Assessment of Heavy Metal Contamination and Distribution in Surface Soils and Plants along the West Coast of Ghana

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Abstract

Onshore oil drilling activity is ongoing at Jubilee oil fields, Ghana. This activity could lead to heavy metal exposure with consequential adverse effects on public health in nearby coastal communities. Therefore, we assessed heavy metal levels and spatial distribution in soils and plants from the west coast of Ghana to obtain baseline values for monitoring heavy metal exposure. Surface soils were collected from six coastal communities, and analyzed for arsenic, cadmium, copper, mercury, lead, selenium and zinc using atomic absorption spectrophotometer. Mean heavy metal concentrations in soil samples were 2.06, 6.55, 0.016, 21.59, 0.18 and 39.49mg/kg for arsenic, copper, mercury, lead, selenium and zinc, respectively. Mean heavy metal concentrations in plants were 2.70, 17.47, 3.17, 91.74, 1.51 and 9.88mg/kg for arsenic, cadmium, copper, lead, selenium and zinc, respectively. Concentrations of arsenic, cadmium and lead in plants exceeded WHO/FAO permissible limits. Enrichment factor for arsenic was significant and extremely high for selenium, while geoaccumulation index showed moderate pollution for selenium. Soil contamination factors for arsenic, lead, and selenium indicated considerable contamination. In view of these findings remediation methods must be adopted to safeguard the communities. The data will be useful for future monitoring of heavy metal exposure in the communities and to assess the impact of the ongoing crude oil drilling activity on the environment.