



## **Gold mining activities in Apolobamba (Bolivia): Pollution by heavy metals**

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Gold mining activity in Bolivia has had different phases, however few studies have considered the impacts that this industry produces in both the society and the environment. In the Natural Integrated Management Area of Apolobamba (Department of La Paz, Bolivia), intense gold mining activities have been carried out from ancient times to the present, with very little gold extraction and mineral processing technology, where mercury is still being used in the amalgam processes. As a consequence, unfortunately, high environmental pollution by Hg and other heavy metals may be provoked. In terms of environmental toxicity and human health, mercury is highly danger, and methyl mercury the most toxic chemical species. Therefore, any research on metal distribution in water, soils and sediments provides valuable information for environmental and human safety in this Area. The Technical University of Cartagena, Spain, through the Research Group “Sustainable Use, Management and Reclamation of Soil and Water”, has carried out a research, developed in most gold mining degraded zones in Apolobamba. The aim of this work was the evaluation of heavy metals impact into the soil-plant-water system, with emphasis on mercury. Considering the amount of extracted mineral, five representative mining districts in Apolobamba were selected: Sunchullí, Suches, Viscachani, Katantika and Sural. These districts, located in Apolobamba, have altitudes above 5000 m.a.s.l, and consisted mainly of little cooperatives. Water, soil and sediments samples were taken, and total, DTPA and wa-

ter extractable heavy metals (Pb, Cu, Zn and Cd) and total mercury were determined. Preliminary results show in some extent the presence of metals such as Pb, Cu, Zn and Cd in soluble and bioavailable forms, standing out the concentrations of mercury. The most polluted soils are near Sunchullí mining site, with very high levels of mercury, where workers and population are in close contact with these soils without any type of protection. On the other hand, heavy metals coming from the mining processing plant are dumped into the rivers, (Sunchullí, Katantika and Pelechuco), where sediments may be enriched in these heavy metals. They could also be incorporated to the trophic chain, through the flora and the fauna, in their bio-available and soluble forms. In some zones (Sunchullí, Katantika) there are high Hg levels, but according to Dutch legislation, Pb, Cu, Zn and Cd levels weren't high enough to consider those areas as polluted.