The Use Of Post-Mining Areas For Educational And Scientific Purposes

Wiktoria SOBCZYK[1)], Michał POROS[2)]

[1)] Dr hab. inż., prof. nadzw.; AGH University of Science and Technology, Faculty of Mining and Geoengineerig, Mickiewicza 30, 30-059 Cracow, Poland; email: andrus@agh.edu.pl
[2)] Mgr; GEOPARK Kielce

Abstract

Geoparks are area forms of protection and promotion of geological heritage. They play an important socio-economic function, involving the use of geological and cultural heritage for the development of the local community. In this context, the post-mining land use requires a specific multi-faceted approach. This article attempts to identify important factors which are important in choosing the direction of the reclamation and management development in the context of the functioning the post-mining area within the future geopark.

Keywords: geopark, reclamation, post-mining area

Admission

Mining area is the space covered by the harmful effects of anticipated mining mining plant. The concession sets the boundaries of the land (concession decision) to activities [Ustawa 2011]. Post-mining landscape is usually defined as the processes related to the stage of mining exploitation and post-exploited (anthropogenic), objects and physical characteristics of the land surface in relation to a specific place and time [http:Krajobraz]. Post-mining landscape is not only form of devastated natural landscape, but it may be a new quality of the landscape. Post-mining areas can be adapted to serve a function as a geological park. Reclamation in order to give the new features to the sites transformed by mining activity is a key issue in industrial areas, where mining and processing industry has played or plays a leading role. Selecting the optimal direction of reclamation and development at the end of activity should be done in accordance with the strategy of sustainable development in the region [Badera, Kocoń 2015].

Natural conditions and scientific-educational aspect

The possibilities of post-mining land use for scientific and educational purposes can be seen in many variations:

- mining areas, reclaimed in the direction of the forest and/or aquatic, where appropriate revitalizing treatments initiate new functions for use in scientific research and environmental education,
- mining areas as environmental education centers, associated with the possibility of observing the interaction between abiotic and biotic environment (restoration)
- reclaimed post-mining areas as geotouristic objects,
- mining areas converted into parks/rock gardens, on which can be carried out research and education.

Natural conditions affecting the process of reclamation and revitalization planning associated with the post-mining land interdisciplinary indexation for picking and protection of valuable natural fragments. In the case of the protected area, intended also to serve as an object geotouristic, one of the optimal methods for the valorization geosite [Fijałkowska-Mader, Malec 2013]. Geosite term is defined as fragments of geosphere of particular importance for understanding the geological history of the Earth. Geosites are an essential element of the organizational structure of the geopark, which is an area that combines the tasks of protection and promotion of geological heritage with sustainalble policy of development [Knapik et al. 2010]. Geosite method of analysis can provide important information on the optimal direction of reclamation and management of the post-mining fragments selected land.

Socio-economic and environmental education

Strategy of creation and functioning of geoparks takes into account the important function of the local community in decision-making. Social and economic factors, related to each other within the framework of the sustainable development strategy, should have a specific impact on the planning process of reclamation and revitalization of post-mining areas located in areas prospec-

tive for the creation of geoparks. The problem of public participation in the process of restoration and revitalization, and public perception of the effects of these processes has been the subject of many studies [Badera 2008; Badera, Kocoń 2014; Pawul, Sobczyk 2010; Sobczyk, Pawul, 2010; Wawrzyniak, Sobczyk, 2009]. The research carried out suggested, that public consultation should be an essential part of reclamation and revitalization planning as treatments with long-term socio-economic consequences.

In the projected or existing geoparks described problem is particularly important in terms of environmental education of the local community and the criterion of active participation of the community in the development and functioning of the geopark [Poros, Sobczyk, 2013; Sobczyk, 2007]. Examples of European geoparks show tangible benefits of their functioning. The long-term educational projects activate local communities [Torabi-farce et al., 2012]. This process involves the building of regional identity and identity inhabitants with the geopark initiative. The economic activity, involving the creation and support of local business initiatives harnessing and promoting geological and cultural heritage of the geopark, is also important.

Examples of post-mining land use for the purpose of designing geoparks

The Coal Mine "Belchatow" is an interesting example of reclamation and revitalization activities from the Polish solutions [Kasztelewicz 2010]. Except the reclamation activities planned and carried out successively in different parts of the mine, several ideas developed for the post-mining land use. One of them is the proposal prepared by a team of researcher from the AGH University of Science and Technology in Krakow, on conversion after-mine area in the center of sports and recreation and cultural supra-regional importance. The concept of revitalization included geotourist and educational aspect, introducing an element part of the mine development with existing mining infrastructure for mining heritage museum. Belchatow city in cooperation with the Management Board of Mine "Belchatow" and scientific research team of The Polish Geological Institute - National Research Institute (PIG-PIB) implemented an interactive exhibition ,,Giants of Force".

The attractiveness of scientific and educational of stands located within the part of the mine reclamation provided towards the water or forest reclamation was used. Complex of scientific documentation and valuable geological specimens were prepared for the exhibition. Described example is essential for the creation of the concept of a natural and cultural geopark "Szczercowskie Diamonds" [Kin, 2011].

Another example concerns "White Basin Geopark" ("Geopark Białe Zagłębie"), located within the Chęciny-Kielce Landscape Park [Poros, 2011]. Geopark initiative resulting from the cooperation between local residents and local government, joints an area of Sitkówka-Nowiny and aims promotion and geotouristic use of local geological and industrial heritage associated with the exploitation of raw rock and ores. Community activities are oriented primarily on the areas associated with the historic stone and ores mining. The active mining area located in the municipality are also of interest. The inclusion of the idea of post-mining land use for sustainable tourism, geological and environmental education for the municipality's development strategy starts to deliver concrete results in the form of greater opportunities for cooperation with mining concerns and processability.

In the case of the European geoparks, interesting examples of post-mining land use for the needs of geotourism and geological education, come from the UK, Germany and Portugal. British model of geosite conservation [Prosser et al., 2006] proposes specifically developed methodology of mining reclamation for future functioning as geotouristic stations. The examples of its use are among active quarry Barrington Chalk Pit and Quarry Broadway, located in the districts of Cambridgeshire and Worcestershire. In both cases opencast rock materials geological profiles revealed significant from the point of view of a supra-regional (Barrington Chalk Pit) and local (Broadway Quarry).

Selected parts of the mining areas have been included in a special protection system geosite, in consultation with the authorities of mining companies. The system takes into account the protection of geological heritage, valuable in terms of research and teaching at the national level (SSSI - Site of Special Scientific Interest), regional and local (RIGS - Regionally Important Geological and Geomorphological Sites). shared areas for tourism

English Riviera Geopark is an example of revitalization of post-mining areas for geotourism mining and geological education. Currently within the geopark 8 geosite work.

The use of active or inactive mining areas in geoturism and geological education is also known

from two Portuguese geoparks, involved in the European and global network: Naturtejo and Arouca [Torabi-Farsani et al., 2012]. One of the examples is mine quartzite sandstone and shale in Canelas, where part of the mine was excluded from the operation. Interpretive center and position for geological education were created here.

Summary and conclusions

An important social and environmental problems is nuisance mining activities for the people living in areas covered by the direct or indirect impacts of mining is. The connection of the revitalization process with the strategy of sustainable socio-economic development of the region allows you to look at the mining activities through the prism of the potential benefits. It may have an impact on the perception of the local community. This follows from the idea of creating a geopark: the local population is the creator and recipient of the benefits. It is also an important aspect of environmental education, assuming the activation of the population living in the geopark area.

Examples from Poland and Europe suggest a beneficial effect of post-mining land reclamation on the investment attractiveness of the region. This applies to investments closely linked to the function of the area (investments in the tourism sector) and development investments, which are a natural reaction of the market to the creation of an attractive area to reside. Both activities subjected to the rigors of the functioning of the geopark stimulate socio-economic development of the region.

Paper developed as part of statutory work no. 11.11.100.482

Literatura – References

1. BADERA J., "Opinions and attitudes of local community towards mining project – an example from Zawiercie (Poland)." *Gospodarka Surowcami Mineralnymi – Mineral Resources Management* 4/4(2008): 23–40.
2. BADERA J., KOCOŃ P., "Local community opinions regarding the socio-environmental aspects of lignite surface mining: experiences from central Poland." *Energy Policy* 66(2014): 507–516.
3. BADERA J., KOCOŃ P., "Moral panic related to mineral development projects – Examples from Poland." *Resources Policy* 45(2015): 29–36.
4. FIJAŁKOWSKA-MADER A., MALEC J."Waloryzacja geostanowisk na obszarze projektowanego Geoparku Łysogórskiego w Górach Świętokrzyskich." *Przegląd Geologiczny* 61(2013): 165–171.
5. http://pl.wikipedia.org/wiki/Krajobraz_pogorniczy (data wejścia: 13 II 2015).
6. KASZTELEWICZ Z., *Rekultywacja terenów pogórniczych w polskich kopalniach odkrywkowych*. Fundacja Nauka i Tradycje Górnicze AGH, Kraków 2010.

7. KIN A., "Koncepcja Geoparku Przyrodniczo-Kulturowego ‚Szczercowskie Diamenty." *Problemy Ekologii Krajobrazu* 29(2011): 77–96.
8. KNAPIK R. et al. *Inwentaryzacja i waloryzacja geostanowisk Karkonoskiego Parku Narodowego i jego otuliny oraz wykonanie mapy geologicznej tego obszaru.* http://www.mos.gov.pl/g2/big/2010 (data wejścia: 13 II 2015)
9. PAWUL M., SOBCZYK W., "Akceptacja społeczna prac rekultywacyjnych na terenach przemysłowych na przykładzie Jastrzębia Zdroju." *Innowacyjne rozwiązania rewitalizacji terenów zdegradowanych* 2010: 51–58.
10. POROS M., *Chęciny-Kielce Geopark – an aspiring projected geopark* (Poland) (abstract), in: *Geoparks: Learning from the Past – Buidling a Sustainable Future. Proceedings of the 9th European Geoaprks Conference Lesvos Island*, Greece, 2011: 133.
11. POROS M., SOBCZYK W., "Rewitalizacja terenu pogórniczego po kopalni surowców skalnych na przykładzie kamieniołomu Wietrznia w Kielcach." *Rocznik Ochrona Środowiska Annual Set The Environment Protection* 15(2013): 2369–2380.
12. PROSSER C., MURPHY M., LARWOOD J., *Geological conservation – a guide to good practice*. English Nature, External Relations Team, Peterborough, 2006.
13. SOBCZYK W., "Badania opinii respondentów na temat uciążliwości środowiskowej górnictwa węgla kamiennego." *Górnictwo i Geoinżynieria*, 3/1(2007): 497–506.
14. SOBCZYK W., PAWUL M., *Społeczne aspekty rewitalizacji terenów zdegradowanych w wyniku odkrywkowej eksploatacji siarki w Tarnobrzegu*. in: *Innowacyjne rozwiązania rewitalizacji terenów zdegradowanych* 2010: 147–157.
15. TORABI-FARSANI N., COELHO C., COSTA C., NETO DE CARVALHO C., *Geoparks&-Geotourism, New approaches to sustainability for the 21st century*, Brown Walker Press, Boca Raton, Florida, USA, 2012.
16. Ustawa z dnia 9 VI 2011 r. - Prawo geologiczne i górnicze, art. 6, ust. 1, pkt, 15 (Dz. U. z 2011 r. Nr 163, poz. 981).
17. WAWRZYNIAK, S., SOBCZYK, W., *Znaczenie rewitalizacji w lokalnym rozwoju gminy. Innowacyjne rozwiązania rewitalizacji terenów zdegradowanych* 2009: 171–175.

Wykorzystanie terenów pogórniczych do celów naukowo-edukacyjnych

Geoparki są to obszarowe formy ochrony i promocji dziedzictwa geologicznego. Pełnią istotną funkcję społeczno-gospodarczą, polegającą na wykorzystaniu dziedzictwa geologicznego i kulturowego dla rozwoju społeczności lokalnej. W tym kontekście zagospodarowanie terenów pogórniczych wymaga szczególnego wieloaspektowego podejścia. Artykuł stanowi próbę wskazania istotnych czynników mających znaczenie przy wyborze kierunku rekultywacji i zagospodarowania zagospodarowania obszaru pogórniczego w kontekście funkcjonowania w obrębie przyszłego geoparku.

Słowa kluczowe: geopark, rekultywacja, obszar pogórniczy