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# MINING LANDSCAPE AS A TYPE OF CULTURAL LANDSCAPE

## *KRAJOBRAZ GÓRNICZY JAKO TYP KRAJOBRAZU KULTUROWEGO*

**Key words:** mining, landscape, anthropogenic, cultural

***Słowa kluczowe:*** *górnictwo, krajobraz, antropogeniczny, kulturowy*

**Abstract**

Numerous inactive post-mining excavations left in the landscape do not introduce negative elements; quite contrary, they serve positive functions at present, so attributing the same negative impact to them is a misunderstanding. These are places of biodiversity, scenic diversity and geotourist or tourist attractiveness. Some of them are closely related to local history and create a peculiar form of cultural landscape, which is worth preserving.

***Streszczenie***

*Liczne nieczynne wyrobiska pogórnicze pozostawione w krajobrazie nie wprowadzają do niego elementów negatywnych; wręcz przeciwnie, służą one podkreśleniu jego pozytywnej cech w chwili obecnej. Przypisując, więc ten sam wpływ negatywny zarówno czynnym jak i nieczynnym wyrobiskom jest nieporozumieniem. Są to miejsca, różnorodności biologicznej, geologicznej, geoturystycznej o dużej atrakcyjności turystycznej. Niektóre z nich są ściśle związane z lokalną historią i tworzyć swoistą formę krajobrazu kulturowego, które jest warte zachowania na równi z innymi.*

## INTRODUCTION

The period of intensive and rapid resource mining in the previous century has made the society strongly aware of the negative impact of mining on the natural environment, especially landscape. Negative stereotypes regarding degradation[1] of the environment and the need to reclaim mining areas affected all mining sectors, from sulfur, brown coal and hard coal mining to small clay-pits and quarries. Also, the society was persuaded for decades that only biotic elements were of any value and nothing that was related to resource mining was worth preserving. The argument regarding importance of mining excavations for education, tourism or culture seemed little convincing until recently (Pietrzyk-Sokulska, 2000a, 2000b, 2001b, 2001c, 2005, 2008; Żarska, 2003; Tokarska-Guzik, 2003; Węgierek, Dorda, 2004; Nita, Myga-Piątek, 2005, 2006; Nita, 2013). A similarly unconvincing argument was one claiming that a mining object might be of cultural or historical value which is important for a given place or region. Until the end of the 20th century, post-mining infrastructure was devastated, pulled down or hidden with embarrassment (e.g. that remaining of KWK Sosnowiec coal mine). If post-mining buildings and infrastructure did not have cultural value, neither did excavations themselves, which were usually filled with all kinds of waste and then concealed by foresting. The turn of the 21st century was when people started to notice that precious cultural and historical values are represented in a 200-year-old tenement house as well as in an old lime kiln or post-industrial infrastructure (Starzewska-Sikora, 2007). Researchers of identity of a region and its past noticed importance of a railway station, a mill and a chapel, as well as a lime kiln or a mining shaft, and consequently, historians should give them appropriate value and rank in development of a region or a location. Thus, all objects registered on Earth as mining buildings or excavations have their cultural value.

## MINING LANDSCAPE AS PART OF CULTURAL LANDSCAPE

Cultural landscape is a whole of factors, objects and physical properties, which are visually observable, and an expression of human culture on Earth. It combines elements of the existing natural environment and the processed – cultural environment (Birnbaum, Hughes, 2001; Rubenstein, 2002; Myga-Piątek, 2012). Cultural landscape is a result of transformation of natural landscape by one or more cultural groups and overlapping of various cultural elements of different ages on the same geographic space, identified with surface features (Sauer, 1925; Dobrowolska, 1948; Wagner, Mikesell, 1962). Such landscape may be understood as an anthropogenically modified section of geographic space which developed as a result of a combination of environmental and cultural influences (Zonneveld, 1990), creating a specific structure which expresses regional distinction perceived as peculiar physiognomy (Myga-Piątek,

[1] Degradation – here, it is something transitory, which can be repaired after the factor which causes transformation recedes.

2001, 2005; Nita, Myga-Piątek, 2006). Natural space which occurs within the range of human impact adopts a cultural form expressed as cultural landscape. Cultural landscape appears in many publications as a synonym for anthropogenic landscape (Bieroński, 2002; Stryjakiewicz, 2008; Degórski, 2009). The group of cultural (anthropogenic) landscapes includes subtypes which are related to the dominating kind of human activity and degree of transformation of the natural environment. The types that are generally distinguished include: rural, urban, tourist and industrial landscapes, but also mining or artificial landscapes etc.

Mining operations lead not only to obtaining mineral resources, but also to modifications of the natural surface features and, in many cases, to creation of completely new artificial surface features which build up landscape. The simplest classification of changes resulting from mining-related activities, which is important from the point of view of landscape, is a division into concave forms such as excavations and convex forms such as waste heaps (dumps). These forms are often closely correlated, being a more or less permanent element of the landscape structure and a permanent element of civilizational development.

The main form of surface changes in landscape resulting from mining operations is an excavation (Ostręga, Uberman, 2005), which becomes a basic element of the landscape structure (Mizerski, Sylwetrzak, 2002; Glapa, Korzeniowski, 2005). At least two meanings of this notion can be distinguished – the technical (mining) meaning and the legal meaning; these should be complemented with one more, landscape-related meaning. A mining excavation is space in a land lot or the orogen, which formed as a result of mining operations (PGiG, 2011). It is space created in place where mining output was removed. According to the instructions for the environmental map (Technical directives…, 1990, 2005), an excavation is land subsidence deeper than 2 m, which formed as a result of open-pit mining of energy (brown coal, peat), chemical (sulfur, chalk, limestone), building (natural rock, clay, building limestone) or other resources. It could be a pit, hillside or hillside-pit excavation.

Formation of an excavation is related to mining operations in the orogen and leaving an empty space, which means modification of landscape. The degree of modification of this space depends on the method and range of mining activities. Currently, the main method of mining of loose minerals is using heavy duty equipment, e.g. digging and loading machines. Stone quarries use explosives as the main mining method if aggregate is mined. This method is not used in open-pit mining plants which mine block rocks and relatively low hardness minerals, that is those which can be mined using diggers, e.g. clays, silts or sands. What distinguishes stone quarries from other kinds of excavations (sand, gravel or clay pits) is their higher durability and resistance to mass movements like sliding or crawling etc. Higher resistance or rock which builds the walls of an excavation causes it to become a permanent element of landscape for a longer time (Pietrzyk-Sokulska, 2000a, 2001a, 2002, 2003, 2005; Nita, 2012, 2013). Features that distinguish a stone quarry in landscape include a clearer outline of its external edges in the morphology of terrain

in comparison with e.g. sand pits, as well as higher and steeper slopes and their number (levels of exploitation). Poland is dominated by quarries where sandstones, limestones, granites, basalts and dolomites are mined. The largest quarries in Poland are more than 1 $km^2$ in area, those worldwide are even larger (up to several square km). Factors that are important for landscape include location of a quarry, its depth and, in case of hillside-pit excavation, the number of mining levels and its location within other forms of terrain. The deepest stone quarry in Poland is in Strzelin (120 m). A quarry starts functioning harmoniously with landscape when it stops operating as an active mining plant and becomes a post-mining object, even if it only concerns its part. The parts that have been used up start to blend in landscape. Then, a kind of equilibrium occurs between biotic and abiotic factors. The landscape function of a quarry should be interpreted as a combination of elements including slopes, mining levels, a waste heap, etc. What marks its existence in landscape for the longest time is the basin of an excavation, which is a permanent element of terrain morphology even though its edges become less clearly visible.

An important distinguishing feature in excavation landscape is colors of their slopes and the outer outline, which is a combination of lines that clearly distinguish it from others. Excavations can be oval or elliptically elongated in shape, have irregular or geometric shape resembling a polygon. That depends on the way the deposit lies, the surface features and the method of mining. The color of slopes depends on the type of mined rock, its hardness, resistance to weathering, the degree of renaturalization of excavation slopes and time since mining activities ceased. In terms of landscape, the color becomes the main factor which emphasizes the remaining elements of an excavation.

The location of resource mining (excavation and its surrounding) can be considered as a geocomplex with a specific type of surface features and landscape structure. An excavation, considered as an element of landscape, can occur in various forms and consist of single or multiple components (scarps, slopes, edges, mining levels, waste heaps, etc). One example might be a large stone quarry (excavation) which makes up certain closed natural space and a kind of specific landscape (quarry landscape). When mining activities cease, it becomes a post-mining object, often limited by the borders of its upper edges, making up an isolated entity both as a scenic and environmental area. With time, a kind of equilibrium between biotic and abiotic factors occurs in it. Thus, changes in landscape caused by creation of an excavation and its further transformation, both man-made (reclamation, revitalization, revalorization, restoration, etc.) and related to natural processes (renaturalization) can be treated as artificial landscape or, in the course of time, pseudo-natural landscape. It should however be emphasized that the part that an excavation plays in landscape changes with every stage of its existence, from clearly contrasting and dominating (in conflict with the environment) to blended in the surrounding and barely marking its distinctiveness (blurred, being a part of the environment). It is connected with the state of relatively fast evolution of such an object in landscape, expressed by stages

of increased or missing economic activities. Thus, three basic stages of excavation development in landscape can be distinguished:

- **mining stage** – continuous mining of resources causes the change that occurred in landscape as a result of initiation of mining activities to intensify until its maximum. In an extreme case, it means running out of the reserves of a deposit and degraded (changed) landscape with new mining-technical elements like an excavation basin, waste heaps, service roads etc; changes that occur are dynamic, progressive and periodical, but are always limited to the period of continued mining;
- **post-mining stage** – including partial or full liquidation of a mining plant and a process of "blending in" of an excavation with its surrounding; changes related to ceased mining are stabilized either artificially (e.g. through reclamation) or naturally (through renaturalization). There is also an increase in natural processes related to landslides and weathering in an excavation, and stabilization of environmental changes which seem to aim at restoring the previous state but are actually something completely new;
- **adaptation stage** – this is usually stage when Nature "arranges" its biotic/abiotic equilibrium in an excavation, with or without human support. This is a long-term process and its time is significant from the point of view of "life of an excavation"; restoration of natural equilibrium usually takes place quite soon, but at a different level in comparison to the condition before mining activities. Physical vanishing of an excavation, though, is a long-term process which depends on a number of natural and anthropogenic factors. New features are stabilized in the landscape or it is transformed into a new form through evolution of its elements and, consequently, landscape evolves towards its cultural type.

In the mining industry, cultural landscape is the whole of mining-related objects and physical changes of land which, observable visually, reflect human culture on the Earth's surface by combining elements of both natural and anthropogenic environments. Mining landscape, where the basic driving force is man and his activities, becomes a part of cultural landscape. The group of cultural landscapes can be divided into subtypes depending on the prevailing type of human activity, including mining activities.

Mining landscape is identified with the whole of phenomena, processes and mining-engineering objects related to mineral mining for resources. It concerns objects and physical features on the Earth's surface in relation of a given place and time of mining work and restoration work after mining is terminated. It is a result of mutual dynamic influence of multiple phenomena and processes with dominating geological and geomorphological processes and anthropogenic factors. So understood mining landscape can be divided into two subtypes: current-mining and post-mining landscape, and then more detailed classification can be made. Mining landscape can be qualified as a form of landscape that has been degraded, but it can also be classified, like some authors do, as devastated (Degórski, 2005). According to M. Degórski (2009), "excavations left of open-pit mining activities" are an example

of areas with devastated landscape. Degraded or devastated landscape refers to landscape which developed as a result of processes and phenomena occurring in the natural environment under determining influence of anthropogenic factors. That resulted in disturbed functioning of the system of the natural environment and consequently, influence of natural phenomena on development of landscape has become limited or impossible (Degórski, 2005). In this case, however, the role of the landscape-developing factor has been overtaken by man, who creates cultural landscape, which is landscape based on the function of transformation rather than relation to occurrence or re-occurrence of natural components.

The environment, transformed as a result of developing mining operations, including resource mining, results in development of specific cultural (anthropogenic) landscapes, sometimes defined as a type of so-called engineering, mining-industrial, post-mining, or sometimes openpit-wasteheap landscapes (Mikłaszewski, 1996; Nita, Myga-Piątek, 2006; Pietrzyk-Sokulska, 2003, 2005, 2010). Such terminology is becoming commonly used in reference books when referring to areas of mining activities. Landscape develops specific forms with underground or openpit mining features, resulting from technological transformation of surface features and terrain. After mining activities cease, mining landscape transforms into anthropologic landscape with artificial features but its mining-related features remain for a long time. Mining landscape changes into post-mining landscape when mining activities stop. Mining excavation landscape becomes post-mining excavation landscape and, with time, pseudonatural landscape. These landscapes have common features, which include time sequence of human activities and relations with the geological structure and its reflection in surface features.

## SUMMARY

Post-mining landscape is space which has been transformed as a result of mining activities, by being "arranged" during these activities and preserved when mining operations stop. It is frequently the whole of places of mining activities at different advancement stages of resource mining (or ceased mining operations), which evolves towards pseudonatural landscape, that is landscape which loses its existing cultural features. This space, however, stores for a long time its geological, tourist, educational and other values developed as a result of resource mining operations that were carried out. The suffix "post-" suggests the type of landscape which preserves traces of something that has been already completed and become history. In this case, it was intense economic-mining activities which finished the period of intense and dynamic changes on the surface of terrain as a result of resource mining. This kind of landscape can be considered as "a part of geographic space, historically developed by mining activities, combining environmental and cultural influences that build up a specific structure which is reflected in regional distinction perceived as a peculiar physiognomy" (Myga-Piątek, 2001; Nita, Myga-Piątek, 2006).

Post-mining landscape does not have to be a form of degraded natural landscape, but could be a new landscape quality with dominating anthropogenic components like excavations and waste heaps. Appropriate adaptation, and natural background for those places could be a driving factor for new quality of cultural landscape instead of degradation of the environment. If mining landscape is a result of changes in the landscape that existed at the time resource mining activities were carried out and intensified, which determined the degree of transformation, post-mining landscape is a form of adaptation and creation of new reality in place of degraded one. It is an image of mining sites related to resource digging, which lead to changes in surface features, most commonly in the form of an excavation which grows in size, at the stage of exploitation. Post-mining landscape, in turn, is a result of continued or ceased activities that a mining region is subjected to at the moment of interruption, termination or cease of mining activities. It results from mutual dynamic influence of multiple phenomena and processes which include dominating processes aimed at "masking" anthropogenic factors. It is an image of a resource mining site which is masked in landscape after mining activities cease. This "masking" of mining landscape, inspired by reclamation proceedings, often leads to development of artificial landscapes. Artificial landscape is "built" by man especially for specific purposes, e.g. for adaptation of post-mining areas for a specific purpose related to economy, rest, water recreation, etc. (Pietrzyk-Sokulska, 2010). Its creation is based on large area changes introduced in existing landscape, including building various artificial structures, creating large objects, large-area planting of vegetation, various arrangements in landscape (funfairs, theme parks – plastic animals like dinosaurs, artificial palm trees and plants) (Zachariasz, 2003). Theme parks are invented – Disneylands, Legolands, Gaelic villages, miniature parks, dinosaur parks. Artificial landscapes are also created for the needs of industry, army and communication (Plit J., 2010).

Landscape is "here and now", but if its "now" is made up by a sequence of events inspired by man and related to the civilizational development, it becomes cultural landscape wherever man appears. In case of the mining industry, cultural landscape exists along with man as long as mining itself continues.

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