Agroecological effects of terrestrial sand mining in Accra metropolitan area, Ghana

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Introduction & Methods

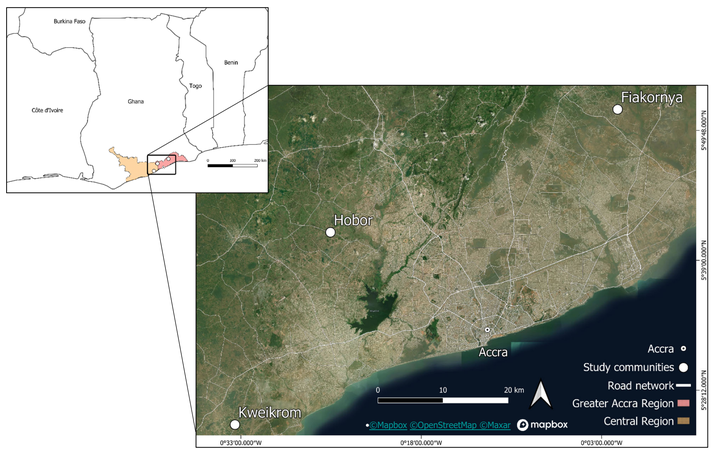

Figure 1. Locations of study areas in southern Ghana.

The infrastructure needs of Accra, the economic, political and cultural capital of Ghana, have prompted extensive sand extraction in the surrounding rural and peri-urban areas. To assess mining effects on soil productivity we conducted quantitative interviews with farmers and soil analyses of mined, near mined, and unmined fields in three mining communities (Figs. 1 & 2).

Figure 2. Farmland in southern Ghana with exemplary soil sampling areas of mined (left), near mined (center) and unmined (right) fields

Results & Discussion

Impact of sand mining on farmers

- 63 % of the interviewed farmers have experienced sand mining on their fields (121 mined fields, 95.7 ha)
- Destruction of food crops: 53 t maize, 48 t cassava, 12 t pepper, 10 t groundnut and 106 t pineapples of the farmers → Increase in food prices
- The majority of the farmers (90%) were not informed beforehand but received no compensation
- Land was not reclaimed (92.2% of the fields) and farming could not be restarted on mined fields (97%) → sold as residential sites

Figure 3. Destruction of food crops (pineapple, maize) by sand mining in the Greater Accra Metropolitan Area, Ghana (June to August 2021).

Impact of sand mining on soil chemical and physical parameters

Mined fields showed a significant:

- Reduction in K, Mg, P, N, C, pH, contents of clay and silt
- Increase in Na, soil moisture, soil compaction (bulk density & penetration resistance), and sand content

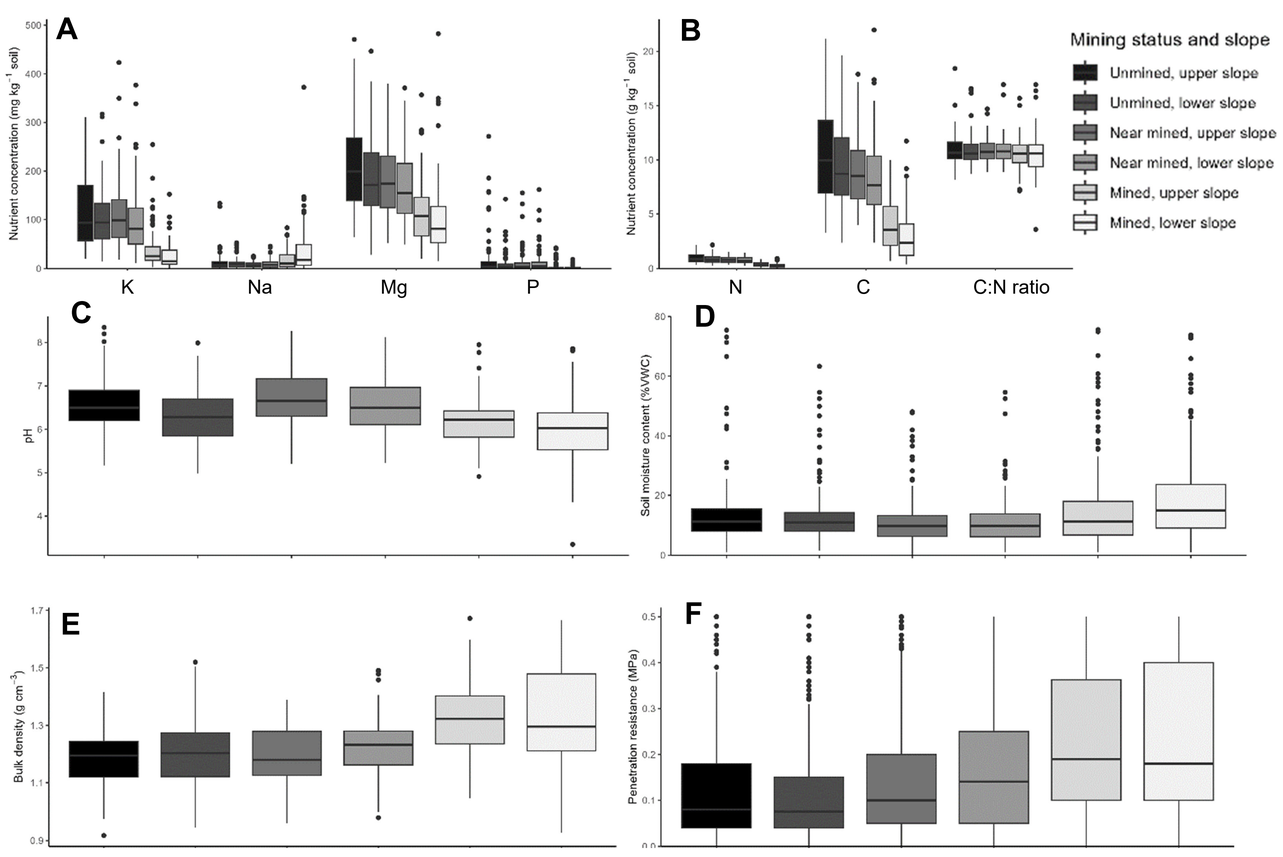

Figure 4. Soil chemical and physical properties by mining status and slope (A: Plant available nutrients, B: Total N, C contents & C:N ratio, C: pH, D: Soil moisture, E: Bulk density, F: Penetration resistance)

Impact of sand mining on livelihoods

- Loss of trees (→ warmer microclimate, loss of firewood, reduced availability of natural medicinal herbs, destruction of wildlife habitat, lack of cattle grazing grounds Fig. 5 A, B)
- Increase in waterlogged areas (Fig. 5 C), disruption of river flows, reduction in river water quality
- Health (dust, mosquito breeding spots, lack of clean drinking water, psychological issues)
- Deteriorated roads (Fig. 5 D)

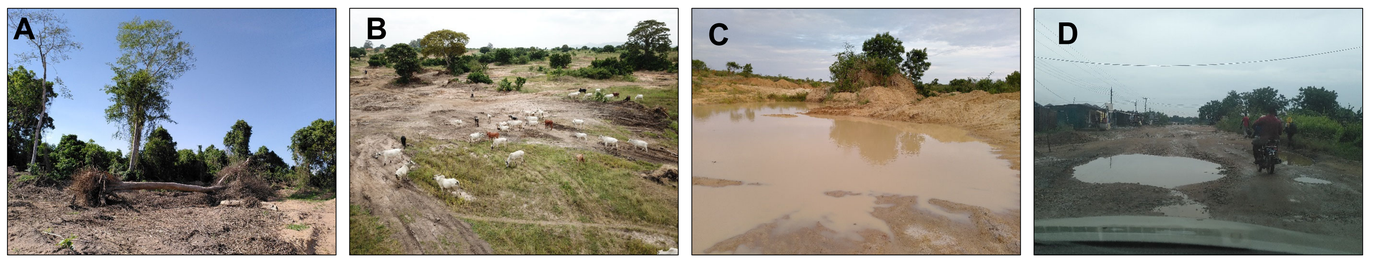

Figure 5. Effects of sand mining on livelihood aspects in the Greater Accra Metropolitan Area, Ghana (August 2021)

Conclusions & Recommendations

- Effective collaboration between the regulatory agencies and law enforcement, land reclamation after mining, zoning of peri-urban and rural areas, compensation payments to farmers, and support in adapting alternative livelihood strategies are necessary to mitigate mining effects on society and ecosystem services.
- In the long run, increase of sand use efficiency, reduction of consumption, and use of alternative building materials are suitable mitigation approaches.

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