

Total iron concentrations in waters and fish tissues in the Nam Theun 2 Reservoir area (Lao PDR)

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Abstract Data on total iron concentrations in waters and freshwater fish tissues in man-made reservoirs are scarce, especially in Southeast Asia. Changes in total iron concentrations in water and in fish tissues were studied after the impoundment of the Nam Theun 2 Reservoir (central Lao PDR). Water quality parameters were monitored at 11 stations (reservoir, upstream area and downstream areas) from 2008 to 2010. In 2009 and 2010, total iron concentrations were measured in three different fish tissues (viscera, gills and flesh) from 14 species belonging to the omnivorous and carnivorous feeding groups. The results indicated that iron concentrations in the water were influenced by the reservoir impoundment during the first year after the creation of the reservoir. Intra-annual variations of the total iron concentration in these waters appeared to be driven by the soil leaching processes mainly during the wet season. In fish, total iron accumulated preferentially in viscera, followed by gills and flesh. Iron concentration was highly species dependant and related to the ecology

of the species whereas feeding habits (omnivorous or carnivorous) did not influence total iron concentration in fish tissues. Finally, reservoir impoundment did not affect iron concentrations in fish from the reservoir and from both downstream areas.

Keywords Freshwater fish · Fish tissues · Feeding habit · Seasonal effect · Reservoir impoundment

Introduction

Numerous literature references have been produced about heavy metals contamination in freshwater ecosystems (Jeziarska and Witeska 2006; Staniskiene et al. 2006; Atici et al. 2008; Vinodhini and Narayanan 2008; Ma et al. 2013) mainly because of sanitary consequences, but data are very scarce in the sub-tropical region of Southeast Asia. Heavy metals are generally non-biodegradable and are therefore able to bioaccumulate and biomagnificate through the food chain, with toxic effects above a biological tolerance level (Wepener et al. 2001; Dural et al. 2007; Arnaudova et al. 2008; Amin et al. 2011; Ambedkar and Muniyan 2012). Iron is a metallic element that makes up approximately 5.6 % of the Earth's crust by weight and ranges from 0.5 to 50 mg.L⁻¹ in natural waters (WHO 2008). Iron has a natural origin (e.g. geology) but can also be introduced into ecosystems through anthropogenic activities (e.g. industry, agriculture, domestic activities; Oronsaye et al. 2010; Kalyoncu et al. 2012). According to its various oxidation states, iron is distributed in three main different

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