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# Historical Mining in Croatia – Valuable Examples for European MineHeritage Project

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MineHeritage – “Tracing and learning from ancient materials and mining technology” is a running Wider Society Learning project with the main goal to raise society’s awareness of usage and need for raw materials. Duration of the project is three years (1 January 2019 – 31 December 2021) with total budget of 974,245.00 € founded by European Institute of Innovation & Technology (EIT) in the frame of Knowledge and Innovation Community (KIC) Raw Materials. Project consortium consists of 13 partners from eleven European countries, with Faculty of Mining, Geology and Petroleum Engineering as one of them. Leading partner is New University of Lisbon – Faculty of Sciences and Technology (FCT NOVA) from Portugal.

The scope of the MineHeritage project is wider understanding of the mining technologies and raw materials uses and trades in different regions of Europe during specific historical periods (since prehistory) with the resulting impact on development of European society. The objectives of the projects are following: (1) to engage dissemination approaches to cross-generational target audiences on mining and raw materials as a unifying common ground for Europe through an historical perspective; (2) to promote synergies with other actors such as schools, museums, local admini-

stration and mining companies; (3) to involve society in raw materials and mining through knowledge, (4) to build multicultural bridges between different regions in Europe; (5) to stimulate the debate on environmental sustainability in mining and raw materials sector; (6) to develop popular science materials and organise popular science events; and (7) to raise awareness of own cultural heritage and history of a region. End users of the project are school age children (13-19 years) and young adults (20-45 years).

Expected project outcomes are: (1) database with information on ancient mining sites, abandoned mines, classified heritage sites related to mining from different EU countries participating in the project; (2) popular science materials (booklets and videos on specific mining sites); (3) interactive multilevel game with historical and regional perspective of mining and raw materials in Europe; (4) mobile application for cultural tourism involving historical mining sites; (5) social media accounts (Facebook, Instagram, LinkedIn and YouTube) dedicated to the dissemination of historical mining sites, events and news; (6) promotion of popular science materials (talks, lectures, discussion events, excursions); (7) collaboration with local administration, tourist offices, schools, museums, as well as with other KIC running programs.

The emphasis of the presentation will be on up-to-date information related to Croatian historical mining sites collected for the database, promotional activities of the Croatian team as well as established collaborations. Croatia has a long mining tradition and heritage. Exploitation of natural and crushed stone together with sand and gravel for civil engineering purposes has represented the most important raw material exploited in Croatia throughout our history to the present days. Although, there is no potential in Croatian ore deposits nowadays, there were times in the past when metal production (Ag, Zn, Pb, Cu, Fe) was significant (e.g. Trgovska gora; Rude). There are also several distinct historical mining sites of non-metallic minerals (e.g. sulphur in Radoboj; bauxite in the Mirna valley in Istria). Notwithstanding out of interest for KIC Raw Material, we will present several coal mines, especially when they were related to mining of other commodities (e.g. coal and zinc in Ivanec). Historical examples of technologies related to mining in Croatia will also perfectly contribute to the overall project (e.g. Radoboj machine for sulphur refinement shown on Fig. 1; blast furnace from Bešlinec). Alongside

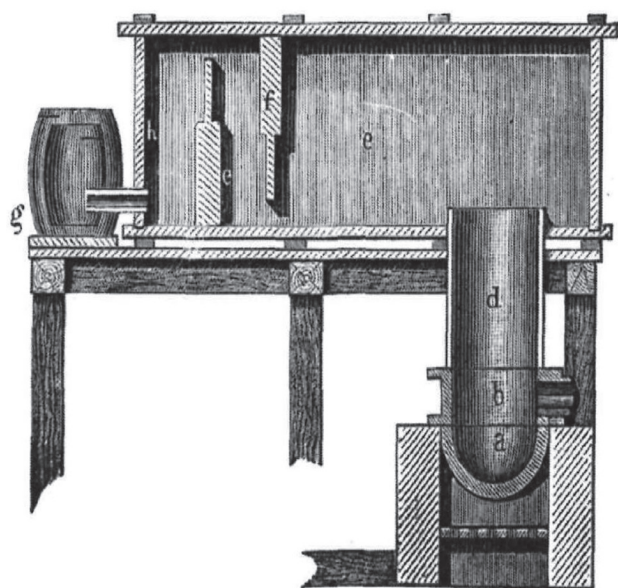


Figure 1. Radoboj machine for sulphur purification (from KIŠPATIĆ & TUČAN, 1914.)

traditional promotional materials as brochures and videos, important localities will be promoted using geocaches (traditional and EarthCaches).

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**Keywords:** *raw materials, historical mining and processing, heritage*

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## SIMONA Project – Transnationally Harmonized Protocol for Drainage Sediment Sampling and Laboratory Analysis of Hazardous Substances Content in Danube River Basin

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The SIMONA project is an Interreg project within the Danube Transnational Programme, which responds to a long needed initiative for accessing data and a development of Sediment-quality Information, MONitoring and Assessment System (SIMONA). The project is designed to ensure support for transnational cooperation in joint Danube Basin water management. The focus of the project is on monitoring of the drainage sediment quality. The Croatian Geological Survey is responsible for Working Package 4 of the project, which outputs were transnationally harmonized protocols for drainage sediment sampling and hazardous substances content laboratory analyses in the Danube basin. These protocols were primarily based on data being collected and inventoried under the Working Package 3 of the project, which included inventory of protocols and methodologies for drainage sediment sampling and analyses in all 17 project partner countries. The first activity within the Working Package 4 was a review of inventoried protocols by the following criteria: the developed protocols (1) are acceptable in all countries of the Danube Transnational Programme, (2) are in-line with the International Commission for the Protection of the Danube River and the EU requirements, (3) are based on the latest scientific knowledge and (4) are sustainable. Within the second activity, protocols were developed for sampling and laboratory analyses of various drainage sediments (bottom,

suspended and floodplain). The third activity was focused on reviewing the drafted protocols in terms of comments and suggestions from all project target groups across the whole Danube Basin.

The two working groups Sampling WG and Laboratory WG are responsible for all three activities during period from the 1<sup>st</sup> of February 2019 to the 1<sup>st</sup> of October 2019. During protocols development, the WGs also reviewed guidelines from the Water Framework Directive Guidance documents and EU Common Implementation Strategy of Water Framework Directive (CIS WFD), GEMAS (Geochemical Mapping of agricultural and grazing land soil) project, FOREGS (Forum of European Geological Surveys) project and all other relevant studies. In addition, the working groups conducted comprehensive data analysis and organized workshop in Zagreb with all project countries representatives where obstacles and problems were discussed.

Finalization of the protocols ensured uniform and reliable monitoring of the quality of the drainage sediment across the almost whole Danube Basin. Finally, they assured prompt and precise hazardous problem detection and represent first step in protection from unexpected and unwanted negative changes in environment.

**Keywords:** *SIMONA project, monitoring, drainage sediment, hazardous substances*