Modelling Trends in Waste Management

Debashish Sengupta · Sudha Agrahari
Editors

Modelling Trends in Solid and Hazardous Waste Management

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Editors
Debashish Sengupta
Geology and Geophysics Department
Indian Institute of Technology Kharagpur
Kharagpur, West Bengal
India

Sudha Agrahari
Geology and Geophysics Department
Indian Institute of Technology Kharagpur
Kharagpur, West Bengal
India

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The Present Book is Dedicated to our Parents

Preface

The present book deals with the state-of-the-art research studies and technological developments in modeling trends and remediation of solid and hazardous waste management of various categories. **Hazardous waste** is a waste that creates substantial or potential threats to general health of public. Hazardous wastes are defined under RCRA in 40 CFR 261, according to which they have been divided into two major categories as characteristic hazardous and listed hazardous wastes. Characteristic hazardous wastes are materials that are tested for exhibiting four hazardous traits such as ignitability, reactivity, corrosivity, and toxicity. The hazardous wastes are materials listed by the regulatory authorities and connoted as hazardous wastes. These are from nonspecific sources, specific sources, or discarded chemical wastes. The various types of case studies discussed in this book include hospital waste which is an important type of urban waste. The waste from utilization and exploitation of energy resources enhances the heavy metal content and the ambient radiation environment 'Naturally Occurring Radioactive Materials (NORM)'. Procedural aspects for the framing of regulatory mechanism as employed for waste disposal and modeling of solid waste which includes municipal solid waste and the effects of hydrofracking for shale gas recovery is presented. The Non Invasive methods can be used for characterization and monitoring of solid waste and sustainable mineral development, primarily uranium resources for nuclear energy. The book also emphasizes the efficacy of Remote Sensing and GIS for geohazard studies, integrated geophysical methods for hazardous waste management and recent developments in site selection for landfills and innovations in microbial fuels cells.

The adequate protection and restoration of soil ecosystems contaminated by heavy metals require their characterization and remediation. Scattered literature is harnessed to critically review the possible sources, chemistry, potential biohazards, and best available remedial strategies for a number of heavy metals commonly found in contaminated soils. This book would be useful not only for practitioners of Environmental Science and Engineering but also to the readers who are involved in Environmental Planning and Management, preservation of heritage sites, development of suitable healthcare systems, and the practitioners in the framework of

environmental-friendly "Green Technology." The context is of great significance due to the rapid urbanization and the development of smart cities for the growing population in various countries, especially developing countries like India, China, Brazil, South Africa, and Nigeria, to name a few.

In order to visually understand the trends in solid and hazardous waste management, we need the tools of remote sensing and GIS. GIS or geological information system is "location Intelligence" as propounded by the father of GIS Roger Tomlinson (1968). Necessity is the mother of invention. There is a dire need to understand the trends in solid and hazardous waste management for regional planning. This book encompasses the extensive research work by various research groups all over the world to understand the modeling trends in solid and hazardous waste management.

Kharagpur, India

Debashish Sengupta
Sudha Agrahari

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About the Editors

Dr. Debashish Sengupta is Professor, Higher Administrative Grade and Ex-Head of the Department of Geology and Geophysics at the Indian Institute of Technology Kharagpur, West Bengal, India. Dr. Sengupta completed his Ph.D. in Applied Geophysics in 1987, and has more than 25 years of teaching and research experience. His areas of interests include nuclear geophysics with petroleum logging using subsurface nuclear data, radioactive methods and geochronology, radon emanometry and its applications, applications of isotopes and radionuclides in Earth and Environmental Geosciences, heat flow and geothermics. Dr. Sengupta has authored more than 90 research publications in international journals and more than 50 papers in conference proceedings, in addition to a large number of invited talks delivered both in India and abroad. His research work has been seminal and resulted in the formulation of environmental regulation policies in various countries of Asia, North and South America and the European Union. Dr. Sengupta had also been Visiting Professor at the University of Sao Paulo, Brazil and Senior Visiting Professor at the University of Salamanca, Spain. He received the Society of Geoscientists and Allied Technologists (SGAT's) Award of Excellence in Earth Sciences for the year 2003. To date, 10 students have been awarded Ph.D. degrees under his supervision.

Dr. Sudha Agrahari is Assistant Professor in the Department of Geology and Geophysics at the Indian Institute of Technology Kharagpur, India. She completed her Ph.D. in 2010, followed by three years of postdoctoral research experience in the field of helicopter-borne electromagnetics at the University of Cologne, Germany. Her research interests include unconventional energy resources, study of joint inversion of electrical and electromagnetic methods for environmental applications, and modeling and simulation of geophysical data. She has disseminated her research through publications in international journals and book chapters.