

Analysis of Spatial and Temporal Levels of Heavy Metals in Water, Sediments and Fish in Sosiani River

Authors: Shieunda, Ogara Rose, Neyole, Edward, Omuterema, Stanley, Orata, Francis

Abstract

The objective of the study was to examine spatial and temporal levels of heavy metals in water, sediments and fish in Sosiani River. This study was an experimental design approach in which a scientific analysis was done involving sample collection, preparation and laboratory work to determine Pb, Cd and Cr concentrations in fish water and sediments. The main Sosiani river flows from the Keiyo escarpment at the far South East through Uasin Gishu plateau to Turbo which is in the North West. The units of analysis used in the study included two species of fish, water and sediment; whereby water and sediment were sampled from eleven sampling locations (SR0 – SR10) and fish from ten sampling points (SR1 – SR10) along river Sosiani catchment. Sample analysis was done using Atomic Absorption Spectrometry. Data analysis was done using the statistical program for social sciences (SPSS) version 23. Inferential (ANOVA), regression and descriptive statistics were used to analyse data. Spatial and temporal levels of heavy metals in water, sediments and fish were the outcomes. In the upper Sosiani, SR3 (Chepkorio) registered the highest lead levels in the wet season of 0.127 mg/l. In both dry and wet seasons, and in all the sites, lead values in water were above the NEMA and WHO thresholds of 0.01 mg/l. In the analysis of cadmium concentrations, it was observed that in wet season water had all 50% of the sites above the NEMA and WHO thresholds while all the sites were had values below the limits during the dry season. Cr in water was high for 90% of the sites. Sediment had the highest lead values of 1.744mg/l. Barbus (*Barbusbarbus*) fish had high lead, cadmium and Cr values in both wet and dry seasons. In both seasons, catfish (*Clariusgariapinus*) had low values of lead and cadmium below the NEMA

and WHO limits for most of the sites but high levels of Chromium. Spatial and temporal variations in heavy metal concentration were observed between the water, sediment and the two species of fish within the catchment. This study recommended mandatory measures (enforcement) to control the increased heavy metal concentration downstream the basin.