Pollution Status and Human Health Risk Assessment of Exchangeable Selenium in Sediment Cores Along Shatt Al-Basrah, North West Arabian Gulf

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Abstract. This study investigates the distribution, pollution status, and potential human health risks associated with exchangeable selenium (Se) in sediment cores collected from five stations along the Shatt Al-Basrah Channel, northwest Arabian Gulf. Sediment cores were sectioned into six depth intervals (0–30 cm) and analyzed for exchangeable Se using sequential extraction. Pollution indices—Contamination Factor (CF), Enrichment Factor (EF), and Geoaccumulation Index (Igeo)—were applied to assess contamination levels relative to background values. Results revealed significant spatial and vertical variability, with the highest Se concentrations found in surface sediments (0–5 cm), particularly at stations near industrial zones (up to 15.36 ppb), indicating strong anthropogenic influence from industrial, urban, and agricultural sources. Contamination decreased with depth, approaching background levels in deeper layers. Comparison with global studies confirms that Se levels in Shatt Al-Basrah are comparable to those in other industrialized aquatic systems. The elevated bioavailability of Se in surface sediments poses a potential risk of bioaccumulation in the aquatic food web, highlighting the need for continued monitoring and public

Keywords. Selenium, Sediment core, Exchangeable fraction, Shatt Al-Basrah, Contamination indices, Anthropogenic pollution, Human health risk.

1. Introduction

Selenium (Se) is an essential micronutrient that can be toxic at elevated concentrations [1]. Its mobility and bioavailability in sediments depend on its chemical fractions, with the exchangeable fraction being particularly significant for environmental and human health risks [2]. The Shatt Al-Basrah Channel, a critical waterway in southern Iraq, is susceptible to contamination from agricultural runoff, industrial