

Sustainable management of former iron industry settling ponds

by revegetation

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Industrial processes may generate by-products with particular geochemical and/or mineralogical compositions which are subject to environmental factors. Blast furnace sludge produced by iron industry were often stored in settling ponds. The sustainable management of these sites is now required considering the risks for the environment and human health related to the high metal amounts (e.g. Pb, Zn) they contain.

In this context, a former industrial settling pond shutdown in the 1950's, and covered with a forest was investigated. A thorough characterization of the materials [1, 2] along with lysimeter experiments [3] were conducted i) to assess the risks of transfer of metals to groundwater and organisms and ii) to study the potential influence of vegetation on the materials.

Main mineral phases were poorly crystalline aluminosilicates and Mn and Fe oxy(hydr)oxides, as well as carbonates and sulfates. In relation to this mineralogy assemblage, the materials displayed chemical (e.g. alkaline pH, high CEC) and physical (e.g. high SSA, high porosity) properties which favor the retention of water and metals. Root activity induced some changes in porosity and mineralogy and increased the metal extractibility in the adherent materials. Lysimeter experiments showed that soluble compounds (sulfates, carbonates) are leached, but metal flow was limited. The presence of a dense vegetation cover limited water flow by increasing evapotranspiration and water uptake.

Revegetation contributes to reduce the risk of transfer to groundwater. However, the application of this management solution requires to monitor changes induced by the vegetation on metal status.

[1]. Huot *et al.* (2013) *J. Soils Sediments* **13**(3), 555-568. [2] Huot *et al.* (2014) *Eur. J. Soil Sci.* **65**, 470-484 [3] Huot *et al.* (2015) *Sci. Total Environ.* **256**, 29-40.