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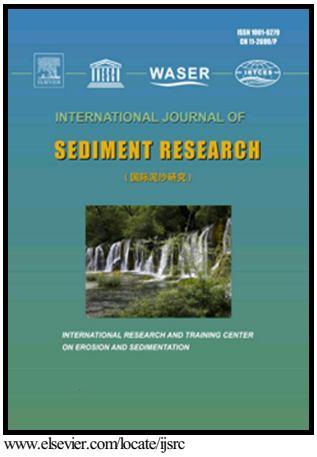

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Investigation of trace metals distribution in water, sediments and wetland plants of Kızılırmak Delta, Turkey

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Abstract

In this study, accumulation and distribution of Pb, Cu, Zn, Co, Ni, Mn and Fe in water, bottom sediments and four plant species (*Myriophyllum verticillatum, Hydrocharis morsus-ranae, Nymphaea alba* and *Typha latifolia)* were investigated in Çernek Lake of Kızılırmak Delta. The Kızılırmak Delta is one of the largest natural wetlands of Turkey and it is protected by the Ramsar convention since 1993. Selected physico-chemical parameters such as pH, conductivity and dissolved oxygen and also trace metal concentrations were monitored in water. All the parameters obtained were found higher than that of the national standards for the protected lakes and reserves. The accumulated amounts of various trace metals in bottom sediments and wetland plants were found in the following order of Fe>Mn>Zn>Ni>Co>Cu>Pb and Fe>Mn>Zn>Ni>Co respectively. The historical trace metal intake of *Myriophyllum verticillatum, Hydrocharis morsus-ranae, Typha latifolia* and *Nymphaea alba* were obtained higher than that of the toxic metal levels and these plants may be accepted as accumulators for the detected trace metals and also bio-indicators in the historically polluted natural areas.

Keywords: Trace metals, Wetland plants, BCF, Pollution, Phytoremediation, Kızılırmak Delta.

1. Introduction

Heavy metals are in the group of inorganic pollutants that attracted public and scientific attention for their persistence in the environment, toxicity to living beings and bioaccumulation (Shahbaz *et al*., 2013). Because of their toxic and undesirable effects most of the heavy metals can cause severe health and environmental problems even at very low concentrations (Kara, 2005; Arora *et al*., 2008; Memon & Schroder, 2009). There are many ways for metals to take place in the environment. For example; atmospheric deposition, erosion of the geological matrix or from anthropogenic sources such as sewage outfalls and industrial and agricultural runoff (Edwards *et al*., 2001; Alam *et al*., 2002) Bottom sediments, water bodies, plants and other organisms in polluted wetlands contain heavy metals and their concentrations rise from year to year (Govindasamy *et al*., 2011). Pollution of the aquatic environment, especially lakes, with metals is a major factor posing a serious threat to the survival of aquatic organisms. Lakes are complex and fragile ecosystems because they have a lower self-cleaning ability compared to rivers. Therefore, they can readily accumulate pollutants (Vemic *et al*., 2014). Ramsar convention has protected Kızılırmak Delta since 1993 and it is one of the most significant and