

Assessment of sediment contaminants in river basin. A case study of Po river.

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Introduction: Inside a national initiative promoted by Slow Food and by University of Gastronomic Sciences, a scientific research was performed to evaluate the state of health of Po River basin (the most important river in Italy)¹. This initiative was based on the evidence of the ecological emergency concerning fresh water, that it is the strategic resource of the future, and that the survival of the great river systems of the world is a global challenge. The research, executed by a scientific committee in conjunction with Golder Associates, included the monitoring of different environmental components of Po: naturalistic and physiographic characteristics, fresh water, benthonic community and sediments.

Particular attention was paid on sediments, as the most complex component to assess.

The aim of this study is to describe the approach to characterize the Po River sediments and to point out the lack in Italian regulations about sediment quality assessment.

Methods: In July 2007 samples of sediments were collected from twenty-six different locations, twelve of which along the Po River and fourteen near closing sections of its main affluents. Three samples of sediments were also collected along Adriatic Sea coast, where the Po flows.

Two different type of analyses were performed on each sediment samples:

- physical and chemical analyses;
- toxicological tests.

Physical and chemical analyses included pH, electrical conductivity, moisture content, particle size analysis, total organic carbon, metals, PAHs, PCBs, pesticides, hydrocarbons C<12 and C≥12, azoth and phosphorus.

Toxicity tests included bacterial luminescence, total heterotrophic bacteria, algal growth and *Daphnia magna*, *Fathead minnow* and Nematode survival.

The results are compared to standards defined in "Canadian Sediment Quality Guidelines for the Protection of Aquatic Life" [1] by Canadian Council of Ministers of the Environment (CCME) and by National Oceanic & Atmospheric Administration (NOAA) [2] were used as reference values.

Toxicological analyses results were normalized on a ranking system from 1 to 5 and summarized in a Sediment Health Index (SHI) [3].

Results: Results showed elevated concentrations of metals in all samples, above all for zinc, total chromium and nickel.

Eleven samples presented elevated concentrations of PAHs and seven samples of pesticides. Only one sample was contaminated by PCBs.

Toxicological tests showed that all sediments analyzed were characterized with high ecological potential.

Discussion: This study became part in an initiative promoted by Slow Food and by University of Gastronomic Sciences to draw people's attention to Po River about its territorial, cultural and environmental characteristics. This proposal represented an opportunity to focus on sustainable management of Po River. In this context monitoring sediments allowed to point out:

- the environmental quality of a river component usually not much considered;
- the absence of national regulations to prescribe how perform a characterization sediments and to establish standard reference values;
- the limitation of physical and chemical analyses in the quality sediments assessment and the importance to integrate physical, chemical and biological information.

References: [1] CCME (2002) *Canadian Environmental Quality Guidelines*, Winnipeg, MN, Canada; [2] Buchman, M.F. 1999 *NOAA Screening Quick reference Tables*, NOAA HAZMAT Report 99-1, Seattle, WA, Coastal protection and restoration Division, National Oceanic and Atmospheric Administration, 12 pages; [3] HydroQual Laboratories Ltd. 2000 *Sediment Health Index – Application Document*, Calgary, AB, Canada.

¹ Discovering the Great River: establishing a new academic model for research into the memory and identity of a region.