The Handbook of Environmental Chemistry

Founded by Otto Hutzinger

Volume 21

The Handbook of Environmental Chemistry

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The Llobregat

The Story of a Polluted Mediterranean River

Volume Editors: Sergi Sabater · Antoni Ginebreda · Damià Barceló

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Aims and Scope

Since 1980, *The Handbook of Environmental Chemistry* has provided sound and solid knowledge about environmental topics from a chemical perspective. Presenting a wide spectrum of viewpoints and approaches, the series now covers topics such as local and global changes of natural environment and climate; anthropogenic impact on the environment; water, air and soil pollution; remediation and waste characterization; environmental contaminants; biogeochemistry; geoecology; chemical reactions and processes; chemical and biological transformations as well as physical transport of chemicals in the environment; or environmental modeling. A particular focus of the series lies on methodological advances in environmental analytical chemistry.

Series Preface

With remarkable vision, Prof. Otto Hutzinger initiated *The Handbook of Environmental Chemistry* in 1980 and became the founding Editor-in-Chief. At that time, environmental chemistry was an emerging field, aiming at a complete description of the Earth's environment, encompassing the physical, chemical, biological, and geological transformations of chemical substances occurring on a local as well as a global scale. Environmental chemistry was intended to provide an account of the impact of man's activities on the natural environment by describing observed changes.

While a considerable amount of knowledge has been accumulated over the last three decades, as reflected in the more than 70 volumes of *The Handbook of Environmental Chemistry,* there are still many scientific and policy challenges ahead due to the complexity and interdisciplinary nature of the field. The series will therefore continue to provide compilations of current knowledge. Contributions are written by leading experts with practical experience in their fields. *The Handbook of Environmental Chemistry* grows with the increases in our scientific understanding, and provides a valuable source not only for scientists but also for environmental managers and decision-makers. Today, the series covers a broad range of environmental topics from a chemical perspective, including methodological advances in environmental analytical chemistry.

In recent years, there has been a growing tendency to include subject matter of societal relevance in the broad view of environmental chemistry. Topics include life cycle analysis, environmental management, sustainable development, and socio-economic, legal and even political problems, among others. While these topics are of great importance for the development and acceptance of *The Handbook of Environmental Chemistry,* the publisher and Editors-in-Chief have decided to keep the handbook essentially a source of information on "hard sciences" with a particular emphasis on chemistry, but also covering biology, geology, hydrology and engineering as applied to environmental sciences.

The volumes of the series are written at an advanced level, addressing the needs of both researchers and graduate students, as well as of people outside the field of "pure" chemistry, including those in industry, business, government, research establishments, and public interest groups. It would be very satisfying to see these volumes used as a basis for graduate courses in environmental chemistry. With its high standards of scientific quality and clarity, *The Handbook of*

Environmental Chemistry provides a solid basis from which scientists can share their knowledge on the different aspects of environmental problems, presenting a wide spectrum of viewpoints and approaches.

The Handbook of Environmental Chemistry is available both in print and online via www.springerlink.com/content/110354/. Articles are published online as soon as they have been approved for publication. Authors, Volume Editors and Editors-in-Chief are rewarded by the broad acceptance of *The Handbook of Environmental Chemistry* by the scientific community, from whom suggestions for new topics to the Editors-in-Chief are always very welcome.

Damià Barceló
Andrey G. Kostianoy
Editors-in-Chief

Volume Preface

The Llobregat basin has received the effect of human presence since historical times. Barcelona, one of the most populated cities in the north bank of the Mediterranean, has historically developed using – and avoiding – the river. The Llobregat has provided its water resources and has been at the base of the industrial development of the city and of the whole region. Therefore if something characterizes the story of the Llobregat is the human pressure.

As such, the story of the Llobregat is not different of some others in humanized rivers elsewhere. However, the pressures on the whole watershed are overwhelming. Hydraulic exploitation, water abstraction, channelization, and damming have added to mining exploitation, eutrophication, pollution, and the arrival of invasive species in successive steps of increasing pressures on the ecosystem. These man-made disturbances add to those naturally derived from its Mediterranean character, that is, the irregular and unreliable provision of water resources.

The wide array of pressures, together with the necessity of preserving the river resources, provides the framework to justify the Llobregat as one of the best studied and monitored river basins in Europe. Several groups from different Universities and Research Institutions, both Spanish and European, have placed their efforts to understand the hazards and resilience of such a river system. The basic and applied research in the Llobregat has been immense, and most of the times has been triggered by the water administration remarkably in the context of the WFD development and its subsequent deployment. The knowledge gathered on the Llobregat is a paradigm of collaboration between scientists and managers. Such collaboration historically characterized the management of the most problematic water issues in Catalonia.

As a whole, the proper management of the water cycle – both natural and anthropogenic – in the Llobregat River basin is a cumbersome (but challenging) task, requiring a lot of "fine-tuning" effort. Its successful achievement will be only feasible with the active and collaborative involvement of science, authorities, and stakeholders participation.

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