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How mining heritage can be used? 
Selected examples from Europe

Abstract
The revitalization of industrial architecture objects enables to preserve them for the future generation in order to return its primary function or confer a new one, which enables further exploitation of these monuments. In this group, objects, which remained from mining industry are considered as special resources. Apart from buildings, the group consists of specific constructions used for drawing out the winning and also processing plant objects. Some elements of underground construction are also considered in this group. The revitalization program for post-industrial areas after termination of exploitation is very similar in all European courtiers. An example of good development of such areas and its usage for tourist purpose can be found in Great Britain. Successful practice, which has led to develop mining heritage objects for educational and tourist purpose can also be discovered e.g. in Italy, Spain, Czech Republic and Poland.

Key words: mining heritage, cultural heritage, mines, tourism

1. Is a mining heritage a cultural heritage?

The term ‘mining heritage’ is commonly associated with a complex of nasty, filthy and generally not interesting buildings. What is more, the abandoned mine doesn’t evoke a positive attitude because of its association with dismissal from

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workplace for many people. The term ‘mining heritage’ applies for a very wide range of problems being closely related to the mining industry i.e. the culture of mining society, customs, traditions, accommodation, cuisine, etc. A significant problem is the migration for work and the influence of emigrants on customs and technique of local societies.

Apart from cultural and sociological aspects, the ‘mining heritage’, being preserved and renovated, are mostly mines with their ground-based and underground infrastructure. The main aim of the revitalization of such areas is the change of their previous function and adaptation of the area with its post-industrial objects for the service purpose as well as economic, social, educational, medical, recreational, cultural, tourist etc. Considering this activities, significant attention should be paid to environment protection issues, contributed to area re–conversion through creating green areas, afforestation and disassembly of useless installation in order to grant a new socio – economic function.

Projects of post-industrial areas revitalization comprise of the following activities [1, 2]:

− renovation, insulation, dismantling works, re-construction or adaptation of buildings, objects, infrastructure and industrial machines in order to use it for: offices, conference rooms, workshops, etc.

− appropriate area development and use of empty spaces,

− demolition of buildings to obtain areas for the following purpose: service, cultural, educational, economic, tourist or recreational.

− renovation and conservation works of infrastructure buildings of architectural and historical value (e.g. objects of industrial heritage) together with development of the adjacent surrounding.

− afforestation of purified area, placing parks to assign new tourist or recreational function,

− renovation, redevelopment of municipal infrastructure (e.g. water supply network, sewage system, waste water treatment plant) being located on the revitalized area.

− land reclamation, disposal of dangerous materials if it’s an essential part of Local Revitalization Program realization,

− building a monitoring and lighting system in order to create a safety zone.

The post industrial area revitalization program is similar in all European courtiers, the implemented projects consists of similar elements. Good examples of successful practice may be found in many countries. Many objects which have remained after mining industry liquidation, being now in the process of revitalization, may be seen in Italy, Spain, Czech Republic and Poland.

2. Selected examples from Europe

The classical example of proper usage of such areas for the tourist purpose can be found in Great Britain. The ore mining of Cornwall in 19th century may have been considered as an exemplary [3, 4]. Because of complicated geological conditions of ore-veins occurrence, the miners of that time were specialized in making mines in highly dangerous and inconvenient for that purpose places. Many of them are located at the northern coast, where shafts were driven right on the edge of cliffs, which rises dozens meter above the ocean level, while the underground pavements were cut below the ocean level.
The last zinc mines were closed in Cornwall in 1990 and since that time the affluent region has started to experience the results of unemployment [5,6]. Some mines are being remained as a sign of hope for exploitation revival, especially because of the fact that the strategic value of tin in electronic industry is undisputable. Geevor Tin Mine closed on 16 February 1990 as one of the last, was transformed into a preserved mining site and museum three years later. Most of machines and equipment used for ore processing remained there and partially is still working, presenting the tourists the technological process starting from ore output in the mine, through the modification phase, packing the tin concentrate and finally, its preparation for melting. The didactic route is well prepared and the organized school groups constitute a significant group among the visitor.

Located just at the ocean shore, The Levant Mine, belongs to the same mining monuments complex (Fig. 1). The chimneys of steam engine houses are very characteristic elements of the local landscape, and its most spectacular attraction is a running steam engine. The steam supply is carried from the boilers to the engines.

![Fig. 1. Reconstructed engine house and boiler house of the Levant Mine, Cornwall (photo M.W. Lorenc)](image)

The Botallack Mine, the third in the complex, is a picturesque example, presenting at the same time how it was hard sometimes to locate a mine. In such places shafts were excavated 500-600 meters depth and the winze were almost 2 km away from the coast line (Fig. 2).
The other local mine that was closed was the South Crofty Mine, where an unique exhibit may be found. In a locked and properly secured entrance to the building of former engine house there is a gigantic, well preserved steam engine from 1955, which is still in a perfect condition. The ‘giant’ with a cylinder of 2 meter wide diameter and the 3.9 meter high was pumping water from ‘Robinson’ shaft with its 38 tones weighing arm (!). The engine will be renovated and compressed air supplied, it will be started as a part of newly created ‘Heartlands’ Mining Heritage Centre.

There is another liquidated mine nearby – King Edward Mine – the existence of which depends on persistent work of several volunteers. The significant advantage of this mine is an outstanding museum collection, where you can find precisely constructed mine machine models including steam machines. On the mine site there are also two original wooden machines used for disintegrated ore separation. These are the only remained machines of that type staying at the same place all that time (Fig. 3). The other machines are consecutively reconstructed. The pride of the collection is a steam engine, which was successfully dismantled from another British mine and reinstalled back again in the King Edward Mine in recent years.
Incomplete remains of the mine from 19th century in the shape of singular building of steam engine hoses, boiler houses and modification plant, may also arouse interest [7]. These objects are marked in the landscape of Cornwall with its characteristic tall chimneys, which are clearly visible from the far distance due to the bald area. All former industrial architecture monuments of that kind are under conservator care [8]. Many of them are equipped with detailed descriptions of particular objects and drafts, explaining the visitors the importance of the place. Others, located far from the contemporary roads and attended routes after being nominated as Mining Landscape of Cornwall and Western Devon to UNESCO World Heritage List in 2006, are consecutively secured, preserved and described, but also open for visitors [9,10].

The second object that has entered UNESCO World Heritage List is ‘Big Pit’ National Coal Museum in Wales in 2000, located on the area of Blaenavon mining area [11,12,13]. Tourists can find here well organized centre, which offers short but perfectly organized underground tourist route as well as museum, situated in renovated, relatively reconstructed former mine buildings (Fig. 4). Management of this whole area, its infrastructure and the preparation for tourist may serve as an example to such initiatives. It is worth mentioning that the realization of ‘Big Pit’ project was complex. Within the project a significant amount of funds was devoted to renovation of many objects, located in Blaenavon, the town located nearby. The origin of the objects is tightly woven into a local mining history.
Another object of monumental postindustrial architecture is located in Yorkshire county near Wakefield. It is National Coal Mining Museum for England in Caphouse (Fig. 5). One can visit here, just as in ‘Big Pit’, perfectly arranged and organized place of mining heritage, with the following attractions: very interesting underground tour, variety of mechanical equipment, including well preserved steam engine of a 19th century winder and ecological and educational tour, presenting a process of dehydration of the mine, then de-ironing and cleaning the water that was pumped out. A very significant element of the whole complex is the interpretation centre, designed in a modern style, located in numerous post-industrial buildings, which offers comprehensive exhibitions and multi-media presentation.
The revitalization of closed talc mines located in the north-west Italy was found as interesting for Scoprominiera Association, as well as two organizations: Comunità Montana Valli Chisone e Germanasca and Ecomuseo delle Miniere e della Val Germanasca. Works on Minet project covered two mines. One of them is ‘Paola’ mine, the surface objects of which were transformed into an Eco-museum, and the underground part – in a modern, well-organized tourist route. The mine was totally adjust to tourist traffic, with the complex lighting at the whole route, convenient transport with the mine train, many well prepared didactic areas as well as radio connection with workers outside (in case of emergency). On the route, the tourists have the chance to get acquainted to any details connected with the miners’ work, and the modern interpretation program is based on audio-video technique, which makes an impression that the mine is still running (Fig. 6). The second monumental talc mine is ‘Giana’, which is located nearby in the same mountain, but at the lower part of the slope, below the ‘Paola’ mine. Both mines are joined by a long dip-road, equipped with safe, metal stairs. The ‘Giana’ mine should be visited on foot, with a helmet on the head and battery miners lamp. The underground attractions and tourist places are similar to those in the ‘Paola’ mine.

Fig. 6. Underground tourist route in the ‘Paola Mine’, Italy (photo M.W. Lorenc)

The contribution of the local mining to the development of the whole vicinity was appreciated by the Ministry of Education, which agreed to include this branch of industry in the geography syllabus for both the primary and secondary schools of the whole region. Geography lessons which are conducted in the Eco-museum and on
the area of the ‘Giana’ and ‘Paola’ underground route present a significant meaning for the education.

The Linares-La Carolina area in the south Spain [14,15] is now waiting, after handing the essential documents, for entering UNESCO World Heritage List. On the vast area, stretched away into the ore-rich veins, there are located numerous lead mines, which were the pride of Andalusia in 19th century. In those time Linares was a dynamic industrial centre, where not only mines were functioning, but also numerous still plants and factories, that produced steam engines, pumps and many other facilities necessary for mining industry. Building of a former unloading platform of the ancient ‘Madrid railway station’ in Linares was adapted in order to promote the rich history of this region. A modern Mining Landscape’s Interpretation Centre was created here, offering a comprehensive educational exhibition, with the use of the latest electronic and multi-media techniques. The main element of exhibition is the model of Linares-La Carolina mining district with all mines, processing plants and lead foundries situated in this area [16,17]. In a different part of the town, in the area of the former ‘La Cruz’ foundry, the modern Metallurgy Interpretation Centre is being created. In the restored shot-tower, there will be reconstructed the whole production line, which will present to visitors how the leaden bullet of various size were produced. There is a lot of abandoned mines in the neighborhood of Linares such as: La Tortilla, Los Lores, Poso Ancho, San Vicente, San Andres and others (Fig. 7, 8). One of the most intresting mine complex is in El Cenenillo, where the remains of processing plant and underground route might probably be seen. The whole area of Linares – La Carolina – similarly to Cornwall – aspires to enter UNESCO World Heritage List [18,19].

Fig. 7. ‘Pozo Ancho’ Cornish-type engine houses in Linares, Spain
(photo M.W. Lorenc)
Extremely interesting centre of former mining industry can be found in the middle Czech Republic in Příbram. Numerous mining museums can be found here, including two gold mine museums. In the very town, there are exemplary organized zinc, lead and silver museums. Visitors are under a great impression of the mining equipment exhibition as well as comprehensive collection of minerals and fossils. Another interesting attraction is the trip to the local mine, which only a small part was transformed into a tourist route; this part can be visited from the perspective of a mine train. Perfectly preserved winding steam engine dated to the beginning of 20th century makes a great impression. It is a double-cylinder horizontal engine, operating the local winding machine. In the suburbs of Příbram, another mine is located with a very well organized underground route. The special attraction is the giant, metal reconstructed water wheel (12 m in diameter), used to draw up and drain the underground water from the mine (Fig. 9).

The oldest Polish and also Europe’s salt mine is located in Wieliczka (southern Poland) and this is the only mine in the world continuously working from Mediaeval till now. Its corridors, inclined shafts, which together with chambers are located at 9 levels, reaching a depth of 327 m. Their total length comprises ca. 300 km of corridors and 3000 chambers. This is the first Polish mining heritage site which entered UNESCO World Heritage Site List (8 September 1978).
The underground tour starts from the C19th ‘Daniłowicz’ shaft, where tourists go down the steps to the first level located 64 m below the surface. The 3.5 km long tour includes a walk through numerous chambers, salt lakes and chapels located on levels 1, 2 and 3. What makes Wieliczka really famous is a large salt chamber, which has been transformed into a chapel dedicated to St. Kinga, the Patron Saint of salt miners. This chamber, situated 101 meters below the surface, was created in 1896. The floor of the chamber is built of salt plates that have actually been carved in salt, very impressive wall sculptures are also hewn in salt, even the ornate lamps are constructed of transparent salt crystals.

Before moving back, visitors can rest in a complex of restaurant, post office and souvenir shops located on the third level (depth 125 m). Tourists go back from this level (depth 135 m) by the lift through the same ‘Daniłowicz’ shaft.

Apart from this standard tourist route, two other routes, named ‘Geological’ and ‘Miner’s’ are also available for visitors. In both cases a route goes along ancient galleries and chambers and visitors have a professional miner’s equipment, including individual battery-lamp and a rescue set (Fig. 10). The Wieliczka Salt Mine also provides medical services in the first underground Sanatorium in Poland. Treatment takes place 135 m underground and is highly successful due to beneficial therapeutic microclimate of the chambers.
Another salt mine, working since 1248, is located in the town of Bochnia (17 km east from Wieliczka). Tourists enter the mine by the lift through the C19th ‘Campi’ shaft. Nearby the ‘Campi’ shaft tourists can see a huge horizontal steam engine built in 1909. The underground tourist route comprises a labyrinth of salt chambers and corridors left over 750 years of salt exploitation. Total length of the tourist route is ca. 9 km and a depth of 215 m and it leads tourist through corridors and shafts, including a short journey by train. There is a still operating underground sanatorium located at the depth of 250 m. Inhaling the air filled with salt during one night is the equivalent of 3 weeks holidays by the seaside. One large ‘Ważyn’ chamber was transformed into a basketball sport hall, located side by side with underground restaurant (Fig. 11). Another one was transformed into a chapel, dedicated to the same St. Kinga. Like in the Wieliczka mine, also here the floor, wall sculptures and the ornate lamp are made of transparent salt. Tourists leave the mine through another C19th ‘Sutoris’ shaft.
The first record of the organised mining in this area applies to Złoty Stok (south-western Poland) and appeared in a document dated at 1273. Foreign investment in the mine started in 1510 or 1511. At that time, 8% of total European gold production was coming from 199 small works in the Złoty Stok mine. The gold mine at Złoty Stok is also famous for another event that occurred in 1612. Here, perhaps for the very first time, black gunpowder was successfully used in mining operations.

The ‘Underground Tourist Route and the Museum of Mining and Metallurgy in Złoty Stok’ was officially opened on May 28, 1996. The tourist route currently represents only a very small part of the 300 km of underground corridors together with 21 different levels make up the entire mine. Now a private person holds the "The Gold Mine in Złoty Stok" [20, 21, 22].

Groups of up to 40 people, accompanied by a professional guide, visit a section of the two-kilometre-long ‘Gertruda Adit, which is 500 metres long and now fully lit and safe. Small groups, equipped with individual electric lamps and using a boat, may visit a deeper part of this adit, closed off by a low dam and partly filled with water.

While leaving the ‘Gertruda Adit’, visitors walk along the valley of the ‘Golden Stream’ to examine the remains of small foundries, ore sorting places and various hydro-technical objects. Finally, some 30 metres above the adit, they arrive at a large quarry where the entrance to the 200 metre-long ‘Black Adit Upper’ is located. After descending 23 metres of stairway, visitors enter a mediaeval corridor that leads to an 8 metres high underground waterfall, the major attraction of the mine (Fig. 12).

The underground train operates in the mine since April 2008. Its end-station is at the next level below underground waterfall and tourists start there their last part of the route. The engine with five wagons crossed a distance ca. 300 m to the station located in front of the adit’s entrance.
In the town of Wałbrzych (southwestern Poland) well organized coal mine operated since 1561. Layers of very good quality Carboniferous coal were exploited there. Until C 19th underground works were led by horizontal galleries only. Three shafts were constructed: ‘Julia’ (formerly ‘Julius’) in 1867, ‘Sobótko’ (formerly ‘Ida’) in 1869 and ‘Dampf’ in 1884-1892; on the top of first two 25-metre high Malakov-type (unique in Europe) head frames were built (Fig. 13).

The ‘western branch’ of the mining industry was ultimately closed in 1997. A territory of the ‘Julia’ colliery was transformed into the local Museum of Mining and Mining Technique [23,24,25]. It presents the display of documents, maps and historic photographs. It also protect numerous, in some cases unique, machinery and industrial remains, that tourists can see in several buildings. Among the others this includes electrically driven winding engines, introduced in 1911 and 1912, and the machine shop (erected in 1870) containing a smithy, mill, turnery and equipment required for repairing mining machinery. Among mine buildings one can see abandoned engine houses and boiler houses too. A set of buildings for coal crushing, sorting and flotation is very special one. It hides the only completely preserved large scale mechanical coke processing plant in Europe, dated on the beginning of the 20th century with a full technological profile. Decommissioned and cut up parts of steam engines and elements of large winding machinery are stored here and there, at some places hidden in grass and bushes.
A tourist route includes an underground experience too. Walking 30 m down by stairs via the 'Sbótka' shaft visitors reach the 'Fox Adit', which was built in 1794. Primarily it was used as drainage adit for the whole mine. However, it was also used for transportation of coal by boats to the exterior harbor (for the first time in Europe).

Comparing ways of application of mining heritage sites to the museum or tourist activity, it looks very similar in various countries. Some ruins reconstructed and adapted to a new role, work with very good results. Head frames are different in different countries but there always are buildings very typical for the mines and always visible from a distance. Steam engines, if exist, are always extremely valuable machinery, exposed with great care; the same concerns electric engines. Machinery equipment and processing halls are typical for each mine, depending on the kind of materials exploited. Miners’ train is a great attraction for the tourists in every mine, and travel with it remains unforgettable impressions. This is very good to see how Spanish enthusiasts of he mining heritage take care of each building and each kind of machinery, even if it is in very bad shape; there is a chance that, sooner or later, local and international tourists will see them protected and exposed to the wide audience.

**Conclusions**

The revitalization of post-industrial architectural objects permits their protection for succeeding generations. Such projects may involve the re-establishment of their original uses or the creation of entirely different sustainable functions. Within many elements of postindustrial heritage, mining heritage objects are very special. These comprise constructions for the winding machineries as well as the engine houses and buildings used for processing. Underground infrastructure such as galleries and machinery are of special importance. Mining heritage currently constitutes a small part of the heritage tourism sector which is not a large part of the overall tourist
market. However, there are indicators that mining heritage tourism is set to grow in some regions. Programmes for the maintenance of suitable sites are currently active in all European countries and some have attained the distinction of being classified as UNESCO World Heritage Sites. However, several remains of various mines that are a major national mining heritage tourist attractions still exist in many countries. The cultural value of such heritage must be also taken into account, because of the fact that such objects protect memories of a very special profession, that in many places has been almost forgotten since at least two generations.

References


