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Bioaccumulation of metals in sediments, fish and plant from Tisza river (Serbia)

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In the aquatic environments metals originate from various natural and anthropogenic sources. The purpose of the study was to assess the bioaccumulation level of metals in sediments fish and common reed at four different localities of the Tisza River stretch in Serbia.
For purpose of this study concentrations of Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, Sr and Zn were determined in sediment, common reed (Phragmites australis (Cav.) Trin. ex Steud. 1841) and four ecologically different fish species (piscivorous northern pike (Esox lucius L.), benthivorous sterlet (Acipenser ruthenus L.) silver bream (Brama brama L.), omnivorous common carp (Cyprinus carpio L.)). Analysis of metals was carried out for liver, gills, brain, testicles and ovaries in fish and in the rhizome, stem and leaves of the common reed and sediment fraction <0,0063mm.
The concentrations of metals have been assessed using the Inductively Coupled Plasma – optical emission spectrometry. Obtained results revealed that Al and Fe had the highest concentrations in sediment, fish and common reed samples. The research proved a strong positive correlation between the concentrations of all metals in the sediment, fish and common reed. The highest concentration of heavy metals was recorded in omnivorous common carp Cyprinus carpio, and organs that the most intensively accumulated the greatest number of them were liver and gills. Accumulated metals in the common reed were not distributed evenly, but there are target organs for bioaccumulation. Concentrations in below-ground organs were usually higher than above-ground organs, and the general decreasing trend of element content was rhizome>leaves>stems.
Obtained results indicate that the location does not have impact to the level of bioaccumulation. On the basis of this research the under-ground organ (rhizome) of common reed, liver and gills and omnivorous fish species could be recommended as environmental indicators for the presence of metals during environmental monitoring.