

## DISTRIBUTION OF CD, PB, CU AND ZN IN CARBONATE SEDIMENTS FROM THE KRKA RIVER ESTUARY, CROATIA

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We studied distribution of trace metals (Cd, Pb, Cu and Zn) as well as some sediment components (carbonates, organic matter i.e. loss on ignition - LOI, Fe and Mn) in oxic carbonate sediments from the Krka estuary. By applied chemical extraction technique (somewhat modified procedure of TESSIER *et al.*, 1979), it is possible to distinguish: exchangeable cations (F1), carbonates (F2), hydrous oxides of Fe and Mn (F3), organic matter (F4) and residual (F5). Although carbonates are regarded rather as trace metal diluters in sediments than as their collectors, selective chemical extraction procedures are mainly designated to differentiate also the carbonate fraction between other fractions (KERSTEN AND FÖRSTNER, 1990). High metal concentration in this fraction is often regarded as a pollution indicator, i.e. that fraction represent metals desorbed from other substrates (like Fe and Mn hydrous oxides and organic matter). This indeed seems to be the case for polluted estuaries with prevailing non-carbonate sediments. The Krka river estuary is a non-polluted estuary with low total metal input and very low sedimentation rates (average 0.12 mm/y in the upper part, negligible in the seaward part of the estuary, PROHIC and JURACIC, 1989). Previous study of the carbonate sediments from the Krka estuary, by PROHIC and KNEIWALD (1987), showed the high percentage of some trace metals (Mn, Cu, Pb and Zn) in this fraction, despite the low metal levels in the majority of analyzed samples. Procedure was performed on grain size fractions: 300-150, 150-61 and 61-5  $\mu\text{m}$ . Trace metals were

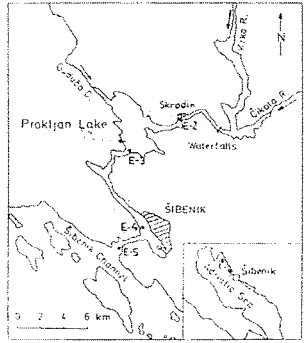
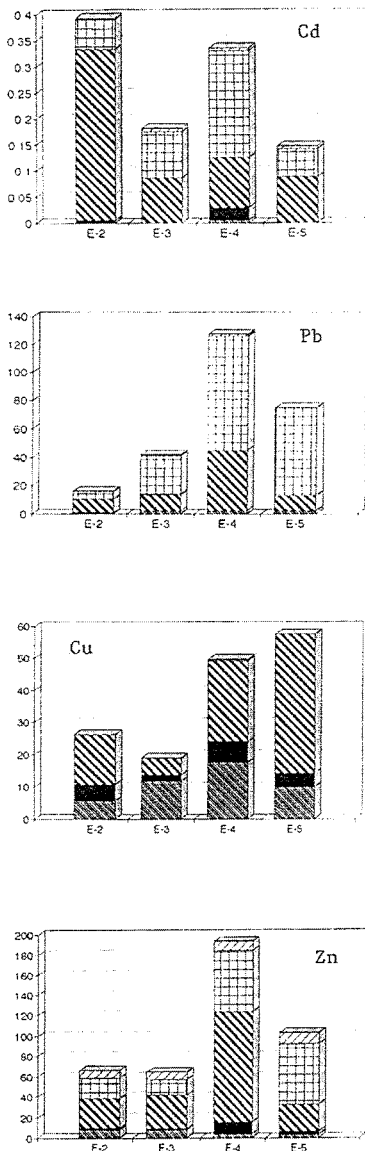


Fig. 1. The study area with the sampling sites



determined by differential pulse anodic stripping voltametry (DPASV). Trace metal concentrations were found as Cd 0.156-0.399, Pb 17.3-118.6, Cu 19.1-52.1 and Zn 66.2-168.1  $\mu\text{g/g}$  dry wt., in the smallest size fraction, along the estuary (sampling sites shown in Fig. 1). Distribution of trace metals differed for different size fractions. Generally, there was no relation between metals concentrations in fractions F2, F3 and F4 and the concentrations of sediment components (CaCO<sub>3</sub>, organic matter, Fe and Mn. Seaward, total trace metal concentrations and carbonates increased while organic matter and Fe decreased (also did Mn, being highest at site E-4). The highest metal concentrations were obtained in F2 (Pb in 61-5  $\mu\text{m}$  and Cd and Zn in 300-150  $\mu\text{m}$  size fraction) and in F3 (Cu, Zn and Cd in 61-5  $\mu\text{m}$ ). The concentrations in other fractions were low (Fig. 2). It seems that carbonates can not be regarded exclusively as a trace metal diluter in the actual carbonate sediments present in the Krka river estuary.

### REFERENCES

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Fig. 2. Concentrations, at four sampling sites, of trace metals (Cd, Pb, Cu and Zn) in chemical fractions of sediments for grain size fractions 61-5  $\mu\text{m}$  ( $\mu\text{g/g}$  dry wt.).

- F1
- F2
- F3
- F4
- F5