

Historical ore mining sites in Lower Silesia (Poland) as geo-tourism attraction

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ABSTRACT

Article presents the possibilities of using of the remains of old ore mining tradition in the Lower Silesia as major attractions of industrial tourism and geo-tourism, against a background of the mining development in that area and characteristics of the research work conducted systematically for many years at former mining and metallurgical sites by the Mining Institute of Wrocław University of Technology. The article presents a project for the preservation, conservation and modern-day use of the survived remains of tin and cobalt ore mining in the vicinity of Krobica-Gierczyn-Przecznica at the foot of the Izerskie Mountains in the neighbourhood of Świeradów Zdrój, which is executed by KGHM CUPRUM Sp. z o.o.

Key words: history, ore mining, exploration and exploitation of deposits, Sudety Mountains

LOWER SILESIAN ORE MINING IN HISTORICAL PERSPECTIVE

„...There is land of such a nature that if you sow, it does not yield crops, but if you dig, it nourishes many more than if it had borne fruit ...”

This timeless Xenophanes thought was cited in the introduction to „De Re Metallica” – the first ever complex study concerning mining, metallurgy and mineralogy, by its author Georgius Agricola, a 16th-century researcher, scientist, physician and philosopher, one of the most eminent intellects of the Renaissance. The above maxim perfectly reflects the importance of mining carried on over the ages in the area of Lower Silesia, especially in the Sudety Mts., where adverse weather conditions and poor soils did not favour stock-farming and plant-growing, and the real source of wealth and prosperity of their inhabitants were the treasures hidden deep in the mountains by the Nature. These treasures are made up of numerous mineral deposits, especially metal and ore deposits, including gold,

silver and copper, the mining origin of which is covered with mists of history and can be traced back to as early as the bronze age. Although the territorial notion of Silesia underwent essential changes throughout its history, the mining of different ores had been successfully carried on here for many ages. To the north and to the east of its boundaries no mining activity had been carried on, it was only in the distant Bytom and Tarnowskie Góry region (the Polish Ore Basin) that mining activity was carried on a large scale. To the west, the nearest mining activity area was the region of Freiberg. It should be stressed that despite the distinct separation of the Lower Silesian mining, it took advantage of the experience of other, important mining centres in Europe, achieving a high level of mining and metallurgic technology (Dziekoński, 1972). In order to respect the old divisions, the notions of Lower Silesia - *Silesia Inferior*, *Niederschlesien* for the west Silesia and the Upper Silesia - *Silesia Superior*, *Oberschlesien* for the east Silesia were used. The borders of Poland on the Bóbr and Kwisa Rivers were established in

the year of 1000, when the Wrocław bishopric was created and they did not undergo any major changes throughout the Middle Ages. The south border constituted the massifs of the Sudety Mountains (Czapliński et al., 2002). Despite the complex and turbulent political history of the Silesia, mining activity has always an important economic role, providing livelihood for their inhabitants and for regional development opportunities. The origin of many Lower Silesian places is associated with mining. Gold, ores of silver and lead, copper, tin, arsenic, cobalt chromium, iron, coal, lignite, building stone, and even mineral waters constituted large resources of that region. However, the subject of interest for former miners were, first of all, numerous, small polymetallic ore deposits, usually containing a few basic ore minerals, exploited in a documented manner over the period from the 13th to 20th century (Dziekoński, 1972). In Lower Silesia, more precisely in the Sudety Mts., these types of ore formations encompass a number of deposits and occurrences characterised by multicomponent and variable mineralisation. The area of their occurrence is the Sudety Mts. and their foothills, where veins or mineralised zones reach the length of more than 2 km (Radzimowice), and the depth of more than 300 m (Kowary) (Dziedzic et al., 1979). In the initial mining period, first of all the richest and easily available deposits at small depths have been exploited, and the vein deposits initially evaluated as abundant often turned out to be small and difficult in exploitation.

Lower Silesia is divided into six main regions in respect of the useful mineral occurrence. These are: Kłodzko Land, Sowie Mountains along with the Wałbrzych region, the foothills of the Karkonosze Mountains, exploited gold-dust deposits in the vicinity of Lwówek, Złotoryja and Legnica, the so-called North-Sudeten Zechstein depression (having outcrops south of Lwówek and Złotoryja and near Grodziec), and Fore-Sudeten Zechstein

monocline situated north of Lubin (Dziekoński, 1972). The historically known deposits were exploited over many ages and they were mostly the so-called “open deposits”, i.e. the ore bodies of those deposits were at least partly exposed by the erosion surface, which allowed their early discovery and extraction (Dziedzic et al., 1979).

German scientists Cloos, Berg, Bederke and Petrascheck were the first to undertake work aimed to systematise the information on Lower Silesia deposit occurrence and genesis, in combination with geological and structural assumptions. In 1936, the comprehensive study “Schlesien. Bodenschätze und Industrie“, containing the evaluation of geological basis for the development of mineral extraction and processing within the area of Lower Silesia, was completed by a group of German scientists and researchers of that period, such as O. Spangenberg, E. Bederke, O. Eisenkraut, I. Bartsch, L. Gäbler, F. Illner, A. Metzinger, M. Morgeroth, E. Pralle, D. Rademacher, F.W. Siegert, H. Sinnreich, W. Thust (Madziarz, 2009). Since 1945 that work has been intensely continued by the Polish researchers and it has resulted in the discovery of a huge polymetallic deposit of copper and silver, and consequently in the modern-day boom in the ore mining in Lower Silesia. The deposits on the Fore-Sudeten monocline, which were discovered only after World War II, are ranked among the largest in the world and are nowadays intensely exploited in the three modern underground mines.

The history of Lower Silesian ore mining is well known and mostly associated with the gold mining which was carried on in many centres and was of special importance to them (Dziedzic et al., 1979; Dziekoński, 1972; Quiring, 1948; Sachs, 1906). First of all, the area in the former Legnica Duchy, between the rivers Kaczawa and Bóbr in the region of Lwówek, Złotoryja, Mikołajowice and Bolesławiec was distinguished by the volume of production. The boom in gold

mining took place in the years 1180–1241, and only in the first half of the 13th century the mining law was introduced for the gold mines as one of the earliest in Europe (Lwówek in 1278, Złotoryja in 1342). On the European scale, Złoty Stok became a recognised centre of gold mining and metallurgy, where the arsenic ore deposits containing gold were exploited. There, the beginnings of mining goes back to 1291, and the largest boom is traced back to 15th century and the first half of the 16th century. Till the end of the 17th century the goal of the mining activity was the production of gold, and since the beginning of the 18th century the activity had been concentrated on the production of arsenic, with gold being recovered as a by-product. The exploitation in Złoty Stok was finally brought to an end in 1962. According to German researcher Quiring the name Sowie Mountains – in German: Eulengebirge, comes from the Celtic word meaning gold (Quiring, 1948). In fact, in the already-exploited ore veins in the Sowie Mountains there were small amounts of that precious metal.

Hidden behind the fascinating shine of gold is the forgotten but yet several-century-old and noble history of Lower Silesian mining and metallurgy of many other ores among which ores of copper, lead and silver, tin and cobalt, arsenic, iron and, later, uranium were historically most significant. It is worth stressing that gold and copper - the earliest used and mined metals by human being (Craig et al., 2003) were fairly abundant in relatively easy to find polymetallic vein deposits in the area of Lower Silesia, which can indicate very early beginnings of their exploitation in that area. Although as yet there is no material evidence that the history of Lower Silesian ore mining goes back more than one thousand years, there is no way not to recall here again the works of German scientist H. Quiring, who linked the beginnings of mining works in the Sudeten with the activity of Cretans – already around 2 thousand years B.C., and their continuation

with the influence of Celts, who stayed in the Silesia in the period of the 4th to 3rd century B.C. (Celtic silver and bronze coins are known). It is also known that in the period of the so-called “Lusatian Culture”, in the neighbourhood of Legnica and Złotoryja arms and tools were locally made of bronze – an alloy of copper and tin, by casting in stone moulds, with the shortages replenished with imports from Carpathians and Eastern Alps. In the bronze age this area was within the reach of the so-called “Unietic Culture”, which formed from around 2100 B.C., especially south of Wrocław. Numerous copper products as well as those made of bronze and gold, including arms, daily necessities, ornaments, etc. are found in the discovered skeleton graveyards of that culture. It is known that its twilight occurred as a result of the fall of already-existing copper mining and processing centres, which were located in the areas where that culture evolved (Czapliński et. al., 2002). The documented history of copper ore mining in Lower Silesia – the metal which, besides gold, was the earliest and initially most extensively used one in the human history, both in ancient times and nowadays, encompasses the period of at least 700 years, as the first survived information on the existence of “Cuprifodina in montibus” – which simply means „a copper mine in the mountains” in Latin (Dziekoński, 1972; Madziarz, 2010), in the vicinity of Miedzianka near Jelenia Góra, comes from the year of 1311. The copper and arsenic ore deposits in the area of northern Karkonosze Mts., in the vicinity of Miedzianka i Ciechanowice, Radzimowice and Czarnów have an essential role in the development of mining in Lower Silesia. The second area in Lower Silesia, where copper mining activity was carried on was the neighbourhood of Złotoryja, where already in the 18th century in the place called Leszczyna a copper ore mine of sedimentary origin was started, in the form of cupriferous shales poor in metal but ensuring stable production. The gently and uniformly declining bed exploited there

in the “Stilles Glück” mine in the second half of the 19th century ensured the smoothness and continuity of production (Dziekoński, 1972). Mining activity in the North Sudeten Zechstein depression was resumed only in the thirties of the 20th century, when the progress in mining technology and the shift in global mining towards more and more poorer ores made the mining of those merely 0.8-1.2% ores with uniform mineralisation cost-effective. It gave the origin to the so-called “Old Copper Basin”, operating until the nineties of the 20th century, in the region of Złotoryja and Bolesławiec. Mining activity aimed at obtaining copper ores were also carried on in a number of other places. The object of exploration and exploitation in the area of Lower Silesia were also polymetallic deposits containing silver.

Poor deposits of tin ore occur on the northern slopes of the Izerskie Mts., in the vicinity of Gierczyn and small amounts of cobalt minerals exist in their neighbourhood, in Przeczница. The tin ores were exploited in the 16th and 17th century, and the cobalt minerals were exploited in the 18th and 19th century (Dziekoński, 1972; Madziarz, 2008, 2012; Madziarz et al. 2006, 2008, 2012).

The exploitation of iron ores was also carried on in Lower Silesia. The region of Kowary and that of Janowa Góra were abundant of easily accessible magnetite. In Kowary, the iron ores had been exploited since 1148. In the second half of the 19th century, Stanisławów near Jawor became an important centre for mining that material.

The mining works on the Sudeten deposits, apart from few exceptions, were carried on periodically. In the initial stage of exploitation, the richest and most easily accessible deposit parts were extracted. They often included vein deposits, initially evaluated as abundant but then turned out to be small and difficult in exploitation, which led to abandoning of mines. The mining activity was interrupted by wars, epidemics, population migrations or by falling prices of raw materials. Over a long period, the

knowledge about the Sudeten deposits was limited to those already recognised during the mining activity carried on throughout the centuries, in the shallow near-surface parts (Dziekoński, 1972).

The documentary collection of the former German Higher Mining Office in Wrocław (*Oberbergamt zu Breslau, OBB Breslau*) is a rich source of information on the history of mining in Lower Silesia, in which the especially rich materials come from the years of 1779–1852. The source publications for historical studies are codes containing names, summaries and full texts of documents from old chronicles. Furthermore, the works by Festenberg, Steinbeck and Fechner contain plenty of information. Among the works published after 1945, the work by Dziekoński (1972) is of special importance as it is a comprehensive source of information on the history of Lower Silesian ore mining.

REMAINS OF FORMER ACTIVITY

Nowadays, most of the formerly exploited deposits in the area of Lower Silesia have only of historical importance. Hundreds of years of the intense mining works left numerous traces in the area, still readable despite the lapse of centuries. Inherent landscape element which is characteristic especially for the mountains is numerous remains of former mining activity. They constitute a precious source of knowledge about the development of deposit mining technology, providing the evidence of knowledge and skills of the generations of miners connected over the centuries with the area of Lower Silesia. These relics occur in the area mostly in the form of clearly distinguished heaps of waste rock, land subsidence, and often in the form of partly or fully survived underground workings: shafts and adits, often in good condition, ruins of mine buildings, ore processing and concentrating equipment (e.g. stream water damming reservoirs). These objects are usually devoid of any

protection or documentation. Many of the hitherto survived and accessible objects disappear from the landscape forever, as a result of modern-day construction works carried on in their vicinity, incorrect liquidation - without consideration to the historical value of such objects, or filling them for dozens of years now with all kind of wastes, including hazardous. In the works devoted to the history of Lower Silesian mining the issue of preserving the relics of former activity and their importance - as a source of knowledge about the old mining techniques, as well as the necessity to properly preserve and conserve them, or even the possibilities of using them today as tourist attractions, apart from few examples, practically have not been addressed. And yet the confrontation of information derived from archive materials with that obtained during the field work can lead to the enrichment of knowledge concerning the history of mining in Lower Silesia, and the "specific atmosphere" of old, underground workings constitutes a great attraction for many people, which can be used to improve the attractiveness of presently forgotten and declined places connected with the old ore mining.

Exploratory and documentary work conducted in the field reveals the traces of merely visible land subsidence marking the routes of adits and galleries made at a small depth, or collapsed shafts, as well as perfectly survived workings, with the fragments of lining, equipment, etc. There exist large stretches of land covered with neighbouring remains of shallow shafts used in underground mining with the multi-shaft method (e.g. on the slopes of the Ołowiane Mts. in the vicinity of Ciechanowice), traces of trenches and shallow prospecting shafts marking all the regions of former exploitation, naturally collapsed or "spaced-out" adits outlets, but also survived large complexes of underground workings, with clearly distinguished foreheads, exploratory adits, and often with exploitation chambers of

relatively large sizes. In a number of former mining centres there still exist, in various degree of preservation, channels supplying water from rivers and streams to the processing equipment as well as water dams, often in the form of reservoirs located close to the drift outlet. The water energy constituted the basic source for driving drainage, hoisting and processing equipment in most of the former Lower Silesian ore mines until the middle of the 19th century.

MINING AND ARCHAEOLOGICAL WORK

Considering the abundance of relics of the former exploitation in the area of Lower Silesia and their undeniable historical and cognitive value in 1995 work aimed at systematic cataloguing and documenting of such type of objects was undertaken at the Mining Institute of Wrocław University of Technology. Because of the special character of work conducted at the objects of historical value which should be subjected to preservation maintenance, the agreement on scientific cooperation was concluded in 2006 between the Faculty of Geoengineering, Mining and Geology of Wrocław University of Technology, the Institute of Archaeology and the Institute of History of the University of Wrocław, with the aim to jointly conduct work concerning former mining sites in the area of South-West Poland, thus the mining archaeology work. The research and cataloguing work has been conducted at a number of former ore mining centres, among which there are those of most importance from the viewpoint of the history of mining works in Lower Silesia, as well as those of smaller importance but having a documented multi-century history of exploration and exploitation. Among the regions under the study are: the site of former copper and arsenic ore mining in the vicinity of Miedzianka, Ciechanowice and Janowice Wielkie, polymetallic ores in Radzimowice

and Czarnów, tin and cobalt ores in Gierczyn and Przecznicza, chromite in the Ślęza Massif, iron and uranium in the region of Kowary, iron in Stanisławów, lead and silver in Marcinków, Bystrzyca Górna and Modliszów.

Each centre of former exploitation the mining works were carried on periodically within the space of several centuries. With the development of knowledge and technology, the previously abandoned workings were revisited several times and the depth of exploitation was continually increased with the aim to make use of the newest achievements in mining technology and geological knowledge. The effect of such type of activities is a large number of former mine workings and surface building remains, often spread even within a single centre of former mining works over a large, usually undulating area. Traces of former works are usually obliterated as a result of different kind of works carried on after abandoning the mining works, e.g. forestry works. The precise study of a single site, even without giving consideration to underground workings is a long-term and arduous work requiring the participation of a team of experts, including mining archaeologists. The identification and examination of underground workings entail speleological works, and the access to the interiors of former mines often requires reopening of their outlets that had been filled up for hundreds of years. This type of activity involves, which is obvious, the necessity to make many formal and legal arrangements, to say nothing about the considerable costs of its completion. Due to the above reasons, most of the hitherto completed research and cataloguing work has been limited to the superficial identification of former mining work sites and still accessible parts of workings.

Due to the importance of the historical mining centres, the scope and results of completed research work, and what is particularly important – the possibilities of using them in industrial tourism and geo-tourism, the results of the work carried out

in the operating area of former lead and silver ore mines in Bystrzyca Górna (Sowie Mts.) and those conducted in the historical region of tin and cobalt ore mining in Gierczyn and Przecznicza (Izerskie Mts.) are presented below.

FORMER LEAD AND SILVER ORE MINING SITES IN BYSTRZYCA GÓRNA (SOWIE MOUNTAINS, IN NEIGHBOURHOOD OF ŚWIDNICA)

The area of the occurrence of quartz-barite veins with polymetallic mineralisation (mainly lead and silver minerals) in the neighbourhood of Bystrzyca Górna in the Sowie Mountains was, within the space of more than five centuries, subjected periodically to fairly intense exploration and exploitation works (Madziarz, 2008). In the area formerly known as “Goldener Wald” (Golden Forest), and more precisely, in the area known as “Silber Wiese” (Silver Meadow) the following mines operated in a chronological order: *Segen Gottes*, *Christinenglück*, *Victor Friedrich*, *Wilhelmine*, *Beathe* and probably *Berthe*. Although the documented information on the mining works in the neighbourhood of Bystrzyca Górna concerns only the year of 1539 (Dziekoński, 1972) it is no way not to rule out the considerably earlier moment of their beginning, the sign of which can be the shape and size of the cross-section of the workings reopened during the mining and archaeological work. The first mine operating in the described region was *Segen Gottes*, which was relatively large for the Sowie Mountains’ conditions. As known from the survived documents, while driving the workings the traces of „old works” were encountered, which was the sign of considerably earlier time of starting the mining works on the deposit in the Widna mountain (Dziekoński, 1972). The documented attempt to resume the exploitation there was undertaken for the last time in the year of 1844, in the mine

called *Beathe*, however, the mining works were stopped after a few years – probably because the deposit was depleted. The area of the former mines in the north part of the Sowie Mountains, was revisited after the Lower Silesia had been reunited with Poland. The exploration works were initially aimed to evaluate the prospects of the occurrence and extraction of uranium ores, and then barite (Madziarz, 2008).

Despite the numerous source materials, the proper identification of the mine workings mentioned in the survived literature and historically operating in the region of Bystrzyca Górna became possible only today owing to the mining archaeology work carried out in the Widna Mountain in the years 2006–2010. In consultation with the Institute of Archaeology of the University of Wrocław and after obtaining the consent from the

owner of that land – the State Forests, part of the workings of the *Beathe* mine were reopened in 2008, first the so-called „upper adit” located on the highest level (fig. 1), then the 18th-century lower adit (in 2009). The charting of the workings completed in comparison with the archive plans from the collection of the former *OBB Breslau* made it possible to prove that the examined *Beathe* mine located in the *Silber Wiese*, made use of the main opening-out headings of the mines operating there in the previous centuries, i.e.: *Segen Gottes*, *Christinenglück*, *Victor Friedrich* and *Wilhelmine*. In this way, it was possible to prove without any doubts that the location and layout of the workings in the Widna Mountain corresponds to the mines known from the literature and operating in that area in the period from the 16th to 19th century (Madziarz 2008).

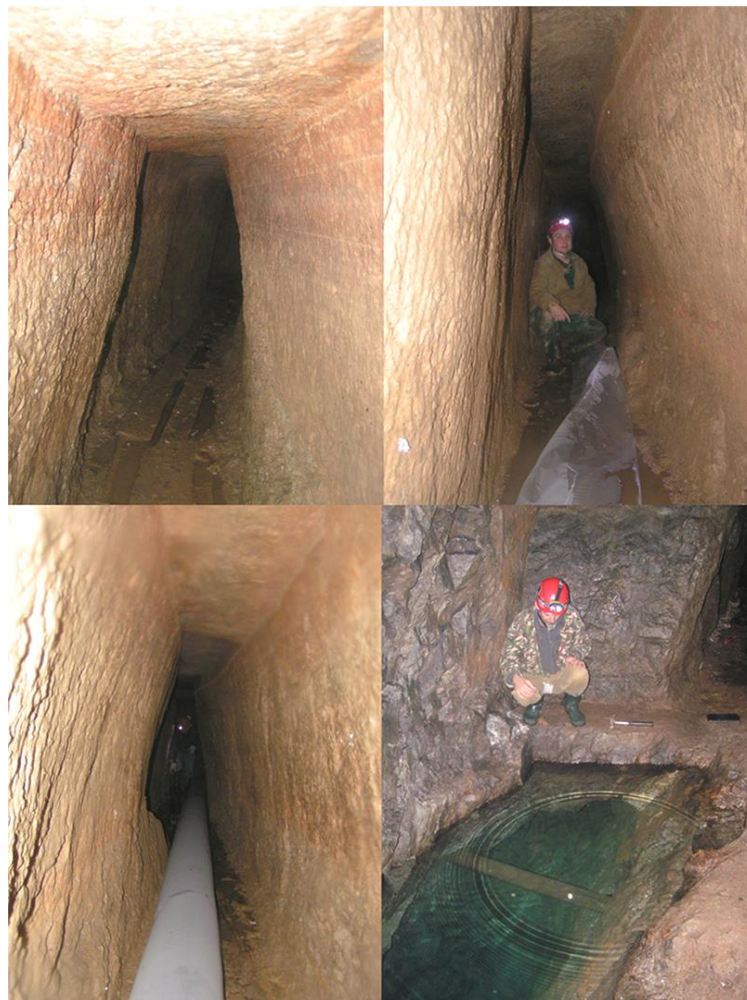


Fig. 1 Historical mining works in Bystrzyca Górna

After completing the charting and photographic documentation the workings were preserved and filled up again. The complex of workings of the former mines in the neighbourhood of Bystrzyca is wide, it has a great historical value and absolutely requires further research and cataloguing work, as it constitutes an example of the mining work development within the space of about 500 years, and the condition of its workings has not been impaired as a result of exploration works for uranium ores – as it was the case in many similar former ore mining centres in Lower Silesia.

Based on the work results the concept of creating a tourist path presenting the attractions of the Bystrzyca River valley, among which the special role should play the relics of the former mining works, including the complex of perfectly preserved underground workings dated back to the period from the 16th century to the beginning of the 19th century has been developed. The authorities of Świdnica Commune are interested in the study results and are in favour of making the complex of historical mine workings in the Widna Mountain available for the tourist traffic as an industrial tourism and geo-tourism attraction.

FORMER TIN AND COBALT ORE MINING SITES IN GIERCZYN AND PRZECZNICA REGION (IZERSKIE MTS.)

The beginnings of mining works in the region of Gierczyn and Przecznica in the Kamienicki Ridge of the Izerskie Mts. are traced back to the 16th century, when the tin ore mining and metallurgy reached the apogee there (Dziekoński, 1972). The mining works were stopped in time of the Thirty Years' War (1618-1648), there were several attempts of their resumption, but they were not successful. The exploration and exploitation works were carried on until the beginning of the 19th century, and they were finally stopped in 1815. The

gradual decrease in tin ore extraction at the end of the 18th century in Gierczyn converged with the beginnings of exploitation of cobalt ores in nearby Przecznica, providing the basic component for a very expensive cobalt paint. The exploitation of cobalt ores in Przecznica has of great economic importance, since it supplied about 10% of the then European production of that dye. The mining and metallurgical works in the *Sct. Maria-Anna* mine were carried on until the middle of the 19th century. The German authorities became interested again in the abandoned workings of the *Reicher Trost* and *Hundsrücken* tin mines in 1939, in connection with the war preparations. After 1945 the area of the occurrence of tin deposits became the subject of long-term geological exploration. On the basis of documented resources, the "Initial project for the construction and exploitation of the *Gierczyn* mine" was completed in 1957, which was operating on the basis of the former workings, with the mining works limited to the prospecting works only. The exploitation was never started because the deposit was too poor (Madziarz, 2008; 2009; 2012, Madziarz et al., 2008).

Numerous mining objects are the remains of the more than 400 years' documented history of mining works in the region Krobica – Gierczyn – Przecznica. During the cataloguing work carried out in the analysed region, the complexes of mines and their superficial infrastructure, which are known from archive materials, have been found and identified. They include: *Sct. Maria-Anna*, *Drei Brüder* and *Fryderyk Wilhelm* in Przecznica; *Morgenröthe*, *Kupfer Zeche* and *Reicher Trost* in Gierczyn, *St. Carol* and *Hundsrücken* in Kotlina, *St. Johanes* and *Leopold* in Krobica. Special attention should be paid to the remains of shafts of the former mines *Reicher Trost* and *Hundsrücken*, on the basis of which the mine *Gierczyn* was designed in the post-war period (Madziarz et al., 2006; 2012). Due to their relatively good condition, the complex of workings of

the former mine *Sct. Johannes* and the adit *Leopold* in Krobica as well as the adit *Fryderyk Wilhelm* in Przecznicza (Madziarz et al., 2008) seem to be very interesting in terms of their use as a tourist attractions. Also, part of the underground workings of the *Sct. Maria-Anna* mine in Przecznicza is in perfect condition. In the flooded shaft of that mine there still may exist extremely precious from the historical point of view remains of the original water drive drainage

equipment.

The results of the conducted work have aroused interest of the Mirsk Commune authorities, in the area of which the remains of former mines are located. After the proper preservation and preparation, these objects should add to an increase in the tourist attractiveness of Mirsk Commune, and consequently bring measurable economic and social benefits. This idea is



Fig. 2 Former tin and cobalt ore mines (16th to 19th century)

supported by the experience of similar projects for the restoration of historical post-mining objects and turning them into tourist attractions in Poland and Europe. As a result of the undertaken activities the project entitled “Reclamation of the regions degraded by mining activity in the area of Mirsk Commune, with the creation of a tourist path *Along the footprints of old ore mining*” (Madziarz et al., 2008). The project will be executed by KGHM Cuprum Research and Development Centre in Wrocław. It will be financed by Mirsk Commune from the European Union resources, within the framework of the Regional Operating Programme for the Lower Silesian voivodeship for the years 2007–2013. Within the framework of the above-mentioned project, the complex reclamation of the former mining sites in the area of Krobica – Gierczyn – Przecznicza will be carried out (towards the forest and tourism direction) and the tourist and educational path (about 8 km long) presenting the history and remains of the former tin and cobalt mining in that area will be created. After removing the wastes the proper reclamation and management work will be carried out at the post-mining objects, in the scope resulting from the planned method of their management for the tourist traffic needs. The main assumption adopted for the area management design and creation of the tourist and teaching path is the least possible interference in the existing condition of the former mining sites and the surrounding area. The main goal is to make the remains of former mining works available to visitors in the condition as close to the original, i.e. in the period from 16th to 19th century, as possible.

The most important element of the planned path “Along the footprints of old ore mining” will be the underground tourist route *St. John’s Mine* in Krobica (fig. 2), being prepared on the basis of historical workings from the years 1576–1816. Tourists, under the care of guides, will cover the distance of about 350 m along the

workings from the period of the 16th to 19th century. This project, in its programme assumptions, features the values qualifying it to the category of environmentally-oriented and socially-oriented projects. The completion of the two basic task of the project – cleaning the objects and post-mining area from different types of waste, and then carrying out the reclamation and management work, will bring about a considerable improvement of the environment condition within the area of the three villages: Krobica, Gierczyn and Przecznicza in Mirsk Commune. The revitalisation of the environment, preservation and exhibition of the old mining sites and, on their basis, creation of the tourist path with an attractive underground section should contribute to the increase in tourist traffic in the region of the above-mentioned commune. It will certainly have a positive impact on the economic development of that region.

CONCLUSION

As a result of the research and cataloguing work concerning the former ore mining in Lower Silesia, a number of historical mining sites hitherto known mainly from the source materials and historical studies have been identified, where the exploration and cataloguing work was conducted for the last time mostly at the turn of the 40s and 50s of the 20th century, in connection with the search for uranium ores (*Ocena*, 1959). In order to exchange experience in the scope of identification and documentation of such type of objects as well as to spread the results of the conducted work, the conference “Mining heritage and history and making use of remains of former mining works” is organised every year, starting from 2005. However, the most important effect of the conducted work seems to be the practical use of their results, as the preparation basis for the recent project executed by KGHM Cuprum

company, under the title “Reclamation of the regions degraded by mining activity in the area of Mirsk Commune with the creation of the tourist path *Along the footprints of old ore mining*”. This project is an example of how to make use of scientific and research work that is conducted by the scientific centre - Wrocław University of Technology, the results of which have turned out to be interesting for practical point of view and become the subject of interest of the self-government bodies due to the expected benefits associated with the improvement of the environment condition and development of the Commune. It is worth stressing that Mirsk Commune representatives were acquainted with the results of the research and cataloguing work during the conference “Mining heritage and history and making use of remains of former mining works”, which entailed their interest in the scope of the possibilities to make use of the mining heritage survived in the area of the Commune in the development of industrial tourism and geo-tourism, and hence to significantly improve the hitherto modest tourist proposal.

In the conditions of Lower Silesia, the project executed on the basis of the described work is an innovative and piloting project. At the first, has been made an attempt to save the complex of historical mining sites dated in the period from the 16th to 19th century, which have been destroyed since the 50s of the 20th century, when the exploration works were finally stopped there, and the former workings have become illegal waste dumps. The interest aroused by the described interdisciplinary project among the self-government of some Lower Silesian communes in the area of which similar remains of former mining works are located and in the community of people widely associated with tourism – both those conducting economic activity and those making use of attractions prepared for visiting. The remains of several-century-old mining activity, properly preserved and

made available for visitors, may soon become the major tourist attraction of Lower Silesia.

REFERENCES

- CRAIG J.R., VAUGHAN D.J., SKINNER B.J.**, Zasoby Ziemi, Warszawa 2003.
- CZAPLIŃSKI M., KASZUBA E., WAŚ G., ŻERELIK R.** (eds), Historia Śląska, Wyd. Uniw. Wroc., 2002.
- DZIEDZIC K., KOZŁOWSKI S., MAJEROWICZ A., SAWICKI L.** (eds), Surowce Mineralne Dolnego Śląska, Wrocław 1979.
- DZIEKOŃSKI T.**, Wydobywanie i metalurgia kruszców na Dolnym Śląsku od XIII do połowy XX w., Wydawnictwo PAN, 1972.
- FESTENBERG-PACKISCH H.**, Der Metallische Bergbau Niederschlesiens, Wien 1881.
- MADZIARZ M.**, „Cuprifodina in montibus” o historii i pozostałościach dawnych robót górniczych w rejonie Miedzianki – miasta zrodzonego i unicestwionego przez górnictwo, Dzieje Górnictwa – element europejskiego dziedzictwa kultury, vol. 3, Wrocław 2010.
- MADZIARZ M.**, Kopalnie „Czarnów”, „Miedzianka” i „Stara Góra” w poszukiwaniach okruszczenia uranowego oraz rud metali w latach 40. i 50. XX w., Dzieje Górnictwa – element europejskiego dziedzictwa kultury, vol. 2, Wrocław 2009.
- MADZIARZ M.**, Stan rozpoznania historycznie eksploatowanych sudeckich złóż polimetalicznych w świetle wyników powojennych prac geologiczno-poszukiwawczych, Prace Naukowe Instytutu Górnictwa PWR, No. 128, Series: Studia i Materiały No. 36, 2009.
- MADZIARZ M.**, Tereny dawnych robót górniczych w Bystrzycy Górnej, Modliszowie i Dzieńmorowicach w świetle danych archiwalnych i badań współczesnych. (in:) Dzieje górnictwa – element europejskiego dziedzictwa kultury, Wrocław 2008.
- MADZIARZ M.**, Pozostałości dawnych kopalń rud kobaltu w rejonie Przeczniczy, Dzieje Górnictwa - element europejskiego dziedzictwa kultury, Wrocław 2008.
- MADZIARZ M.**, Zadania i znaczenie sztolni w historycznej eksploatacji górniczej na przyklei zachowanych wyrobisk dawnego górnictwa rud cyny i kobaltu okolic Gierczyna, Dzieje Górnictwa - element europejskiego dziedzictwa kultury, Wrocław 2012.
- MADZIARZ M., MIZERA A., DĘBKOWSKI R.**, Projekt „Rekultywacja obszarów zdegradowanych działalnością górnictw na

- terenie Gminy Mirsk z utworzeniem ścieżki Śladami dawnego górnictwa kruszców” jako koncepcja kompleksowych działań w zakresie ochrony i wykorzystania dziedzictwa górniczego Dolnego Śląska, Dzieje Górnictwa - element europejskiego dziedzictwa kultury, Wrocław 2012.
- MADZIARZ M, SZTUK H.**, Eksploatacja rudy cyny w Górach Izerskich: historia czy perspektywa dla regionu?, Prace Naukowe Instytutu Górnictwa Politechniki Wrocławskiej Nr 117, Studia i Materiały No. 32, Wrocław 2006.
- MADZIARZ M, SZTUK H.**, Kopalnia "Gierczyn" - zapomniany epizod w historii górnictwa rud Ziem Zachodnich, Dzieje Górnictwa - element europejskiego dziedzictwa kultury, Wrocław 2008.
- NEY R.** (red) Surowce Mineralne Polski, Surowce Metaliczne: miedź, srebro. Wydawnictwo Centrum PPGSMiE PAN, Kraków 1997.
- PAULO A, STRZELSKA-SMAKOWSKA B.**, Rudy metali nieżelaznych i szlachetnych, Kraków, Wyd. AGH, 2000.
- COLLECTIVE WORK**, Ocena uranonośności Sudetów, Zakłady Przemysłowe R-1, Kowary, 1959.
- COLLECTIVE WORK**, Zarys Dziejów Górnictwa na Ziemiach Polskich. Vol. I and II, Katowice 1961.
- QUIRING H.**, Geschichte des Goldes, Stuttgart, 1948.
- SACHS A.**, Bodenschätze Schlesiens. Erze, Kohlen, Nutzbare Gesteine, Leipzig 1906.