

Characterizing Subsurface Heterogeneity on Gold Post-Mining Sites¹

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Abstract: Gold mining in southwestern Nigeria is dominated by artisanal and small-scale mining (ASM). Despite the ASM-induced landscape impacts and heavy contaminations, farming kept ongoing. To ascertain the sites' agricultural land-use potentials and safety, characterizing the landscape heterogeneity of the sites remains a fundamental requirement and is timely important. However, this is poorly considered in several post-mining land-use studies. Here, we explore the efficiency of Electrical Resistivity Tomography (ERT) for characterizing the horizontal and vertical variations in the subsurface properties of two gold mining sites. The resistivity structure of the sites shows that ASM has greatly impaired their lithological properties. We identified a dug pit backfilled with muds, buried foreign substance and an unnoticeable inappropriate pit left uncovered. The results correspond with the soil textural analysis of the site. In case that allowing the sites for self-recovery is not feasible, we recommend organic manuring, deep-ploughing and top-soiling (if possible) along with other necessary post-mining studies before agricultural use. Also, we advocate further use of other geophysical techniques on post-mining sites for studies such as identification of foreign substances, cavity, pits, hazardous materials, and determination of contaminants prior to its post land-use decisions.

Additional Key Words: Artisanal small-scale mining (ASM), Post-mining land-use, 2D Electrical Resistivity Tomography (ERT), Soil lithology.

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