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Book Reviews

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BOOK REVIEWS

Assessment of the Fate and Effects of Toxic Agents on Water Resources, edited by I. Ethem Gonenc, Viadimir G. Koutitonsky, Brenda Rashleigh, Robert B. Ambrose Jr and John R. Wolflin, Dordrecht, The Netherlands, Springer, 2007, 422 pp., EUR 171.15, ISBN 978-1-4020-5526-3

Water resources are highly subject to threat from anthropogenic pressures but also from terrorist attacks because of the wide variety of functions they hold and the importance of the derived impacts. The book is a result of a NATO sponsored by Advanced Study Institute (ASI) held in Istanbul, Turkey, in December 2005, aiming at transferring information and knowledge gained by the LEMSM group (NATO Pilot Study Group on Ecosystem Modelling of Coastal Lagoons for Sustainable Management) to young international scientists.

The book is reflective of the instruction provided at the ASI and is organised in five parts, including a general Introduction. Part 2 provides a thorough assessment on how ecosystem models and other decision making tools are employed in the design and implementation phases of a response plan to a chemical, biological, radiological or nuclear (CBRN) threat. The following part, deals with the physical processes that drive transport in lagoons. Hydrodynamic equations and discretisation techniques (inertial motion, diffusion, transport, etc.) are reviewed and monitoring systems and time series analysis of lagoon variables are described. The critical considerations on model implementation, stability, and accuracy problems of numerical modelling and model analysis, are major concerns of this part.

Water resources form a part of a larger system that encompasses ecological, sociological, and economic aspects at multiple scales in time and space. Complex interactions within this larger system must be understood if environmental management is to be successful and sustainable, as described in Part 4. An emerging framework for dealing with the complexity of these stressors considers driving forces, pressures, states, impacts, and responses (D-P-S-I-R). Particular attention is given in one chapter to the ecology of algae, the base of most aquatic ecosystems. Part 4 also describes specific modelling tools that can be used to address ecological effects of terrorist threats: the STELLA, the ECOPATH, and the AQUATOX models. Each of these models has strengths and weaknesses for representing the aquatic ecosystem and the effects of toxicants on such an ecosystem. Taken together, this set of tools provides scientists with options for representing the effect of a toxic event in a range of aquatic systems. Finally, Part 5 presents a case study, a dieldrin attack in Dalyan Lagoon (Turkey), where a general application of the previously described methods and approaches is made.

The book specifically reframes the need for maintaining current scientific data and modelling in management of lagoon systems in the context of emergency conditions. Readers from various disciplines being involved with different aspects of CBRN Agents

Effects on water resources will find in the respective chapters sources of information with references to additional information, practical exercises, and decision-making scenarios that will represent an excellent background material for their activities.

Analysis of Pesticides in Food and Environmental Samples, edited by José L. Tadeo, Boca Raton, FL, USA, CRC Press, Taylor & Francis Group, 2008, 384 pp., £84.00, US\$159.95, ISBN 0-8493-7552-5

Developing safety regulations for pesticides used around the world requires reliable analytical methods for assessing their impact in food and in the environment. The book focuses on the analytical methodologies developed for the determination of pesticide residues and other chemical contaminants in foods as well as in soil, water, and air. It starts with a concise review of pesticide classes and their physicochemical properties (Chapter 1), followed by descriptions of sample preparation and extraction methods (Chapter 2), and the most widely used analytical methods for pesticides determination, namely chromatographic techniques coupled with mass spectrometry (Chapter 3) and immunoassays and biosensors (Chapter 4). Another chapter discusses important aspects of quality assurance and then introduces analytical methods specific to each sample type, including foods from vegetal and animal origin (Chapters 6 and 7), soil, water and air (Chapters 8 to 10). In addition, the book addresses regulatory aspects and presents current data on the levels of pesticides found in food and environmental matrices (Chapters 11 and 12).

This timely and up-to-date work can significantly improve the information in this research area and contribute to a better understanding of the behaviour of pesticides that will lead to an improvement of their use and their safety regulations. Therefore, it will be of interest to those wishing a basic introduction to the field, as well as to those from control laboratories for updating their knowledge.

Methods in Environmental Forensics, edited by Stephen M. Mudge, Boca Raton, FL, USA, CRC Press, Taylor & Francis Group, 2008, 386 pp., £67.99, ISBN 978-0-8493-5007-8

'Environmental forensics' is nowadays a well-disciplined science that integrates sampling design, analytical chemistry, and environmental processes with the legislative framework. Several books have been included recently in this section, reflecting the great activity in the field (*Introduction to Environmental Forensics*, B.L. Murphy and R.D. Morrison, Academic Press, *Oil Spill Environmental Forensics: Fingerprinting and Source Identification*, Z. Wang and S.A. Stout, Academic Press, *Forensic Analysis on the Cutting Edge*, R.D. Blackledge, John Wiley & Sons Ltd. IJEAC **88**, 364–366 (2008)). The present one focuses on the variety of methods that have worked well in past environmental forensic cases.

The book begins with the presentation of a case and follows the tasks of an active investigator from the case's inception up through the delivery of expert court testimony. The text then reviews those scientific methods that have been used with success in environmental forensic investigations. Chapter 2 outlines the ways in which natural and artificial radionuclides can be used as tracers of environmental processes and for dating samples from the field, an important aspect when apportioning blame. Chemical fingerprinting of petroleum hydrocarbons is a classical area of development and still a major cause for environmental concern around the world, and is reviewed in Chapter 3. This chemical composition approach is followed in Chapter 4 on the use of stable isotopes

(especially ^{13}C and ^2H) to improve source specificity, including oil spills. Chapter 5 describes a sensitive method for the analysis of volatile organic compound analysis in water, sediments, and soils and its application in environmental forensics. A range of methods for the molecular characterisation of soil bacteria that can greatly assist in their identification, treatment regimes, and geographic origin is presented in Chapter 6. The following chapter shows how the biological communities in marine environments may be used to classify an area and quantify the degree of stress exerted on the system. Chapters 8 and 9 present a range of methods for the normalisation of data to remove natural effects that may mask environmental processes and of multivariate and geostatistical methods for the treatment of chemical and biological data to determine the underlying trends within a complex environment. Identification of air pollution sources via modelling techniques is the subject of Chapter 10. Lastly, the scientific methods presented are examined from a legal perspective with an emphasis on the admissibility and presentation of evidence and the delivery of expert testimony.

Written by experts in their various fields of environmental forensics, this comprehensive volume represents our state of knowledge in these areas and provides a reference for all wishing to practice environmental forensics and, indeed, any environmental investigation.

Environmental Forensics, edited by Roy M. Harrison and Ronald E. Hester, Cambridge, UK, RSC Publishing, 2008, 192 pp., £49.95, ISBN: 978-0-85404-957-8

Environmental Forensics is the 26th volume in the RSC Publishing Issues in Environmental Science and Technology series. Environmental forensics is a combination of analytical and environmental chemistry, which is useful in the court room context. As a result of the topicality and rapid growth of the subject area, a number of books have been published recently (IJEAC **88**, 364 (2008), and above) and a number of degree courses have been introduced in academia.

This volume provides a comprehensive overview of many of the key areas of environmental forensics written by some of the leading practitioners in the field. The first chapter gives a general introduction to the legislative framework of environmental forensics and then provides a number of case studies illustrating the applications of environmental forensics, particularly in the field of source apportionment. The second chapter deals with microbial techniques for environmental forensics. The explosion of techniques in molecular biology has opened up all sorts of possibilities in this area, which the chapter describes alongside the traditional microbial methods. The following chapter again focuses on techniques, in this case those based upon stable isotopes such as hydrogen, carbon, nitrogen, oxygen, and sulfur, which can be traced with very high precision using isotope ratio mass spectrometry. The principles behind these techniques and a number of fascinating applications are outlined in this chapter. The fourth chapter describes the chemical composition of petroleum and petroleum products and shows how diagnostic compounds can be used for fingerprinting petroleum in the environment. The fifth chapter addresses the question of whether perchlorate in the environment is natural or man-made. The chapter provides a detailed forensic guide to identification of the sources of this important pollutant. The following chapter deals with the tracking of chlorinated solvents in the environment. These compounds have been very widely used and are the most frequently detected groundwater contaminants in the USA and most probable in many other countries. Forensic methods, which can take account of differential rates of decay in the environment, provide an essential means of tracking and

source identification for chlorinated solvents. In the final chapter, the emerging role of environmental forensics in the investigation of groundwater pollution is described.

This volume will prove to be both of specialist use to those seeking expert insights into the field and its capabilities and also of more general interest to those involved in both environmental analytical science and environmental law.

Multivariate Methods in Chromatography: A Practical Guide, by Tibor Cserháti, Chichester, UK, John Wiley & Sons, Ltd, 2008, 335 pp., £90.00, ISBN 978-0-470-05820-6

Multivariate methods have been frequently applied in chromatography to identify basic factors having a marked impact on solute–solvent and solute–stationary phase interactions and to study the clustering of solutes, supports and solvents into groups exposing similar retention characteristics. The objective of this book is to present a concise description and evaluation of the various up-to-date multivariate mathematical-statistical methods applied for the assessment of retention data sets. The book is intended as a bridge between everyday chromatographic practice and theoretical mathematics.

The opening chapter presents a discussion of the various multivariate methods available in the ‘toolkit’ of a chromatographer. The subsequent chapters present a broad range of the use of these methods in gas chromatography, liquid chromatography, and electrically driven chromatography, with an emphasis on their application to pharmaceuticals, food, the environment, biological compounds, and medicine.

It has to be emphasised that the book has been conceived as a practical guide, so it avoids the meticulous theoretical treatment of the calculation methods which is not necessary for their successful application in chromatography. The principles of the individual methods are discussed as simply as possible using practical examples taken equally from the different chromatographic techniques (TLC, HPLC, SFC, GC, CZE, CGE, MEKC, capillary isotachopheresis, and capillary isoelectric focusing).

This essential text is aimed at analysts working in processing plants and quality control environments using chromatographic analysis for any types of solutes, as well as experts in research institutes and those teaching separation science, technology, and analytical chemistry. It is relevant to those utilising chromatography in bioinformatics, life sciences and drug discovery as well as chemical engineering, pharmacology, biology, medicine, and forensic science. In addition the book will be of interest to students and postgraduate students working in separation science.

Inductively Coupled Plasma Spectrometry and its Applications, edited by Steve J. Hill, Oxford, UK, Blackwell Publishing, 2008, 2nd ed., 427 pp., £99.50, ISBN 978-1-4051-3594-8

This second edition follows the same format as the first edition but with some important changes. It is structured into 11 chapters, each utilising the authors’ expertise and experience, and providing enough detail to be useful to both the new and experienced users. The first chapter is new and sets the scene for the rest of the book by providing a thought provoking account of both the strengths and weaknesses of ICP-AES and ICP-MS and how the impact of technology transfer is starting to affect current trends and may impact on future developments. Chapter 2 looks at the fundamental principles of inductively coupled plasma including details of temperature measurement and recent studies employing solid-state detectors to acquire the entire UV-visible spectra for diagnostic studies. Chapter 3 introduces the basic concepts and requirements for precise and accurate

practical measurement and then overviews the instrumentation required for ICP-AES. Again, however, the focus is on current developments and there are sections on high-resolution spectrometry, microplasmas, and plasma on a chip technology. Chapter 4 looks in detail at sample introduction via liquid aerosol generation but also describes other forms of sample transport such as vapour generation techniques, electrothermal vaporisation, and solid sample laser ablation. In Chapter 5 the focus turns to ICP-MS, covering fundamental aspects such as ion sampling, mass analysers and ion detection, prior to a more detailed consideration of the use of ICP-MS for isotope ratio measurements, including selected applications, in Chapter 6. The latter part of the book is designed to provide a useful starting point when users want to try an approach or technique that is new to them. In this regard, in Chapter 7 alternative and mixed gas plasmas (e.g. the addition of oxygen when using organic matrices in ICPMS) are discussed. The following chapter on electrospray ionisation mass spectrometry again offers something additional to users of plasma spectrometry. The last three chapters put all of the above into a practical context. These three chapters cover geological, environmental and clinical applications together with a detailed account of plasma spectrometry in food science.

This updated and fully revised edition is both timely and informative, and provides a useful reference for those engaged in using ICPs to achieve their own scientific or technical goals.

Practical Gamma-Ray Spectrometry, by Gordon R. Gilmore, Chichester, UK, John Wiley & Sons, Ltd, 2008, 2nd ed., 387 pp., £80.00, ISBN 978-0-470-86196-7

Gamma-ray spectrometry is one of the key techniques in the measurement of radioactive materials. Since the first edition of the book (in 1995), there have been a number of significant advances in this technique and the field of applications has been enlarged. Therefore, it has been significantly updated. After a general presentation of the principles of the radioactivity decay and the interactions of gamma radiation with matter, the book describes the properties of materials suitable for constructing detectors and the principles behind their operation as well as the general electronics of the system. Various chapters cover low and high count rate systems, statistics for counting, the control of resolution, the spectrometer calibration, and computer analysis of gamma-ray spectra. The last part of the book is intended as a workshop manual, with sections on choosing a detector and checking its specifications, troubleshooting, and analytical quality assurance, an essential aspect for laboratories seeking formal accreditation. Finally, an in-depth examination of the measurement of naturally occurring radioactive materials and several applications are illustrated. By way of examples, measurements in connection with the compulsory test ban treaty verification program, decommissioning of nuclear wastes, and nuclear material safeguards are discussed.

Throughout the book, an emphasis is given on the practical course at the expense of the mathematics. In this spirit, each chapter ends with a 'Practical Points' section, a short-list of 'Further Reading' and 'Internet sources of information'. Several annexes compile ancillary information of interest (e.g. nuclear data, gamma- and X-ray standards, gamma- and X-ray energies, and even atomic masses of elements).

'Practical Gamma-ray Spectrometry' is aimed at the analysts using the instrument. It will enable all those involved with radioactivity measurements to get the most from their equipment. It will also be of value to researchers, instructors and students in university departments where the measurement of radioactivity is routine, such as physics, chemistry,

environmental biology, archaeometry, and radiochemistry, and in the nuclear industry as a whole. But, as no previous knowledge of nuclear matters or instrumentation is assumed, the text can also be used by complete beginners.

Trace Quantitative Analysis by Mass Spectrometry, by Robert K. Boyd, Cecilia Basic and Robert A. Bethem, Chichester, UK, John Wiley & Sons, Ltd, 2008, 724 pp., £65.00, ISBN 978-0-470-05771-8

This unique book is mainly concerned with determinations of absolute amounts of chemical compounds present at trace levels in complex matrices, such as drugs and their metabolites in body fluids, pesticide residues in foodstuffs, contaminants in drinking water, etc. Therefore, it is not intended to cover other important branches of quantitative mass spectrometry like precise measurements of, e.g., isotopic ratios of an element by isotope ratio mass spectrometry (IRMS) and accelerator mass spectrometry (AMS). Thus, the book covers the analysis of 'small' (<2000 Da) organic molecules in environmental and biomedical matrices. It does not cover the important aspect of analysis of trace level metals by, e.g., ICP-MS. It also treats the more recent developments of quantitative analysis of specific proteins in biological systems, even though these hardly qualify as 'small molecules'.

In an attempt to provide a comprehensive introduction to the subject, all the many ancillary techniques and tools that must be coordinated to achieve a reliable result for a trace-level quantitative analysis by mass spectrometry are introduced. Consequently, many of the present chapters discuss matters that are common to any quantitative analytical method, and probably could be omitted, such as the analytical balance, the theory of chromatography, or the separation practicalities, that can be found in any basic manual. The more focused part of the book is constituted by chapters dealing with mass analysers for quantitation, ion detection and data processing, and statistics of calibration. Two chapters are dedicated to method development and validation. The final chapter is devoted to representative examples from a wide range of application areas, like contaminants in food (acrylamide and paralytic shellfish poisons) and water (disinfection by-products and pharmaceutical residues), bioanalytical applications (drug discovery and development methods), and quantitative proteomics.

The present book is written at a level that presupposes some basic undergraduate level knowledge of chemistry, physics, and mathematics and statistics. Reading this book will be useful in providing enough background information to the beginner, and also a useful reference thereafter.

Advances in Flow Analysis, edited by Marek Trojaviowicz, Weinheim, Germany, Wiley-VCH Verlag GmbH & Co. KGaA, 2008, 672 pp., £145.00, ISBN 978-3-527-31830-8

The flow injection methodology of analytical determinations, being developed since the 1970s, has gained already very many technical modifications such as the most commonly known flow systems: sequential injection analysis, batch injection analysis or the so called bead-injection analysis. Another aspect of the evolution of the technique has been the miniaturisation of particular modules of the flow system. As a result, there is a large arsenal of specially designed measuring instruments and a wide literature on this field, which was timely to review, particularly from the standpoint of the different environmental and technical conditions, and different scales of processes and devices.

However, in spite of the spectacular success in the 1970s of the application of commercial flow analysers with air-segmentation in clinical laboratories, long years of development have not introduced flow injection methods sufficiently into routine analytical laboratories. The main scope of the book is to present the achievements of laboratory flow analysis in recent years that may be helpful in the determination of its position in modern chemical analysis.

The book is divided in three sections on methodologies and instrumentation, advances in detection methods, and applications. First, the current status of the development of theoretical description of flow analysis is reported. Various methods of injection techniques, including the recently developed batch and bead-injection analysis are then described. Another aspect of the evolution of the technique that is covered has been the rapidly progressing miniaturisation of particular modules of the flow system, as well as their integration, for example, by incorporation of some modules into the injection valve or their miniaturisation down to microfluidic format. The concept of multi-commutation in flow analysis and multicomponent flow injection analysis together with advanced calibration methods in flow injection analysis is developed in three specific chapters. Sample processing methods in flow analysis and the most commonly employed detections are discussed, which include: luminescence, atomic spectroscopy, electrochemical (flow potentiometry and voltammetry), biochemical, and mass spectrometry. Numerous applications are reviewed for environmental, pharmaceutical, and industrial analysis. Internet resources for flow analysis including databases, vendors of instrumentation, journals, books, and standard methods are given.

Extensively referenced (until 2007) and written by well known specialists, all chapters constitute a definite must for every chemist working in this field.

Trace Elements as Contaminants and Nutrients Consequences in Ecosystems and Human Health, edited by M.N.V. Prasad, Hoboken, NJ, USA, John Wiley & Sons, Ltd, 2008, 777 pp., £92.50, ISBN 978-0-470-18095-2

Trace elements are inorganic chemicals usually occurring in small amounts in nature. In the right amounts, trace elements are beneficial: in fact, several of them are essential for human and animal health. Deficiencies can produce devastating health defects, while excess exposure or consumption can be harmful or even fatal. With chapters contributed by leading experts in their specialty areas, the book extensively covers both the benefits of trace elements and their potential toxicity and impact in the environment in the chosen topics.

These are illustrated by the proposed titles: The biological system of elements: trace elements concentration and abundance in plant give hints on biochemical reasons of sequestration and essentiality; Health implications of trace elements in the environment and the food chain; Trace elements in agro-ecosystems; Metal accumulation in crops – Human health issues; Trace elements and plant secondary metabolism: quality and efficacy of herbal products; Trace elements and radionuclides in edible plants; Trace elements in traditional healing plants – Remedies or risks; Biofortification: nutritional security and relevance to human health; Essentiality of zinc for human health and sustainable development; Zinc effect on the phytoestrogen content of pomegranate fruit tree; Iron bioavailability, homeostasis through phytoferritins and fortification strategies: implications for human health and nutrition; Iodine and human health: Bhutan's fortification program; Floristic composition at Kazakhstan's Semipalatinsk nuclear test site: relevance to the containment of radionuclides to safeguard ecosystems and human

health; Uranium and thorium accumulation in cultivated plants; Exposure to mercury: a critical assessment of adverse ecological and human health effects; Cadmium as an environmental contaminant: consequences to plant and human health; Trace element transport in plants; Cadmium detoxification in plants: involvement of ABC transporters; Iron: a major disease modifier in thalassemia; Health implications: trace metals in cancer; Mode of action and toxicity of trace elements; Input and transfer of trace metals from food via mother milk to the child; Selenium: a versatile trace element in life and environment; Environmental contamination control of water drainage from uranium mines by aquatic plants; Copper as an environmental contaminant: phytotoxicity and human health implications; Forms of copper, manganese, zinc and iron in soils of Slovakia: system of fertiliser recommendation and soil monitoring; Role of minerals in halophyte feeding of ruminants; Plants as biomonitors of trace elements pollution in soil; Bioindication and biomonitoring as innovative biotechniques for controlling trace metal influence to the environment.

In summary, the book consolidates information on specific elements, including zinc, iron, iodine, cadmium, lead, arsenic, mercury, selenium and radionuclides in ecosystems, on plant and animal nutrient requirements, fortified foods, nutrient deficiencies, and excess exposure via air, water, and soil contamination. Human health implications and biofortification programs are also covered, incorporating relevant case studies from several developing nations.

This is a basic reference for a broad audience, like scientists working in geochemistry, hydrology, analytical chemistry, environmental chemistry, and biology; plant, soil, crop, agricultural, food, and water scientists; academic and regulatory professionals in these fields; and aid agencies and non-governmental organisations.

Natural Groundwater Quality, edited by W. Mike Edmunds and Paul Shand, Oxford, UK, Blackwell Publishing, 2008, 469 pp., £75.00, ISBN 978-1-4051-5675-2

The European Water Framework Directive (WFD) forms the primary legislation for the protection of the European aquatic environment. The Groundwater Directive (GD) introduced in late 2006 has been incorporated to supplement the WFD and deal with specific questions of groundwater quality and to ensure 'good status' of groundwater. However, there is still a poor perception and understanding of groundwater by many people involved in water management and in implementation of policy. Against this background, a consortium of European scientists conducted detailed studies of water quality in Europe, focusing on the natural 'baseline' quality of groundwater as the basis for understanding geochemical processes in aquifers and providing a basis for defining what constitutes pollution.

The aim of this book is to provide a key reference text on natural water quality of aquifers through a series of thematic chapters, together with chapters on representative groundwater systems in Europe which illustrate well the main processes and evolution of water quality. It includes four chapters covering the issues of inorganic and organic quality of ground waters, geochemical modelling of processes controlling the evolution of baseline compositions of groundwater, carried out on three representative aquifers in Portugal, France, and UK. For all three aquifers, the changes in water chemistry are well described by relatively simple reactive transport models which may be used to predict the changes in water quality in the pristine aquifer as well as when the flow rates are accelerated by orders of magnitude due to groundwater abstraction.

The next chapters deal with timescales and tracers, the identification and interpretation of baseline trends, monitoring and characterisation of natural groundwater quality, and policy considerations in Europe about groundwater quality. The combination of careful studies of chemical trends along flow lines coupled with age determination and followed by modelling presents a powerful approach for understanding the baseline conditions. On the other hand, the tracer studies prove to be of particular value in demonstrating mixing processes and the dimensions of flow systems in the reference aquifers.

The second part of the book describes the studies of 25 reference aquifers from 12 European countries (Belgium, Bulgaria, Czech Republic, Denmark, Estonia, France, Malta, Norway, Poland, Portugal, Spain, and the UK). For each aquifer, median and upper baseline values are determined for over 50 inorganic parameters. Where groundwaters have been impacted by man, criteria are suggested for determining baseline ranges. The book concludes with a synthesis about baseline concentrations and identification of background levels.

This is a timely book that will be a reference for the various sectors involved in groundwater management, policy makers, research and industrial communities, as well as academic circles, providing readers with a solid foundation for developing their activities or implementing their responsibilities.

Pollution of Lakes and Rivers. A Paleoenvironmental Perspective, by John P. Smol, Oxford, UK, Blackwell Publishing, 2008, 2nd ed., 383 pp., £32.50, ISBN 978-1-4051-5913-5

Historical perspectives allow us to determine what an ecosystem was like before it was disturbed and to ascertain how the system changed as a result of human activities. Although very little long-term and pre-impact monitoring data are typically available for most ecosystems, much of this information is archived as proxy data in sedimentary records that can be interpreted by paleolimnologists in a manner that is useful to other scientists, environmental managers, politicians, and policy makers, as well as the public at large.

This textbook is about using the vast stores of information preserved in lake, river, and reservoir sediments to track past environmental changes. The first edition was published in 2002, but the rapid evolution of the paleolimnology, with new applications and approaches being developed, prompted the publication of this revised edition in such a short delay. After a general introduction of the principles and methods of retrieving the sedimentary archive and establishing the geochronological clock by calibrating indicators and dating sediment cores, a number of critical issues are discussed. These include acidification, eutrophication, erosion, pollution by metals, mercury and persistent organic pollutants, species invasions and biodiversity losses. New chapters on the effects on greenhouse gas emissions, ozone depletion, acid rain, and climatic warming have been added. The book concludes with an overview of new problems and new challenges to be addressed by paleolimnology.

A few studies are presented showing a broad spectrum of applications, almost all from Western Europe and North America which is a reflection of where most of the applied paleolimnological work has been done to date, but some are also from developing countries, where scientists and managers become more aware that paleolimnological approaches can offer important and cost-effective answers to many serious water-quality questions.

This expanded second edition provides, in a very easy reading, essential insights into a multidisciplinary science aimed at tackling some of the most urgent environmental problems of modern times.

Hydrodynamics and Water Quality. Modelling Rivers, Lakes and Estuaries, by Zhen-Gang Ji, Hoboken, NJ, USA, John Wiley & Sons, Ltd, 2008, 676 pp., £65.95, ISBN 978-0-470-13543-3

This book addresses the fundamental physical and biological processes in surface water systems that provide the basis for both deeper understanding and management decision making. The complexity of the natural surface water environment combined with the ever increasing capabilities of computers to simulate the temporal evolution of systems represented by differential equations has made hydrodynamic and water quality models essential tools for both science and management.

The book is organised as follows: an introductory chapter precedes Chapter 2, presenting the fundamentals of surface water hydrodynamics in the context of the three-dimensional, Reynolds averaged, hydrostatic or primitive equations of motions, as well as related dimensionally reduced formulations. Three process-oriented Chapters (3–5) address three broad water quality categories: sediment transport, toxic contaminants, and eutrophication. Sediment transport has important water quality implications related to water clarity, habitat suitability, and its ability to transport adsorbed materials. The chapter on toxic contaminants provides an overview of the transport and fate of heavy metals and hydrophobic organic compounds, both of which adsorb to inorganic and organic sediments. The final process chapter presents the traditional water quality or water column eutrophication process formulations, as well as the associated remineralisation or diagenesis of settled organic material. Chapter 6 provides an overview of the role of hydrodynamic and water quality modelling in total maximum daily load (TMDL) development that leads to the following chapter on model performance evaluation. The book concludes by focusing on specific aspects of three major groups of surface water systems, streams and rivers, lakes and reservoirs, and estuaries and coastal regions. These case studies, as well as those integrated into earlier chapters, provide excellent guidance in the organisation and execution of hydrodynamic and water quality studies. A modelling package on a CD, including electronic files of numerical models, case studies (Lake Okeechobee and St. Lucie Estuary) and utility programs, is attached to the book.

Instead of trying to cover every detail of hydrodynamics, sediment transport, toxics, and water quality, this book focuses on how to solve practical problems in surface waters. Therefore, it should be an essential reference for practicing engineers, scientist, and water resource managers, as well as a text for advanced undergraduates and graduate students in engineering and the environmental sciences.

Environmental Geochemistry. Site Characterisation, Data Analysis and Case Histories, edited by Benedetto De Vivo, Harvey E. Belkin and Annamaria Lima, Amsterdam, NL, Elsevier, 2008, 429 pp., £63.00, ISBN 978-0-444-53159-9

This volume contains selected papers presented at a Workshop held in Napoli (Italy) on May 2006. Special themes included were soil, surface, and ground waters contamination, environment pollution and remediation, and data interpretation and management.

The book contains 17 papers, starting with an overview on the most essential issues to be taken into account in planning and carrying out geochemical surveys in the field, followed by others on sampling methods and tools suitable for site characterisation, and for the collection of groundwater samples and on-site water quality analysis. The authors of the following two papers report on the sampling methods used by the British Geological Survey (BGS) in order to establish a geochemical baseline for the land area of Great Britain, involving the collection of stream sediments, waters, and panned heavy mineral concentrates for inorganic chemical analysis. The authors give detailed sampling protocols and discuss sampling strategy, equipment, and quality control as well as data conditioning within the BGS's regional geochemical mapping project that has been generating data for various sample media for nearly 40 years. Synthesis of the main considerations necessary to undertake urban geochemical mapping activities in terms of planning, sampling, chemical analyses, and data presentation is also provided. In this context, much emphasis is given to modern Geographical Information Systems (GIS).

Geochemical and epidemiological data mapping representing the detailed patterns of toxic metal concentrations and some, potentially, related pathologies in the Campania region of Italy are described. Two important case studies related with the occurrence of elevated levels of arsenic in drinking water in the State of Maine (USA) and chronic arsenic poisoning caused by the domestic combustion of coal in rural SW Guizhou Province (P.R. China) are also presented.

The gas chromatographic methods for analysis of organic pollutants and the single and sequential chemical extraction procedures more widely applied to determine the plant and the human bioavailability of potentially toxic metals from contaminated soil are briefly presented. Statistical methods to evaluate background values, namely, statistical frequency analysis and spatial analysis are reviewed with case studies of selected areas of Italy.

The improved standards achieved in the field of regulating the disposal and reuse of sewage sludge and solid by-products from municipal solid waste incineration are reported. Site characterisation and site remediation technologies in soil are also considered. Finally, case histories of brownfield sites in Italy, UK, and USA are described in detail.

All students and professionals working in the field on environmental pollution, from field sampling to statistical data interpretation, on-site characterisation and remediation both at regional and urban areas scale (geochemists, geologists, agronomists, environmental scientists, risk assessors, and environmental regulators), will find in this volume relevant information and suggestions for further research in the field.

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