

Geological heritage and landscape valorization in mining regions – the Atlanterra Atlantic Area best examples

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Since the beginning of human history, the exploitation of geological resources has played an important role in the development of human life. Mining and quarrying are one of the most ancient industrial activities. Mineral exploitation and use are essential procedures to industry and economic development and common society activities such as agriculture, construction, health, communication, education and culture. Extractive activities were fundamental in European history periods such as the Stone Age, Bronze Age and Iron Age, the Roman Empire and essential since the Industrial Revolution from about 1750 until present days. Geological resources management and control have been for a long time, an important political goal and responsible for several war periods in history. The global economy is clearly conditioned by geological resources exploitation in a complex and multipolar globalization, including socioeconomic growth of giant countries like China, India and Brazil. The improvement of life conditions at a larger world scale has increased prices and the demand for industrial minerals, fuels and metals with significant impact on the development of mining and exploration projects, promoting new challenges to the old mining sites.

Metal distribution on Earth is conditioned by complex internal and external geodynamic processes present in different geological settings. Particular conditions allowed the circulation of hydrothermal fluids with significant interaction with host rocks that permitted metal deposition in very particular conditions. Ore deposits are an example of high geodiversity. In particular, regional geological settings have formed large metallogenetic provinces like the European mining regions of the Iberian Pyrite Belt (Portugal, Spain), Fennoscandian Shield (Sweden, Finland), Almadén mercury deposits, and others. These territories provided a significant economic profit at regional and national scales. The provinces are usually complex showing mines in different status of their life cycle: exploration, exploitation, closure and post-mining scenarios.

Mining activities are reflected in the landscape and especially in the life and culture of the people. Mining

villages, open pits and underground mining works, present a very particular important industrial and architectural heritage. Geological heritage is present in surface and underground outcrops, showing mineralizations and related hydrothermal systems, host rocks and tectonic plans. Some of these mineral deposits are geosites of international relevance for the Global Geosites Project. The preservation of this natural geoheritage within the mining heritage context (mining infrastructures and landscapes originated by extractive activities) is fundamental to promote proper heritage protection and valorization. A multidisciplinary approach can be observed in mining regions located in geoparks such as Sardinia (Italy), Copper Coast (Ireland), Arouca (Portugal), and Maestrazgo and Cabo de Gata-Níjar (Spain).

The valorization of geological and mining heritage and landscapes is one of the objectives of the ATLANTERRA/GREEN MINES European Interreg Atlantic Area Project. Its activities have enabled the exchange of experience related to mining and geological heritage valorization and the discussion of historical links between the different mining regions represented. In the Atlantic Area, the following best practice examples of mining site development can be presented:

- Lousal Mine – Iberian Pyrite Belt (Alentejo, Portugal) – old massive sulphide exploitation (1900-1988) until 500 m depth with a social and environmental program presented by a Science Centre, Mining Museum and open pit rehabilitation. www.lousal.cienciaviva.pt
- Castlecomer Discovery Park (Co. Kilkenny, Ireland) – Coal exploitation Ireland www.discoverypark.ie
- Copper Coast Geopark (Co. Waterford, Ireland) – largest copper mine in the British Empire (1825-1875) now a Geopark assisted by UNESCO, with preserved mining buildings, geological garden and Geopark centre with educational programmes. www.coppercoastgeopark.com
- Mines of San Finx (Lousame, A Coruña, Spain) – wolfram and tin in quartz veins mined between 1892 and 1990. A Mining Museum was recently inaugurated with mining and geological heritage itinerary with panels. www.igme.es, www.youtube.com/watch?v=VdWzfrFgFx8
- Big Pit National Coal Museum (Wales, UK) - Old coal mine with underground visits. Mining Museum since 2001. Member of the European Route of Industrial Heritage, <http://www.museumwales.ac.uk/>
- National Slate Museum (Wales, UK) – Located at the Dinorwig slate quarry closed in 1969. Mining museum with old railway, dedicated to the Welsh slate industry. <http://www.museumwales.ac.uk>
- Mine de la Brutz (Ille-et-Vilaine, France) – Old iron mine closed in 1950, located near Teillac. Interpretation Centre and underground visits. <http://www.bretagne35.com>