

# Distribution and Accumulation of Heavy Metals in Sediments from the mid-Black Sea coast of Turkey.

Arıman Sema<sup>1</sup>, Bakan Gülfem<sup>2</sup>

<sup>1</sup> Samsun Province Private Administration, Department of Research and Development, Samsun, Turkey

E-mail: [semaariman@gmail.com](mailto:semaariman@gmail.com)

<sup>2</sup>Ondokuz Mayıs University, Faculty of Engineering, Department of Environment Engineering, Samsun, Turkey

E-mail: [gbakan@omu.edu.tr](mailto:gbakan@omu.edu.tr)

Phone: +00-(90)-362 -3121919-1214

**Introduction:** Heavy metal contamination has become a worldwide problem through problem through disturbing the normal functions of rivers and lakes. Sediment, as the largest storage and resources of heavy metal, plays a rather important role in important role in metal transformations (1). Thus, geochemical characteristics of the sediments can be used to infer the weathering trends and the sources of pollution (2). The Black Sea environment has suffered a catastrophic degradation from the waterborne waste from 17 countries. The objectives of this study were determined average concentrations of ten heavy metals (Cu, Pb, Cd, Fe, Al, Cr, Cu, Zn, Mn, Sr) in sediments of the mid-Black Sea coast of Turkey (3). The aims of present study are therefore to; (1) review the various methods for establishing the calculation of the extent (or ratio) of metal enrichment; (2) assess the accumulation and environmental impacts of metal contaminants in sediments of the mid-Black Sea coast of Turkey.

**Methods:** Sediment samples were collected seasonally from the Ye ılırmak, Kızılırmak, Mert, Abdal Rivers and Kurupelit sea regions in 2007-2008. Figure 1 shows the sampling stations which were located along the mid-Black Sea coast of TURKEY. The digestion of total sediment (fraction <math><63 \mu\text{m}</math>) were performed in teflon vessel with a mixture of  $\text{HClO}_4\text{-HF}$ . Heavy metals concentrations of the solutions were measured by ICP-OES.

For the analytical quality control, reagent blanks, standard reference materials (BCR-701), and sample replicates were randomly inserted in the analysis.

**Results:** In this study, physicochemical and mineralogical analysis of the samples, collected from Ye ılırmak, Kızılırmak, Mert, Abdal Rivers and Kurupelit sea regions, were carried out to determine the extent the total metal contamination in sediment layer. Seasonal results showed that TOC (2340-2812 mg/kg) concentrations was low in Ye ılırmak River. and Kurupelit sea region while TOC (19823 mg/kg) concentrations was high in Mert Stream. Seasonal of heavy metal contamination in the samples were also conducted to determine the extent of pollution at the Ye ılırmak, Kızılırmak, Mert, Abdal Rivers and Kurupelit sea regions. Findings obtained from 5 stations which were contaminated with heavy metals were compared with the baseline earth crust rock and

enrichment factors in Abdal region. The extent of heavy metal contamination was as follow; Ye ılırmak river> Kızılırmak river> Kurupelit shores> Abdal river> Mert stream.



**Fig. 1:**Map of the study area with location of sampling station

Sediment quality monitoring and assessment studies carried out using results obtained from heavy metal analysis by calculation of Sediment Quality Criteria Values (SQC) and Sediment Enrichment Factors (SEF and  $I_{\text{geo}}$ ). Depending on the sediment enrichment factor used for sediments of sea and rivers in mid-Black Sea coast; Kurupelit>Mert>Ye ılırmak>Abdal> Kızılırmak sediments were found quite polluted (SEF 20-40). Compared to other sampling stations, Kurupelit sea sediment, especially, was found heavily polluted by Cr, Cd, Ni and Zn metals according to SEF factor.

According to the geoaccumulation index, sampling points can be classified as heavily polluted (3-4  $I_{\text{geo}}$ ) for Cd, heavily-moderately polluted (1-3  $I_{\text{geo}}$ ) for Ni, Zn and Cr, and moderately polluted (1-2  $I_{\text{geo}}$ ) for Cu.

**Discussion:** The potential hazards of metal contaminants to humans and ecological systems are well-recognized. These results show that Ye ılırmak, Abdal, Mert, Kızılırmak ve Kurupelit sea regions can be accepted as environmentally risky areas because of the higher average total metal concentrations and enrichment factors obtained from these regions.

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