

BRIDGING THE REMEDIATION GAP: A COMPARATIVE ANALYSIS AND STRATEGIC ROADMAP FOR MINERAL WASTE VALORIZATION IN NIGERIA THROUGH PHYTOREMEDIATION

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Abstract

In Nigeria, the escalation of both industrial and artisanal mining has led to pronounced land degradation and the accumulation of heavy metals in soils and surrounding ecosystems. Contamination hotspots have been repeatedly reported on the Jos Plateau and in the Zamfara region, where mining and ore processing activities have continuously led to environmental degradation, posing serious public-health and livelihood risks to nearby communities. This paper conducts a systematic meta-analysis of extant soil contamination datasets, appraising phytoremediation as a sustainable approach for mineral-waste valorization. Findings synthesized from existing literature indicate that indigenous hyper-accumulators can achieve significant toxicity reduction while providing pathways for a circular economy through bio-ore recovery. The analysis draws comparisons between Nigerian mining realities and intervention frameworks documented in South Africa. Building on these cross-country insights, the study proposes a strategic roadmap to integrate biological remediation within national policy, supporting both environmental recovery and resource valorization.

Keywords: Mining, valorization, phytoremediation, mineral-waste, contamination.

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