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Distribution of ecotoxic metals in sediments of a tufa-precipitating karstic stream (Krka, Croatia)

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Krka is a specific karstic river, most of its freshwater part being within the National Park "Krka", proclaimed as such in 1985. However, various industrial and agricultural activities in the region were developed earlier. Later on its declaration intensive warfare activities (1990 - 1995) affected the Krka River catchment. Nowadays, the river is divided by several tufa barriers; upstream, many lakes were formed due to continuous sedimentation as an ideal medium for historical review of the anthropogenic influence.

Metals introduced by human activities into the river environment accumulate within sediments and are, therefore, useful indicators of anthropogenic inputs. A fundamental characteristic of ecotoxic metals is their lack of biodegradability. Once introduced into the aquatic environment, trace metals are redistributed throughout the water column, deposited or accumulated in sediments and consumed by biota.

The aim of this study is to investigate spatial distributions of ecotoxic metals and reconstruct the history of metal inputs in the Krka River. Sediment samples were collected by scuba diving using hand-made and hand-driven Plexiglas corers. Sediment cores were sectioned into 2 cm segments.

In this abstract we present the results of the ecotoxic metal determinations in the surface sediment in various lakes formed in the upper part of the river flow and one sediment core taken in the central part of the biggest lake (Lake Brljan). Chemical analyses were performed using cold-vapor AA for mercury (Hg) determination and ICP, ICP/MS for other metals.

Concentration ranges (mg/kg) for selected ecotoxic metals in surface sediments from River Krka were: Hg 0.017 - 0.828, Cd 0.18 - 0.68, Pb 4.37 - 25.7, Cu 2.07 - 19.0, Zn 36.5 -134, Ni 7.20 – 26.8, Co 1.4 - 9.1, Cr 1.3 – 24.3, As 0.1 – 7.0, Ag 0.018 – 0.284 and Mn 102 – 422, while ranges (mg/kg) in vertical distributions were: Hg 0.064 – 0.138, Cd 0.46 – 0.68, Pb 18.2 – 30.4, Cu 12.6 – 21.4, Zn 77.4 – 166, Ni 19.0 – 28.9, Co 6.2 – 10, Cr 17.5 – 28.4, As 1.3 – 6.75, Ag 0.109 – 0.205 and Mn 245 – 422. Contour maps were used to illustrate spatial variations in the data sets using Surfer software for Windows (Golden Software Inc., version 8). The Krigging algorithm was employed as the interpolation method.

According to the values referred in the "Sediment Quality Guidelines" ecotoxic most metal concentrations in sediment from Krka River suppose no threat for benthic communities.

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