An Assessment of Heavy Metals Content of Water, Soil and Plants in Some Selected Coastal Communities Near the Jubilee Oil Field in the Western Region of Ghana.

Ofori, Amoako

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ABSTRACT

This study investigated the concentration of seven heavy metals (As, Cd, Cu, Pb, Se and Zn) in water, soil and plant leaves in some selected coastal communities in the Western Region of Ghana near the jubilee oil field using acid digestion and Atomic Absorption Spectrophotometer methods. Some physicochemical properties of water and soils were also determined to evaluate the quality of drinking water and soils. The ranges of metal concentration in water analysed in the wet season were; As (1.23-7.84 µg/L), Cu (4.10-24.09µg/L), Pb (4.08-57.98 µg/L), Se (BDL-0.38 µg/L), Zn (2.86- 17.75 µg/L) and Hg (0.023-0.068 µg/L) whereas the ranges of metal concentration recorded in the dry season were; As (2.30-5.78 µg/L), Pb (25.47-70.73 11 µg/L), Se (0.081-0.158 µg/L), Zn (0.79-22.80 µg/L), and Hg (0.004-0.047 µg/L). The results of the analysis carried out showed that the levels of heavy metals were generally higher in the surface soils (0-15 cm) than the subsoil (15-30 cm), The mean concentrations of metals in the surface soil (0-15 crn) were; As (2.06 mg/kg), Cu (6.55 mg/kg), Pb (21.59 mg/kg), Zn (39.49 mg/kg), Se (0.178 mg/kg) and Hg (0.069 mg/kg) whereas the subsoil (15-30 crn) recorded mean concentration of As (1.91 mg/kg), Cu (6.29 mg/kg), Pb (21.54 mg/kg), Zn (38.90 mg/kg), Se (0.169 mg/kg) and Hg (0.003 mg/kg). Similarly, the ranges of metal concentration in plant leaves were; As (1.65-6.31 mg/kg), Cd (16.04-19.06 mg/kg), Cu (0.69-4.03 mg/kg), Pb (85.56-100.91 mg/kg), Se (1.42-1.57 mg/kg), and Zn (9.08-10.89 mg/kg). The results of physicochemical analysis of water samples recorded in the wet season were; pH (6.83 to 7.52), EC (291.15-780.64 µS/cm), TDS (195.07-523.02 mg/L), DO (2.98-4.39 mg/L), BOD (3.33 to 6.84 mg/L), salinity (0.01 to 0.30 ppt), and temperature (27.06-30.94 "C) whereas the dry season were; pH (6.84-6.95), EC (516.83 to 660.67 µS/cm), TDS (307.07-442.65 mg/L), DO (1.71-3.04 mg/L), BOD (4.25-13.38 mg/L), salinity (0.22-0.28 ppt), and temperature (28.46- 30.44°C). The physicochemical analysis of soil samples in the surface soils (0-15crn) were; pH (6.33-7.66) and EC (137.70-559.20 u Szcm) whereas results obtained in the subsoil (15-30 cm) were; pH (6.17-7.64) and EC (99.50-592.00 u Szcm). The results showed that the concentration of heavy metals in water were below the WHO standard except Pb which exceeded the permissible limit. The concentrations of heavy metals in soil samples were also below the WHOIF AO standards. The concentration of As, Cd and Pb in plant leaves exceeded the WHOIF AO standard except Cu, Se and Zn which were below the limits. The physiochemical analysis of water samples were within the WHO standards except metals ranged BOD. The enrichment factor of from deficient to minimal enrichment except As and Se which ranged from significant and extremely high enrichment respectively. The geoaccumulation indices of all metals examined

were practically unpolluted except Se and Pb which recorded moderate pollution. The values for contamination factor of heavy metals recorded low contamination except As, Se and Pb which recorded considerable to moderate contamination.

SUPERVISORS

Prof. Gordon, Christopher.

Dr. Fosu-Mensah, Benedicta Y.