

Impact of artisanal gold mining on land degradation and soil contamination in West Africa: contribution of Remote sensing and Geochemistry in Koma Bangou, Niger

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Artisanal mining accounts for 15-20% of global mining production. It directly involves about 13 million people, and affects the livelihoods of a further 80-100 million [1]. The most common artisanal mining activity is artisanal gold mining (gold panning) which accounts for 10-15% of the global gold production [1]. In West Africa, gold panning is a seasonal back-up activity. It is a source of income and livelihood for thousands of farmers. In Niger, gold panning employs over 450,000 people and more than 2,700,000 persons depend on it [2]. About 2-5 tons are produced each year in the southwestern part (Liptako), and around 10 tons in the northern part (Aïr-Djado) [3]. This activity uses environmentally unfriendly methods and processes to recover gold. Sinking shafts and galleries causes land degradation by waste generation. The abusive and uncontrolled use of chemicals (sulfuric acid, nitric acid, cyanide, mercury, zinc) in ore processing can lead to metallic pollution and acidification of soil and water. In this presentation, we will review the environmental consequences and health risks for the artisanal gold miners and population living in mining areas in West Africa. We will then illustrate this general framework with the case of Koma Bangou site (South West Niger), which presents a long history of artisanal exploitation and unsteady development affected by the drought of 1983-1984 and local regulations. About four decades of development of this site have been documented from the analysis of Landsat multispectral images acquired between 1984 and 2020. Regarding the current metallic contamination, we have developed an approach based on the use of a hand-held XRF, combined with ICP-MS and isotopic studies

to assess the current levels of contamination in soils and tailings, and their sources (geogenic or anthropogenic).

[1] T. Hentschel, F. Hruschka, et M. Priester « Artisanal and small-scale mining », *IIED*, 2002.

[2] G. Hilson « Artisanal and small-scale mining and agriculture: Exploring their links in rural sub-Saharan Africa », *IIED*, 2016, <https://www.jstor.org/stable/resrep02665>.

[3] E. Grégoire et L. Gagnol « Ruées vers l'or au Sahara : l'orpaillage dans le désert du Ténéré et le massif de l'Aïr (Niger) », *Echogeo*, 2017.