



DISTRIBUTION OF HEAVY METALS IN SEDIMENTS OF THE VENICE LAGOON: THE ROLE OF THE INDUSTRIAL AREA

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The Venice Lagoon has been heavily polluted both from diffuse and direct sources. It has been recently established that the atmospheric delivery of contaminants to the lagoon can be very significant in zones far from direct sources, but the influence of the industrial area of Porto Marghera, though widely recognized, has not been entirely described and quantified. In order to assess the temporal and spatial variability of metal pollution, and to better understand the contribution of the industrial channels as sources of contaminants, in May 1996 we sampled 18 stations in the lagoon and 9 in the channels of the industrial area of Porto Marghera. At each site a short core, 10 cm long, was taken and immediately extruded to obtain 4 slices 2-2.5 cm thick. Sediment samples have been analysed for As, Cd, Pb, and Zn after acid extraction. Based on this approach we obtained information on the very recent sediment record: assuming accumulation rates of 0.3-0.4 cm y⁻¹ the top 10 cm represent 25-30 years and each section 6-7.5 years. The results relative to surficial samples are summarized in the Table. Zn is the metal which shows the highest concentrations in lagoon sediments.

TABLE I. CONCENTRATION INTERVALS OF METALS IN THE SURFICIAL SAMPLES. BACKGROUND VALUES ARE FROM ORIO AND DONAZZOLO (1987).

Metal	Channels (µg/g)	Lagoon (µg/g)	Background (µg/g)
As	5 - 120	5 - 25	-
Cd	0.3 - 70	0.2 - 5	< 1
Pb	21 - 929	38 - 114	< 25
Zn	113 - 8295	101 - 1115	< 70

Maximum values, are relative to the sample taken from the Canale Industriale Nord which is presently the most important source of pollutants to both the Canale dei Petroli and the lagoon. This is confirmed by metal distributions in lagoon sediments: the highest concentrations have been found in sediments close to the mainland, in a wedge-shaped area located between the Canale Vittorio Emanuele III and the Isola delle Tresse. The comparison of metal distributions in sediments at various levels shows the evolution of the inputs. The patterns suggest that the heavily polluted areas are reducing in size but the influence of the materials stored in the the Canale Industriale Nord has increased through time, and is presently the most important. Metal distributions are also discussed on the basis of grain size composition of sediments and water circulation patterns. Despite many previous studies, these results for the first time clearly point out the potentially most dangerous source of pollutants within the lagoon system.