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REcovery of raw MAterials from mine residues in SARdinia - REMASAR

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Rationale

The **SARs-CoV2 pandemic crisis and the geo-political instabilities** at an international level have highlighted the **fragility** of Europe with regards to **the supply of raw materials**, which is **fundamental** for satisfying the industrial needs of the Member Countries, including Italy

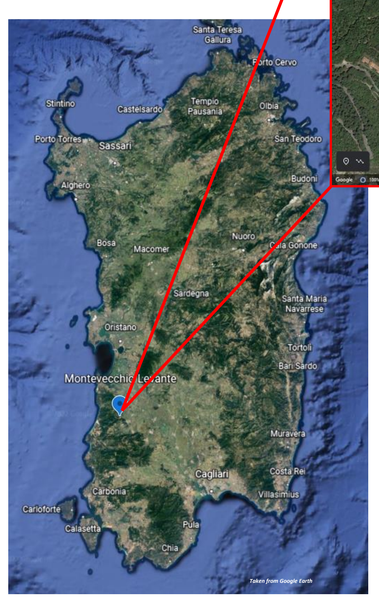
With the presentation of the **Critical Raw Materials Act** (2023), the European Commission proposes a series of **actions** aimed at guaranteeing **safe and sustainable access to raw materials** fundamental for the economic development of the European Union

The possibility of transforming **residues** from **extractive activities** into a **new source of raw materials** (including those of strategic interest) plays a key role in meeting the **needs** of European countries, while ensuring **compliance** with **high environmental quality standards**

Objective

REMASAR aims to develop a multidisciplinary strategy for the sustainable management and valorisation of extractive residues in Sardinia, through the recovery of raw materials of commercial and strategic interest

1. Identification of a potential site of interest (field test)
2. Chemical and mineralogical characterization
3. Mapping of residues with remote (satellite) and proximity (drones) earth observation techniques and their classification
4. Combination of phyto-extraction and hydrometallurgical processes with low environmental impact for the recovery of the substances of interest
5. Environmental monitoring (assessment of water quality)

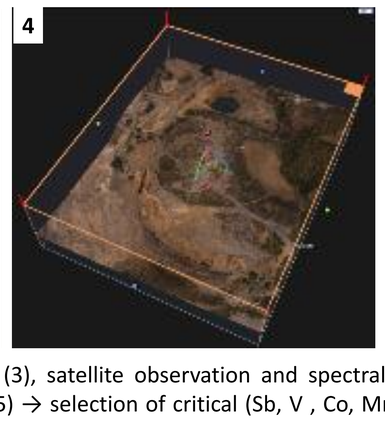


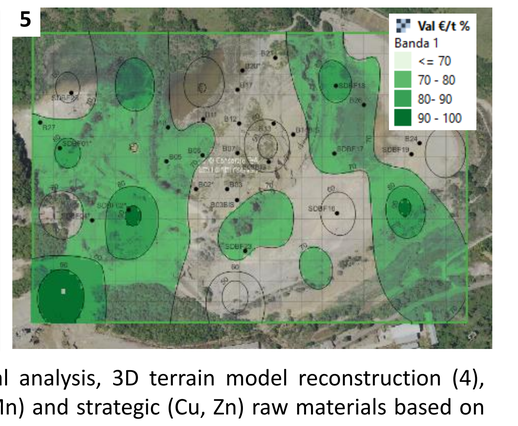
Test area: **Montevecchio Levante** tailings landfill (Sardinia, ITALY)

- Main minerals: blende (ZnS) and galena (PbS).
- Production: lead concentrates (1.7 Mt lead metal), zinc (> 1.2 Mt) as well as silver, bismuth, antimony, copper, cadmium and germanium.
- Total surface area: 25 ha.
- Total volume: 5 million m^3.

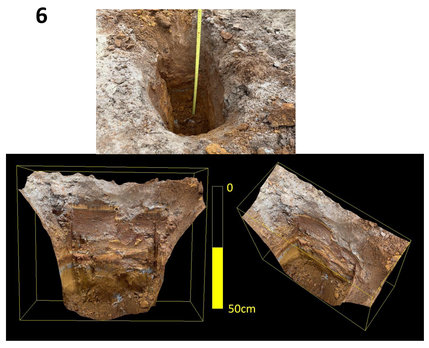
Activities

1-2. Site inspection and preliminary sampling (1), observation with drone (2).

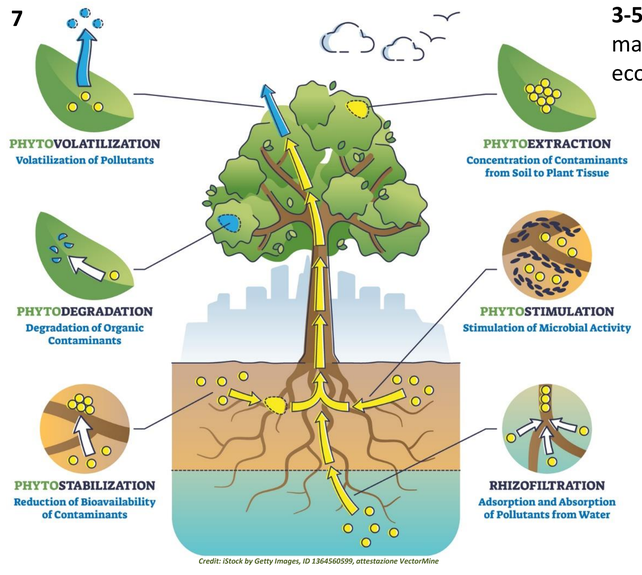


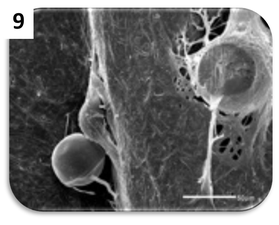


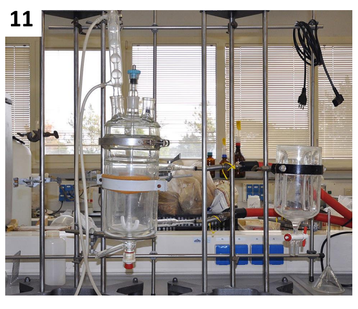
3-5. Chemical and mineralogical characterization (3), satellite observation and spectral analysis, 3D terrain model reconstruction (4), mapping of areas of potential economic interest (5) → selection of critical (Sb, V , Co, Mn) and strategic (Cu, Zn) raw materials based on economic potential.



6-10. Sampling with 3D stratigraphic reconstruction (6), and subsequent application of mycorrhizal-assisted phytoextraction (7-10) and hydrometallurgical protocols (11) characterized by low environmental footprint.







12. Drainage water → Characterization and monitoring for possible application of low-cost, environmentally sound treatments based on bio-electrochemical systems (BES) → further recovery of critical and strategic raw materials.

Partners

CNR - Istituto di Geologia Ambientale e Geoingegneria

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