



Watersheds and mining tailings

Las cuencas hidrográficas y los relaves mineros

J Selva Andina Biosph. 2021;9(2):67-68.

The river basins are important for agricultural, livestock, business-industrial and drinking water activities. However, the growing formal and informal mining activity causes environmental impacts on aquatic and terrestrial ecosystems, affecting the health of families living in the area of influence.

In several countries, the management of mine tailings is still not regulated by laws and regulations that allow the implementation of reduction and treatment processes, applying efficient technologies, in order to avoid contaminating aquatic ecosystems (springs, wetlands, rivers, lakes and lagoons) and terrestrial ecosystems (agricultural and livestock soils) with heavy metals contained in mine tailings.

The composition of tailings is a "breeding ground" capable of eliminating aquatic and terrestrial life, as it contains metals such as lead, mercury, arsenic, copper, cadmium and others that are deadly to life. The headwaters of the basins should be protected or mining or industrial activities should be prevented, as they are important sites, because this is where the regulation and water functioning of the entire ecosystem begins, of wetlands, pastures and maintenance of the aquifer, which influence the development of agricultural activities that are developed in these areas as a priority.


Some research on the treatment of mining tailings and heavy metals is a hope for the survival of life on the planet. For example, soil contaminated with heavy metals as a consequence of artisanal gold mining has been investigated, and the results indicate that the presence of heavy metals in the food produced has a significant risk of non-carcinogenic and carcinogenic effects on children's health¹. Water contaminated with mine tailings can be treated with ferrate (VI) to remove copper and cadmium with pH modification².

Treatment can also be done to reduce arsenic in the waters of streams and reservoirs affected by gold mines through pH modification, which improves the mobility of As³. Another treatment for contaminated soils was electrokinetic remediation coupled simultaneously with two enhancement techniques: modified periodic polarity reversal and catholytic pH control, a strategy with 9 times better results than electroremediation, 96% of Pb and Cu were removed from soils⁴. Enhanced micellar ultrafiltration, a surfactant-based separation technique, removes heavy metals from wastewaters with heavy metals⁵. Finally, headwaters of river basins should be protected and preserved, preventing activities caused by anthropogenic and industrial, as they support the dynamic functioning of the ecosystems found in the middle and lower reaches of these waters, can be treated through biological, physical and chemical technologies. Likewise, contamination by mining tailings, which contain large quantities

of heavy metals, can be treated by means of biological, physical and chemical technologies. Therefore, formal and informal mining companies must be environmentally and socially responsible and invest in the reduction and treatment of mine tailings. The alternative is not to build a space to deposit mine tailings, which at some point collapses and causes serious environmental and social impacts affecting public health, but rather to reduce and treat these tailings.

Cited Literature

1. Johnbull O, Abbassi B, Zitner RG. Risk assessment of heavy metals in soil based on the geographic information system-kriging technique in Anka, Nigeria. *Environ Eng Res* 2019;24 (1):150-8. DOI: <https://doi.org/10.4491/eer.2018.130>
2. Sailo A, Pachuau L, Yang JK, Lee SM, Tiwari D. Efficient use of ferrate (VI) for the remediation of wastewater contaminated with metal complexes. *Environ Eng Res* 2015;20(1):89-97. DOI: <https://doi.org/10.4491/eer.2014.079>
3. Lee J-Y, Kim HJ, Yang JE. Contamination of stream and reservoir waters with Arsenic from abandoned gold mine. *Environ Eng Res* 2008;13(1):33-44. DOI: <https://doi.org/10.4491/eer.2008.13.1.033>
4. Boulakradeche MO, Merdoud O, Akretche DE. Enhancement of electrokinetic remediation of lead and copper contaminated soil by combination of multiple modified electrolyte conditioning techniques. *Environ Eng Res* 2022;27(4):210167. DOI: <https://doi.org/10.4491/eer.2021.167>
5. Yakub M, Lee SH. Heavy metals removal from aqueous solution through micellar enhanced ultrafiltration: A review. *Environ Eng Res* 2019;24(3):363-75. DOI: <https://doi.org/10.4491/eer.2018.249>

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