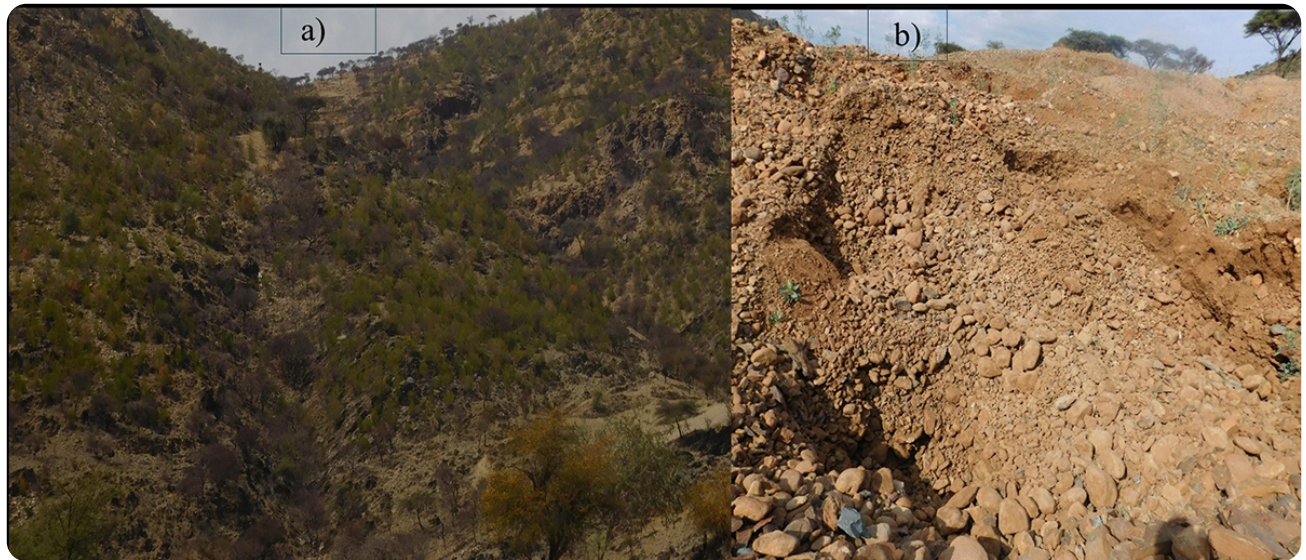




Traditional gold mining reduces soil function in the drylands of Ethiopia

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Field photos showing unmined (a) and mined (b) landscapes in Tigray, Ethiopia, highlighting clear differences in vegetation cover and soil condition following traditional gold mining. Photos courtesy of Meaza Zenebe, Mekelle University.

Traditional gold mining is expanding rapidly across dryland regions of sub-Saharan Africa, often in areas already vulnerable to land degradation. However, its impacts on

soil health, critical for food security, climate resilience, and restoration are rarely quantified in ways that inform policy. A study published in *Soil Science Society of America Journal* applied a function-based soil quality index (SQI) to northern Ethiopia's Tigray Region to evaluate how artisanal mining affects soil ecosystem functioning across land uses, slopes, and soil depths.

Traditional mining significantly reduced soil organic carbon, degraded soil structure, compromised nutrient cycling and buffering capacity, and weakened the soil's capacity to support vegetation and ecosystem services. These impacts were most severe in topsoil layers and on steeper slopes. Importantly, function-based SQIs proved more sensitive than conventional methods, offering a practical tool for monitoring degradation and prioritizing intervention areas.

The findings underscore the need to integrate soil quality indicators into mining governance and land restoration policies. The researchers recommend targeted rehabilitation strategies that restore organic matter, stabilize soils, and support post-mining land recovery. Strengthening regulation of artisanal mining, alongside community-based restoration efforts, will be essential to safeguard soil resources and sustain livelihoods in fragile dryland systems.

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Zenebe, M., Araya, T., Haile, M., Tadesse, T., Teka, K., & Birhane, E. (2026). Soil ecosystem function loss under traditional gold mining landscapes in Tigray, Ethiopia: A function-based soil quality indices approach. *Soil Science Society of America Journal*, 90, e70215. <https://doi.org/10.1002/saj2.70215>

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