

Groundwater Contamination with Toxic Metals through Small Scale Mining Within the Lower Pra Basin.

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ABSTRACT

Small-scale gold mining in Ghana is mainly an informal industry employing thousands of people. The generally undeveloped nature of the industry has resulted in lack of proper monitoring and supervision by relevant authorities. As a result, there is wanton destruction of farm lands and indiscriminate pollution of water bodies. These water bodies serve us recharge zones for groundwater, thereby polluting them. This study assessed the effects of small-scale gold mining on quality of groundwater in the Lower Pra Basin in terms of heavy metal and other physico-chemical pollution. The analysis shows that pH values are generally low in the Basin. More than 95% of dry season and almost all the wet season values are acidic or slightly acidic. Approximately 35% of boreholes in the wet season recorded values for Cadmium above W.H.O guideline value of 3.0µg/l. Only two boreholes recorded values above W.H.O guideline value for the dry season. The higher wet season pollution suggests anthropogenic origin for Cd. Generally, high values were recorded for Iron, Manganese, Lead, Aluminium and Hg. Approximately 15% and 18% of dry and wet season values respectively for Fe were above W.H.O recommended limit of 300µg/l for drinking water with a mean of 218µg/l and a median of 166 µg/l. Manganese concentration was in the range 2.5 - 1544 µg/l with a mean of 142 µg/l. Roughly 5% and 11% of the dry and wet season values respectively, were above the W.H.O recommended value of 500µg/l. The concentration of Lead was higher than 10µg/l (W.H.O guideline value) in 43% and 41 % of the dry and wet season values respectively with a mean of 15.8µg/l and 20.1µg/l for dry

and wet seasons respectively. About, 88% and 42% of the dry and wet season values, respectively, were above the W.H.O limit of 1.0µg/l for mercury. Dry season values ranged between 0.005 and 10.1µg/l with the wet season recording values between 0.005 to 16.4µg/l. Approximately 17% and 11% of dry and wet seasons respectively recorded values above the W.H.O recommended limit of 200µg/l for Aluminium. Other heavy metals present but were generally below W.H.O guideline values or were in insignificant concentrations include Copper, Arsenic, Selenium and Zinc. Values recorded for Phosphate, Sulphate and Nitrate are within acceptable limits. In general, Lead, Copper, Cadmium, and Manganese showed higher wet season values than dry season suggesting anthropogenic influence.

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