



## **Risk assessment and restoration possibilities of some abandoned mining ponds in Murcia Region, SE Spain**

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In Murcia Region, SE Spain, there are 85 tailing ponds due to intensive mining activities that occurred during last century, especially in Sierra Minera de Cartagena-La Union. Although mining activity was abandoned several decades ago, those tailing ponds with high amounts of heavy metals still remain in the area. The ponds, due to their composition and location, may create environmental risks of geochemical pollution, negatively affecting soil, water, and plant, animal, and human populations, as well as infrastructures. The main objective of this research is to evaluate the restoration possibilities of two representative mining ponds in order to minimize the risk for human and ecosystems.

To achieve this objective, two tailing ponds generated by mining activities were selected, El Lirio and El Gorguel. These ponds are representative of the rest of existent ponds in Sierra Minera de Cartagena-La Unión, with similar problems and characteristics. Several techniques and studies were applied to the tailing ponds for their characterization, including: geophysics, geotechnics, geochemical, geological, hydrological, and vegetation studies. In addition, effects of particulate size in the distribution of heavy metals will be used to assess the risk of dispersion of these metals in finest particles.

Once the ponds were characterized, they were divided in several sectors in order to apply different amendments (pig slurry and marble waste) to reduce the risk of metal mobility and improve soil quality for a future phytostabilization. It is known that organic amendments promote soil development processes, microbial diversity, and finally, soil ecosystem restoration to a state of self-sustainability. By comparing the results before and after applications we will be able to evaluate the effect of the different amendments on soil quality and their effectively on risk reduction.

Finally, plant metal-tolerant species are used to restore vegetation in the ponds, thereby decreasing the potential migration of contamination through wind erosion, transport of exposed surface soils and leaching of soil contaminants to groundwater.