

Assessment of heavy metals in sediments and water accumulated by effects shipwrecks in Shatt Al-Arab River, southern Iraq

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Abstract.

In this study, the total concentration of seven heavy metals (Cd, Cu, Fe, Pb, Mn, Ni, and Zn) in sediment and water was taken to determine how much the environment is impacted by rising levels of heavy metals that are not naturally occurring in five stations representing the large shipwrecks in Shatt Al-Arab River in Basra South Iraq by using atomic absorption. The heavy metals concentration in the five sediment stations is ordered as follows: Fe>Mn>Ni>Zn>Cu>Cd>Pb. While, the heavy metals concentration in the five water stations is ordered as follows: Fe>Ni>Mn>Cu>Pb>Zn>Cd. The current results of the study indicate that the concentrations of Cd, Fe, and Pb (slightly contaminated) metals in water are higher than the Iraqi standards (Iraqi standards for drinking water) and international standards (WHO, U.S. EPA, E.U.). An increase in heavy metal concentrations is attributed to the raw materials from which sunken ships are made near stations and these ships being exposed to military bombardment. The level of pollution in the sediment was assessed by employing the Geo accumulation index (I-geo), Contamination factor (CF), and Enrichment factor (EF). The calculated results of I-geo indicate that Cd can be considered to be moderate – strongly polluted except S5 considered strong to extremely polluted. However, Cu, Fe, Pb, Mn, Ni, and Zn showed almost unpolluted levels across all stations. The CF values indicate that this environment is very highly contaminated with Cd, while CF values for Cu, Fe, Pb, and Mn display low contamination. while CF values for Ni are moderate contamination except for S1 is low contamination. The pollution level for Zn is S1 and S5 is low contamination and S2,3,4 is moderate contamination. The EF values refer to Cd at S5 indicating extremely severe enrichment and other stations refer to severe enrichment and minor enrichment for Fe, Mn, Ni, and Zn. Copper (Cu) has minor enrichment at S2 but no enrichment at the other stations. Conversely, Lead (Pb) shows no enrichment at any of the stations.

Keywords: Shatt AL-Arab, Heavy metals, I- geo, CF, EF

1. Introduction

Shatt Al-Arab River originates in Al-Qurna, where the Tigris and Euphrates Rivers converge. It then flows southeastward and empties into the Arabian Gulf south of Faw. Throughout its history, the Shatt Al-Arab River has played a crucial role in the economic, social, and political