republic. On the other side, there are many rare plants and animals here, always typical for all three parts of the mountains.

According to Act no. 114/1992 Coll. (as amended) [19], the nature protection within Czech PLAs is very strict, similar to conditions in National Parks. However, these restrictions are still violated in the ČSM PLA (new constructions and communications, sports, intensive farming, active quarrying, etc.). Here we must especially emphasize the crushed stone production – there are several large quarries which have exceptions on the level of the PLA Administration. Following chapters are dedicated to this problem.

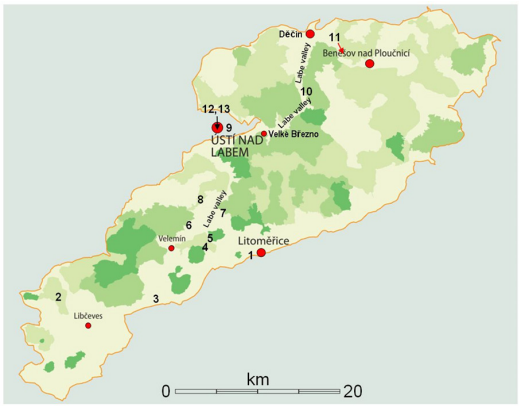

Fig. 1. The České středohoří mountains PLA

Rys. 1. Czeskie góry PLA

Fig. 2. The Písečný vrch near the village of Bečov

Rys 2. 2. Písečný vrch w pobliżu wsi Bečov

2. Geology of the area

This PLA forms a large part of the so-called Eger Graben [2], defined by [11] in 1971 and 1972, respectively. The valley is situated in the easternmost part of the Western European rift system, which may be compared to a huge birdclaw (triad) with the main axis heading from Oslo fiord down to the Rhone valley. Howevewer, in the České Středohoří Mts. the main graben volcanic activity was relatively short (43 to 16 Ma) and some authors deconstruct the rift´s real existence [6], [7]. They have serious reasons – the graben is assymetric, peripheral fault systems are doubtful and volcanic effusions do not follow the graben axis [14]. Moreover, the structure is very short, limited by two transversal fault zones. On the other hand, rocks – more or less – correspond with a typical rift volcanism. We can suppose a very cautious conclusion – this rift may represent a kind of aulacogene [13], i.e. a short living or even inactive lateral part of the triad, mentioned above. The graben itself consists of two main volcanic systems; the České Středohoří Mountains (laid bare volcanic funnels without erstwhile superstructures, but once much larger volcanic province, uplifted during the Late Tertiary and Quarternary) as well as the Doupovské Hory Mountains, a deeply eroded volcano with a mottled history [5]. Both residual provinces are divided by the Most coal Basin (the Sokolov Basin lies southwestwards from the Doupovské Hory Mts). Regarding the České středohoří mountains, conduits and faults pierce the Cretaceous and sometimes the Tertiary basement rocks; other volcanic products form so called multiple sills inside older beds. Because of erosion, many rocks are strongly altered; a very mottled rock composition is often complemented with tuffs and tuffites.

3. The area mining history

Some rocks in the area of question were extracted even in prehistoric times (for example quartzites inside the maar of Písečný Vrch – Sandy Hill – near the Village of Bečov) (Fig. 2). The main phase of utilizing local sources came with the medieval development of residential places. Nevertheless, there was no serious survey; old drawers simply used to set-up quarries and extract sources until they stroke altered rocks, tephra or their hardened forms.

This maar was a rich source of quality quartzite in prehistoric times. The hill is now covered with scrub (here the situation in 2009).

No problem – another quarry could be set up in any adjacent hill. That is why we can cee so many abandoned quarries and minor exposures there. Such a situation used to occur again and again until not a very late time. But modern miners cannot risk additional costs, so they spend money for necessary survey works (probing, boreholes). After 1989, active quarries were privatized and have still been exploited in the most intensive way. The result is pathetic – quarries have even violated the skyline. The end of ectracting basaltic rocks here is unsure. Companies shall try to utilize their property as long as their activities are profitable. They also "abuse" the so-called Mining Law (Act no 44/1988 Coll. (as amended); According to this law, miners are due to utilize deposits in the most complete way. Other sources – sediments, coal – were abandoned long ago for their little importance but they lef their traces in the countryside as well.

4. Volcanic and crystalline rocks

Several quarries – both abandoned and active – are described here. When necessary, photos or maps usefully complement the text.

Radobýl – described in the following chapter (underground limestone mining) it was also affected by a huge, abandoned shelf quarry (Fig. 3).

Fig. 3. The Radobýl is a lonely hill near Litoměřice and was exploited in two ways – in addition to a large wall quarry on the western slope, quality limestone was mined here by a system of underground chambers

Rys. 3. Radobýl to samotne wzgórze w pobliżu Litoměřic, które było eksploatowane na dwa sposoby – oprócz dużego kamieniołomu na zachodnim zboczu, wydobywano tu wysokiej jakości wapień za pomocą systemu podziemnych komór

Fig. 4. The Vršetín u Podsedic was abandoned in 2008. The quarry is situated inside the PLA and is an example of complete destruction of a landscape dominant

Rys. 4. Vršetín u Podsedic został opuszczony w 2008 roku. Kamieniołom położony jest na terenie PLA i jest przykładem całkowitego zniszczenia krajobrazu

Fig. 5. The Kubo quarry near Malé Žernosky is almost perfectly hidden from human eyes. Quarry stone as one of the products; here the filling of gabions

Rys. 5. Kamieniołom Kubo w pobliżu Malé Žernosky jest niemal idealnie ukryty przed ludzkimi oczami. Kamień łupkowy jako jeden z produktów; tutaj wypełnienie gabionów

Fig. 6. Panoramic image reveals a series of smaller wall quarry in the ortorula of the Czech Gate. The dark hill in the background of the picture is the Radobýl [21]

Rys. 6. Zdjęcie panoramiczne ukazuje szereg mniejszych kamieniołomów ściennych w ortoruli Bramy Czeskiej. Ciemne wzgórze w tle zdjęcia to Radobýl [21]

Vršetín – the hill is a typical example of an absolutely devastated landscape dominant. This hill mear the village of Podsedice lost its original profile, being only a torso now (Fig. 4).

Kubo – established in 1842, this open pit quarry is almost perfectly hidden in the terrain above the Labe river (left bank). Lying some 3 km from the City of Lovosice center, it is still the source of superior construction stone (walls, beddings, gabions, decorative elements (the stone is cut or cleaved and polished) and even of various crushed fractions for transportation purposes (Fig. 5). The stone is probably of the Carboniferous age, being a part of the so called Altenberg Caldera. [16]

Quarries in the Bohemian Gate (Porta Bohemica) – between the Villages of Velké Žernoseky and Libochovany, there are huge blocks of crystalline rocks [17] with several smaller quarries close to the railway line from Litoměřice to Ústí nad Labem (the Labe right bank), (Fig. 6). The stone was identified as a kind of red ortogneiss. The same material had to be removed from the left bank in the course of building the railway between Praha and Děčín (before 1850). Blocks were considered a result of vertical uplifts caused by the Tertiary lavas, other authors emphasize fault systems [3], [15]. Both railway lines are protected by safety nets now.

Dobkovičky – this is probably the most problematic active quarry within the PLA. It operates above the left Labe riverside, being a combination of the shelf and open pit quarry. In fact, this defile arose from older individual quarries, now

Fig. 7. The 2013 landslide at its largest extent. The thin silvery line represents the damaged and still non-functional railway line [20]
Rys. 7. Osuwisko w 2013 roku. Cienka srebrzysta linia przedstawia uszkodzoną i wciąż nieczynną linię kolejową [20]

Fig. 8. Deblík, the highest hill slightly to the right, is now only a technological base (left); mining takes place in neighbouring Trabice; Trabice and the broken horizon line (right)
Rys. 8. Dęblík, najwyższe wzniesienie (nieco po prawej stronie), to obecnie jedynie baza technologiczna (po lewej); wydobycie odbywa się w sąsiednich Trabicach; Trabica i przerwana linia horyzontu (po prawej)

Fig. 9. Natrolitic trachyte, mined by the quarry in Mariánská skála; fracturing of the rock as a result of stress relief during the outcrop of the massif (laccolith) during Saxon tectogenesis
Rys. 9. Trachit natrolitowy, wydobywany w kamieniołomie w Mariańskiej Skale; pękanie skały w wyniku odprężenia podczas wychodni masywu (lakkolitu) w okresie tektogenezy saksońskiej

being a very expressive landscape element. The enterprise suffers from very disfavourable geological conditions. There are layers of altered rocks (potential slide surfaces) but their exact extent is not well known. In 2013 (after heavy rains) a devastating landslide occurred below the bottom edge of the quarry. The slide destroyed a part of local railway between the cities of Teplice and Lovosice; it also covered the new D8 highway (Fig. 7).

After difficult sanitation works, the landslide was removed, and the adjacent slope stabilized. The highway contractors (as well as the Czech Ministry of Transport) have accused the quarry (and vice versa) – the plea still continues. According to public sources, contractors have been more successful, but the judgment has not been final yet. In any case, geologists claim the area to be highly unstable and the highway has to be carefully monitored: Now several words about the highway itself. Its construction was planned for more than 80 years with the only aim – to connect Prague and Dresden. Much later, (after 1989) the aim was to decrease the transit traffic load along the river Labe.

Libochovany – the series of basalt quarries is situated opposite to Dobkovičky on the right Labe riverside. The oldest quarry at the railway is full of debris; it was abandoned long ago as well as other minor developments. The first successful quarry was exploited inside the hill called Deblík (Fig. 8); because of altered rocks, working was shifted into the hill known as Trabice. This open pit quarry changes the hill into a torso as well.

Mariánská skála (Marienberg) in Ústí nad Labem – this open pit quarry was established inside a huge massif near the Ústí nad Labem center. In medieval times, the rock was a good source of construction material which enabled to build the whole borough by virtue of smaller quarries Originally the massif extended into the Labe river; rocks had to be partly blasted off because of building the railway line between Prague and Děčín (later Dresden). J. E. Hibsch, a famous Vienna mineralogist, called the stone Marienbergite (he often saw minor differences in mineral composition and called such rocks according to the place of their occurrence). Of course, from the present-day point of view it would be somewhat impractical – the rock is generally called phonolite and more exactly natrolitic trachyte (Fig. 9a) [8]. The quarry itself was opened inside the massif; because of strict spatial limits, it could only proceed downwards to the level of about 90 meters below the rock surface (present day situation). The stone seems crushed (Fig. 9b) but reasons are very different. The massif (called laccolith) was slowly uplifted and after opening the quarry, the internal stress got loose. The future of this quarry is not sure; spatial limits are still very strict.

Těchlovice – this not a very large shelf quarry is situated near the main volcanic center of the České Středohoří Mts. Well visible from the Labe left riverside, it forms another scar in its environs (Fig. 10).

Malá Veleň (Soutěsky) – this is a very obvious example of useless assets. The quarry was opened above the Ploučnice

Fig. 10. The quarry in Těchlovice, known for its position near the volcanic centre of the České Středohoří Mountains PLA and younger vertical intrusions
Rys. 10. Kamieniołom w Těchlovicach, znany ze swojego położenia w pobliżu centrum wulkanicznego PLA České Středohoří Mountains i młodszych pionowych intruzji

Fig. 11. Malá Veleň, Soutěsky: abandoned quarry in very poor condition (rock alteration)
Rys. 11. Malá Veleň, Soutěsky: opuszczony kamieniołom w bardzo złym stanie (przeróbka skały)

Fig. 12. The former coal mine (Kohlbruch) in Ústí nad Labem on a map from 1836 to 1852 [22]; view into part of the residual pit, blocked by a road embankment
Rys. 12 Dawna kopalnia węgla kamiennego (Kohlbruch) w Uściu nad Łabą na mapie z lat 1836–1852 [22]; widok na część pozostałości po wykopie, zablokowaną przez nasyp drogowy

river right bank (near the City of Děčín). Soon after opening, altered rocks occurred and became prevailing. After 1990, private owners tried to utilize one "healthy" basaltic vein in order to make decorative garden items. This activity has already been abandoned. The quarry thus accelerates erosive processes (Fig. 11).

5. Selected sources of sedimentary rocks the cretaceous and tertiary deposits

Along the Labe right riverside, there are minor quarries between the Lake of Píšťany and the Bohemian Gate) near the Village of Velké Žernoseky. These quarries used to extract marles and marlites for local purposes. These relatively soft rocks were apt for building houses, walls, terraces and other constructions. In the Village of Velké Žernoseky, these rocks were massively used within the local cemetery and its chapel in combination with other accessible stones. Sentry houses at famous vineyards (between Žernoseky and the Bohemian Gate) were built of marles as well. All small quarries were abandoned long ago, now being private dwelling and holiday estates. Sandstones were used as decorative components (arches, lintols or caps) because of their easy accessibility Abandoned quarries were also established in uplifted microblocks, for example in Ústí nad Labem and its environs [10]. Due to their unfavorable cementation, these rocks suffer from erosion. The reason is in fact very simple – surface water penetrates into subsurface zones, where cement is dissolved. It then impregnates the surface itself, forming a hard, reinforced crust. After this crust is damaged or eroded, loosened grains screen out and the process can continue deeper and deeper. There are also abandoned limestone deposits – for example Radobýl (Fig. 3 above) hill near the City of Litoměřice. The deposit was accessible via an adit below the volcanic complex. During the WWII, the underground labyrinth was utilized by Germans for producing aerial components, having its own "accessory" concentration camp and even its crematory. Now inaccessible, the mine serves as the deposit of radioactive wastes from hospitals and laboratories.

6. Tertiary coal

The Most coal basin used to be much larger, extending far away to the South-East. During vertical movements of particular crustal microblocks, peripheral basin parts were isolated and eroded into the form of small separate basins [4]. While some of them lie near the main sedimentation area (and not high above it), some others lie in very strange positions. These minor basins were either abandoned for their unfavorable geological conditions or completely exploited. Here are some of them:

Velké Březno – two small separate basins are reported southwards of the commune, particularly Byňov and Horní Zálezly. The booklet [18] informs about mining activities in these basins (beginning in 1765), writing about "black coal" or "anthracite" (allegedly of a pitch glance) which was very demanded especially in Litoměřice. The coal was transported via the Labe waterway, especially in autumn and early winter.

Fig. 13. A weathered coal seam (about 20 cm thick) in the excavation for the foundations of the building. It is clearly part of a separate basin, now almost 100 meters above the main basin. The Kohlbruch connection cannot be proven

Rys. 13. Zwietrzały pokład węgla (o grubości około 20 cm) w wykopie pod fundamenty budynku. Jest to wyraźnie część oddzielnego basenu, obecnie prawie 100 metrów nad głównym basenem. Nie można udowodnić związku Kohlbrucha

For shipmen it was a good opportunity to earn some money out of their main season. Coal seams were later abandoned – they became steep dipping and their quality worsened. Another interesting location is sometimes commemorated in the western part of Příbram village (eastwards from the Buková hora - Beech Mountain - transmitter). It is not sure whether it was a part of a larger separate basin; in any case, there are no visible remnants of mining here.

The question of "black coal" or even "anthracite" in this area is at least disputable. The nearest anthracite occurrence has been documented in Brandov (more than 50 km westwards) – nevertheless, this coal is not of the Tertiary but Carboniferous age. Thus, it is possible to consider some ways of thermal affecting the brown coal in separate basins because some volcanic rocks are younger than seams (for example natural coke in the main basin). Many authors – for example [12] claim that if an off-grade coal is despoiled of humidity (dessicated), the material becomes superior, comparable with hard coal regarding the purity and caloric value. [9]

Ústí nad Labem – the city of Ústí nad Labem forms a "bay" in the PLA boundaries (of course, such an industrial town cannot lie within them). However, there are several obvious records of exploiting the coal here.

The first one was visible in the course of building one of peripheral city parts, called Klíše. No coal can be found there now for intensive seam fires; however, porcelanites give good evidence of an erstwhile seam.

Another well-known place called "Kohlbruch" (coal pit) is well visible even in old maps (Fig 12a). Coal was exploited beyond the town walls from about 1750. Coal was transported by horse carts via reinforced ways. Although abandoned long ago, the pit is still well visible and modern blocks of houses and streets copy original pathways (Fig 12b). The third coal occurrence was incidentally found in the area of regional hospital. A weathered coal seam (about 20 cm thick) was visible and photographed inside the cut for a commercial building (Fig 13). There are more separate basins, but they lie beyond the PLA territory.

7. Bohemian garnets

The least invasive mining within the PLA is connected with tertiary maars, usually represented by small hills with a minimum of vegetation. Three of them – Linhorka, Granátka and Nová trubka (New Pipe) – are sources of pyropes which were transported from a deep subsurface during the Neogene volcanic activity. Pyropes are concentrated in quarternary deluvia (by the way, two Czech diamonds were found here as well). The mining area is relatively small, hidden in fields near the Village of Dlažkovice. This area is guarded, and it is not recommended to try to enter it. Even though the deposit is almost worked-out, subtle pieces of pyropes can be found in surrounding fields, especially after the rain.

8. Conclusion

The České středohoří mountains PLA represents an instance of a very disturbed landscape, historically inhabited, and utilized in a maximum possible way. The volcanic relief was affected by quarrying activities which moved from one hill to another because of a various quality of stone. Before the PLA was proclaimed, quarrying had not respected any rules of protecting the nature – some abandoned quarries evolved into debris and block fields which endanger near buildings and communications. Because of heavy traffic, rocks still loose and it is often necessary to protect railways and roads with catch nets and anchors. Moreover, several large quarries continue working and their activities affects the landscape (the D8 motorway landslide can be a very obvious example). In the past, quarrying and mining here was almost unlimited – while basaltic rocks found their use in medieval walls, sediments – especially sandstones – served as arches, lintels or caps. Brown coal was worked in the so-called separate basins and utilized for local purposes.

And what to say about the future of this beautiful but disturbed landscape? Before D8 was finished, the main traffic load had been concentrated along the river Labe. From this fact it implies that building the highway was a good (i.e. nature and people friendly) solution. Long time ago, the Labe represented an important waterway.

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Działalność górnicza w Obszarze Chronionego Krajobrazu Gór České Středohoří

Obszar Chronionego Krajobrazu Gór České Středohoří (zwany dalej ČSM PLA) jest bez wątpienia wyjątkowy ze względu na rzeźbę wulkaniczną, przyrodę ożywioną i działalność człowieka – szczególnie górniczą. Istnieją tu dwa rodzaje kamieniołomów, ze względu na ich status, tj. opuszczone (w zdecydowanej większości), jak i czynne.

Jeśli chodzi o rodzaj kamienia, możemy wyróżnić trzy zasadnicze typy – skały wulkaniczne (krystaliczne), osady kredowe, a nawet trzeciorzędowy węgiel. Większość działalności górniczej, szczególnie związanej z budową średniowiecznych miast i wsi, została porzucona już dawno temu, lecz niektóre nowoczesne kamieniołomy nadal działają jako źródło najwyższej jakości materiałów budowlanych i kruszonego kamienia, który jest wykorzystywany do budowy i utrzymania dróg i linii kolejowych.

Będąc w rękach prywatnych, kamieniołomy te w znacznym stopniu szkodzą krajobrazowi, a nawet zagrażają bliskiemu otoczeniu, odziaływując niszcząco na budynki i środki transportu publicznego.

Sytuacja ta prowadzi do instalowania barier ochronnych, szczególnie nad liniami kolejowymi i drogami. Z drugiej strony, PLA odczuwa wpływ transportu. Przed ukończeniem autostrady D8 (i naprawą po osuwisku w 1914 r.) prawie cały tranzyt międzynarodowy koncentrował się wzdłuż rzeki Łaby. Z ekologicznego punktu widzenia było „w porządku", ale autostrada poprowadzona przez najmniej wartościową część PLA wywołała utrzymujące się animozje.

Słowa kluczowe: *Czeskie Góry, Obszar Chronionego Krajobrazu, rzeźba wulkaniczna, wydobywanie, szkody spowodowane działalnością człowieka, autostrada D8*