Biomagnification of selected toxic trace elements (Cr, As, Cd, Pb) in a mangrove ecosystem: insights from stable isotope analysis

ABSTRACT

The present study used a food chain model the giant mudskipper (Periophthalmodon schlosseri) to demonstrate the mobility of the trace elements (Cr, As, Cd and Pb) in a mangrove ecosystem. Samples of sediments, P. schlosseri and its food items were collected, digested and determine the trace elements concentration. The mean concentrations of the trace elements were relatively low. In sediments, the concentration As was found to exceed the Interim Sediment Quality Guideline-low (ISQG-low). The concentrations were correlated to nitrogen stable isotope ratios (δ 15 N) to investigate mobility patterns. Data on δ 15 N demonstrated clear separation of trophic levels in the food chain. Integration of P. schlosseri and its stomach contents data showed a strong relationship with r=0.89 for Cr, r=0.75 for As, r=0.93 for Cd and r=0.95 for Pb. These elements are in biomagnification pattern along the food chain of P. schlosseri. In this study, the stable isotope ratio is used to investigate the mobility of trace elements and other pollutants along the food chain in mangrove ecosystems. Capsule Abstract Stable isotope marker should be consolidated with measurements of toxic trace elements concentrations in order to determine the exact transfer route along the food chain.

Keyword: Toxic; Trace elements; Stable isotope; Biomagnification; Food chain; Trophic level; Mangrove ecosystem