



## Importance of Material Fluxes in River Eco-Systems for Integrated Water Resources Management

By Manfred Spreafico, University of Berne, Switzerland

### Abstract

The tool of Integrated Water Resources Management is selected to show the relevance and importance of material fluxes in eco-systems in supporting and solving the difficult and complex problems. After a brief introduction to the material fluxes, the presentation focusses on selected topics of protection of water resources, water quality and aquatic ecosystems, protection against harmful impacts of water and optimal use of the water. And this in the system of driving forces, pressures, state, impact and responses. Some experiences from the environmentally sound management of the Rhine countries are shown. Information is given to monitoring, measures to improve and prevent water quality as well as the improvement of fish habitats and impacts of climate change on fishes. Finally some information is provided to the control of material fluxes in the Rhine River and the alarm system in case of accidental pollution of the Rhine. The second part of the presentation focusses on Integrated Flood Management principles and flood risk cycle and especially on erosion, sediment transport and deposition. The last part of the presentation shows some impacts of the water use by navigation on the environment and river material fluxes.



### Biography

Prof. Manfred Spreafico got his Ph.D at the Department of Civil Engineering of the Federal Technical University at Zurich, Switzerland. He worked then in the Swiss National Hydrological Survey and was 1997 elected as professor at the Institute of Geography of the University of Berne. Since 2008 he works as consultant for Integrated Water Resources Management, specialized in hydrometeorology, flood and sediment management.

Prof. Manfred Spreafico is acting chairperson of the International Sediment Initiative of UNESCO and was for 20 years president of the International Commission for the Hydrology of the Rhine Basin. He has worked as chairman or member of committees and working groups in the fields of hydrology incl. erosion and sediments as well as in IWRM in national and international organizations and institutions. As lecturer, trainer, project manager and project member he has worked in more than 60 countries.

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**环境科学与工程学院**

**水沙科学教育部重点实验室**



## Organic Matter and Metal ions : From Data to Models

By Benedetti Marc F, University of Paris Diderot(Paris 7), France

### Abstract

Nowadays, environmental problems related to soil and water pollution with heavy metals are numerous, therefore, it is important to understand metal ions behavior in rivers dissolved and particulate fractions, aquatic sediments and soils and to estimate their transfer. The fate of metals in the environment is closely related to their interactions with the major reactive compartments (organic matter, iron and manganese oxides, clays). The objective of this seminar is to present an approach based on the combination of laboratory data acquisition and model to study metal ion speciation in different environmental systems. The NICA-Donnan is used to describe the experimental data. First, this work implies the definition of generic parameters to describe the interactions of the studied metals with organic matter. Then, after a validation of the approach by comparison with analytical results, this model is include into a multi-surface model applied to test sites corresponding to riverine environments. These models give good predictions of the behavior of major and trace metal ions even in heterogeneous systems characteristic of natural environment. The measured free metal concentrations in the solution are in agreement with those obtained from model calculations.



### Biography

Dr. Marc Benedetti is a Professor at the Department of Chemistry, University Paris Diderot, Paris, France. He has been the Head of the Aquatic Geochemistry Team IPGP-UMR 7154 since 2004. He was a Deputy Director for Sciences Affairs, University Paris Diderot from 2009-2013. Currently, he is a Deputy Director of the IPGP. Professor Benedetti's research concerns the interactions between major and trace elements and major constituents of water and soil in biogeochemical cycles Specifically: (1) Experimental study of processes at interfaces, understanding the mechanisms that control the speciation and transfer of elements in water and soil. He is studying the reactions of heterogeneous solid-liquid type. (2) Modelling of interactions between major and trace elements and various components of water-soil system. (3) Speciation of chemical elements in natural environments (water and soil).4) Study of the early weathering.

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## Treatment of Cyanotoxins and Contaminants of Emerging Concern in Water Using Advanced Oxidation Processes

By Dionysios D. Dionysiou, University of Cincinnati, Cincinnati, Ohio, USA

### Abstract

Mechanistic transformation pathways of treatment of cyanotoxins and other contaminants of emerging concern in water using AOPs will be overviewed. Emphasis will be given on UV and Solar-based Advanced Oxidation Processes such as TiO<sub>2</sub>-based photocatalysis (UV and visible) (i.e., a heterogeneous AOP) and UV/H<sub>2</sub>O<sub>2</sub> process (i.e., a homogeneous AOP). Details will be presented on the degradation of cyanotoxins and other selected contaminants. Most emphasis will be placed on the oxidative pathways for the degradation of microcystin-LR and cylindrospermopsin. Transformation kinetic rates and reaction intermediates formed by OH radical attack and other reactive oxygen species on specific sites of the target contaminants will be presented and the detailed reaction pathways will be discussed. Discussion will also be provided when oxidation takes place by other radicals such as sulfate radicals and superoxide anion radicals under certain modifications of the processes described above. The role of water quality parameters such as natural organic matter, alkalinity and pH will be discussed, considering also the chemistry of the target contaminants and, in the case of heterogeneous AOPs, the role of the catalyst nano-interface.

### Biography



Dr. Dionysios (Dion) D. Dionysiou is currently a Professor of Environmental Engineering and Science Program at the University of Cincinnati. He teaches courses and performs research in the areas of drinking water quality and treatment, advanced unit operations for water treatment, advanced oxidation technologies and nanotechnologies, and physical-chemical processes for water quality control. He has received funding from NSF, US EPA, NASA, NOAA/CICEET, USGS, USDA, and DuPont.

Prof. Dionysiou is currently editor of several journals, such as *Chemical Engineering Journal*, *Journal of Advanced Oxidation Technologies*, and *Journal of Environmental Engineering* (ASCE) et al.. He is the author or co-author of over 200 refereed journal publications, over 90 conference proceedings, 17 book chapter publications, 17 editorials, and more than 450 presentations. His work received over 7,000 citations.

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