

# **Study of the possibilities of acid mine drainage from the mining sites of the Yaouré gold province (Center of Côte d'Ivoire): implications in the pollution of surface and underground waters**

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Most gold mining in West Africa occurs in the Birimian (Paleoproterozoic) geological context, known to contain primary mineralization often associated with sulphides. The storage of heaps from these exploitation in the open air can constitute a source of pollution known as Acid Mine Drainage (AMD).

This present research project, which focuses on heaps of mining sites in the Yaoure region, has the following objectives to: 1- locate (or identify) the mining sites; 2- specify the metal vectors of acidification reactions; 3- determine the potential for acid generation and the neutralizing power of soils and heaps; 4- assess the acidification risks and levels of metal pollution in the aquatic environment of the area, particularly the Bandama River, the main provider of fishery products in the region. It should eventually lead to the use of scientific evidence to influence policy on mining management issues.

Geological surveys have identified dozens of more or less active gold mining sites, especially downstream of the Kossou Dam, which have been the subject of petrographic, metallogenic and geochemical studies for the determination of sulphides and other heavy metals. Nineteen (19) samples of rocks and soils were collected. The preliminary macroscopic and microscopic studies were supplemented by multi-element analysis using a portable XRF spectrometer to determine the contents of heavy metals (Fe, Hg, Pb, Cr, etc.), sulfur and arsenic. The results obtained showed the presence in non-negligible contents of certain elements such as iron (38886.2 ~ 229000 ppm), arsenic (4.47 ~ 28.93 ppm), sulfur (334.6 ~ 3853.3 ppm), and, of course, gold. Only seven (07) of the samples contain a significant amount of sulfur and were selected for the rest of the study. These samples by correlations of certain metals with sulfur indicate that the iron sulphides could be pyrite, arsenopyrite and chalcopyrite, mainly in the andesites, dolerites, granodiorites and basalts.

To be certain and to know more about their possible implications in a possible acid mine drainage, the samples are currently subjected to analyses, especially for the determination of their acidogenic potentials. The expected results will, if they are conclusive, evaluate the level of risks of acidification and metallic pollution of aquatic environments, in particular by periodic analysis of surface and groundwater (pH, conductivity, turbidity, mineralization, heavy metals, etc.) and, above all, the determination of enrichment factors and heavy metal geo-accumulation indices of Taabo Lake, downstream from the mining sites concerned by the study.

**Keywords:** Heaps, acidogenic potentials, neutralizing power, acid generation potential, enrichment factors, geo-accumulation indices, Yaouré, Côte d'Ivoire, West Africa