

Bioremediation Of Contaminated Soils Environmental Science Pollution

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Environmental Pollution of Paddy Soils - Muhammad Zaffar Hashmi
2018-09-25

The paddy field is a unique agro-ecosystem and provides services such as food, nutrient recycling and diverse habitats. However, chemical contamination of paddy soils has degraded the quality of this important ecosystem. This book provides an overview of our current understanding of paddy soil pollution, addressing topics such as the major types of pollutants in contaminated paddy soil ecosystems; factors affecting the fate of pollutants in paddy soil; biomonitoring approaches to assess the contaminated paddy soil; the impact of chemicals on soil microbial diversity; and climate change. It also covers arsenic and heavy metal pollution of paddy soils and their impact on rice quality. Further, new emerging contaminants such as antibiotics and antibiotics resistance genes (ARGs) in paddy soil and their impact on environmental health are also discussed. The last chapters focus on the bioremediation approaches for the management of paddy soils.

Environmental Bioremediation Technologies - S.N. Singh
2007-02-05

Bioremediation is an eco-friendly, cost-effective and natural technology targeted to remove heavy metals, radionuclides, xenobiotic compounds, organic waste, pesticides etc. from contaminated sites or industrial discharges through biological means. Since this technology is used in in-situ conditions, it does not physically disturb the site unlike conventional methods i.e. chemical or mechanical methods.

Strategies for Bioremediation of Organic and Inorganic Pollutants - Maria S. Fuentes 2018-01-29

Increased awareness surrounding environmental protection has prompted the development of more ecofriendly technologies. This book provides useful information on technologies based upon the use of biological agents for environmental clean-up, including bacteria, yeast, fungi, algae, and plants. Some chapters refer to the direct application of products derived from plants and microorganisms for designing strategies of environmental remediation. The combination of strategies helps in efficient removal of pollutants generated from anthropogenic activities with minimal environmental impact. This book is meant for professionals involved in environmental technology and waste management.

Bioremediation of Petroleum Hydrocarbons in Cold Regions - Dennis M. Filler 2008-02-21

This guide to bioremediation in cold regions is designed to aid environmental practitioners, industry, and regulators in the remediation of petroleum spills and contaminated sites in cold regions. Remediation design and technology used in temperate climates does not necessarily work in cold climates, and cleanup takes longer due to shorter treatment seasons, sub-freezing temperatures, ground freezing and thawing, and limited bioactivity. Environmental engineers and scientists from eight countries working in the polar regions combine their experiences and expertise with petroleum contamination to write this book. It contains in-depth discussions on regulations, freezing and frozen ground, identification and adaptations of cold-tolerant bacteria, contaminant transport in cold soils and permafrost, temperature effects on biodegradation, analytical methods, treatability studies, and nutritional requirements for bioremediation. Emphasis is given to practical and effective bioremediation methods for application in cold regions. Emerging technologies are also discussed.

The Utilization of Bioremediation to Reduce Soil Contamination: Problems and Solutions - Václav Sasek 2003-02-28

Proceedings of the NATO Advanced Research Workshop held in Prague, Czech Republic, 14-19 June 2000

Bioremediation for Environmental Sustainability - Gaurav Saxena

2020-10-13

Bioremediation for Environmental Sustainability: Toxicity, Mechanisms of Contaminants Degradation, Detoxification and Challenges introduces pollution and toxicity profiles of various organic and inorganic contaminants, including mechanisms of toxicity, degradation, and detoxification by microbes and plants, and their bioremediation approaches for environmental sustainability. The book also covers many advanced technologies in the field of bioremediation and phytoremediation, including electro-bioremediation, microbial fuel cells, nano-bioremediation, constructed wetlands, phytotechnologies, and many more, which are lacking in other competitive titles existing in the market. The book includes updated information, as well as future directions for research, in the field of bioremediation of industrial wastes. This book is a reference for students, researchers, scientists, and professionals in the fields of microbiology, biotechnology, environmental sciences, eco-toxicology, environmental remediation, and waste management, especially those who aspire to work on the biodegradation and bioremediation of industrial wastes and environmental pollutants for environmental sustainability. Environmental safety and sustainability with rapid industrialization is one of the major challenges worldwide. Industries are the key drivers in the world economy, but these are also the major polluters due to discharge of potentially toxic and hazardous wastes containing various organic and inorganic pollutants, which cause environmental pollution and severe toxic effects in living beings. Introduces pollution and toxicity profiles of environmental contaminants and industrial wastes, including oil refinery wastewater, distillery wastewater, tannery wastewater, textile wastewater, mine tailing wastes, plastic wastes, and more Describes underlying mechanisms of degradation and detoxification of emerging organic and inorganic contaminants with enzymatic roles Focuses on recent advances and challenges in bioremediation and phytoremediation, including microbial enzymes, biosurfactants, microalgae, biofilm, archaea, genetically engineered organisms, and more Describes how microbes and plants can be successfully applied for the remediation of potentially toxic industrial wastes and chemical pollutants to protect the environment and public health

Bioremediation for Environmental Sustainability - Vineet Kumar
2020-08-28

Bioremediation for Environmental Sustainability: Approaches to Tackle Pollution for Cleaner and Greener Society discusses many recently developed and successfully applied bio/phytoremediation technologies for pollution control and minimization, which are lacking more comprehensive coverage in previous books. This book describes the scope and applications of bio/phytoremediation technologies and especially focuses on the associated eco-environmental concerns, field studies, sustainability issues, and future prospects. The book also examines the feasibility of environmentally friendly and sustainable bio/phytoremediation technologies to remediate contaminated sites, as well as future directions in the field of bioremediation for environmental sustainability. Illustrates the importance of microbes and plants in bio/phytoremediation and wastewater treatment Includes chapters on original research outcomes pertaining to pollution, pollution abatement, and associated bioremediation technologies Covers emerging bioremediation technologies, including electro-bioremediation, microbial fuel cell, nano-bioremediation, constructed wetlands, and more Highlights key developments and challenges in bioremediation and phytoremediation technologies Describes the roles of relatively new approaches in bio/phytoremediation, including molecular engineering and omics technologies, microbial enzymes, biosurfactants, plant-microbe interactions, genetically engineered organisms, and more

Management of Contaminated Sites in Western Europe - Gundula Prokop 2000

Recoge: 1.Management of contaminated sites in western Europe -
2.Review of terminology.

Bioremediation Science - Amitava Rakshit 2021-05-21

This book provides state of the art description of various approaches, techniques and some basic fundamentals of bioremediation to manage a variety of organic and inorganic wastes and pollutants present in our environment. A comprehensive overview of recent advances and new development in the field of bioremediation research are provided within relevant theoretical framework to improve our understanding for the cleaning up of polluted water and contaminated land. The book is easy to read and language can be readily comprehended by aspiring newcomer, students, researchers and anyone else interested in this field. Renowned scientists around the world working on the above topics have contributed chapters. In this edited book, we have addressed the scope of the inexpensive and energy neutral bioremediation technologies. The scope of the book extends to environmental/agricultural scientists, students, consultants, site owners, industrial stakeholders, regulators and policy makers.

Environmental Pollution - Rachel H. Plattenberg 2007

Pollution is the release of chemical, physical, biological or radioactive contaminants to the environment. Principal forms of pollution include: air pollution, the release of chemicals and particulates into the atmosphere. Common examples include carbon monoxide, sulphur dioxide, chlorofluorocarbons (CFCs), and nitrogen oxides produced by industry and motor vehicles. Ozone and smog are created as nitrogen oxides and hydrocarbons react to sunlight. Water pollution affects oceans and inland bodies of water. Examples include organic and inorganic chemicals, heavy metals, petrochemicals, chloroform, and bacteria. Water pollution may also occur in the form of thermal pollution and the depletion of dissolved oxygen. Soil contamination often occurs when chemicals are released by spill or underground storage tank leakage. Contaminants include hydrocarbons, heavy metals, MTBE, herbicides, pesticides and chlorinated hydrocarbons. Often occurs with water pollution, thanks to surface runoff and groundwater. Radioactive contamination was added in the wake of 20th-century discoveries in atomic physics. Noise pollution encompasses roadway noise, aircraft noise, industrial noise as well as high-intensity sonar. Light pollution, includes light trespass, over-illumination and astronomical interference. Visual pollution, which can refer to the presence of overhead power lines, highway billboards, scarred landforms (as from strip mining), open storage of junk or municipal solid waste. The nature, distribution and ecological effects of all types and forms of pollutants in air, soil and water are the subject of this book.

Bioremediation of Agricultural Soils - Juan C. Sanchez-Hernandez 2019-03-14

The quality of agricultural soils are always under threat from chemical contaminants, which ultimately affect the productivity and safety of crops. Besides agrochemicals, a new generation of substances invades the soil through irrigation with reclaimed wastewater and pollutants of organic origin such as sewage sludge or cattle manure. Emerging pollutants such as pharmaceuticals, nanomaterials and microplastics are now present in agricultural soils, but the understanding of their impact on soil quality is still limited. With focus on in situ bioremediation, this book provides an exhaustive analysis of the current biological methodologies for recovering polluted agricultural soils as well as monitoring the effectiveness of bioremediation.

Bioremediation of Environmental Pollutants - Deep Chandra Sual 2021-12-11

This book collates the latest trends and technological advancements in bioremediation, especially for its monitoring and assessment. Divided into 18 chapters, the book summarizes basic concepts of waste management and bioremediation, describes advancements of the existing technologies, and highlights the role of modern instrumentation and analytical methods, for environmental clean-up and sustainability. The chapters cover topics such as the role of microbial fuel cells in waste management, microbial biosensors for real-time monitoring of bioremediation processes, genetically modified microorganisms for bioremediation, application of immobilized enzyme reactors, spectroscopic techniques, and in-silico approaches in bioremediation monitoring and assessment. The book will be advantageous not only to researchers and scholars interested in bioremediation and sustainability but also to professionals and policymakers.

Soil Bioremediation - Javid A. Parray 2021-03-22

SOIL BIOREMEDIATION A practical guide to the environmentally sustainable bioremediation of soil Soil Bioremediation: An Approach Towards Sustainable Technology provides the first comprehensive discussion of sustainable and effective techniques for soil bioremediation involving microbes. Presenting established and updated research on emerging trends in bioremediation, this book provides contributions from both experimental and numerical researchers who provide reports on significant field trials. Soil Bioremediation instructs the reader on several different environmentally friendly bioremediation techniques, including: Bio-sorption Bio-augmentation Bio-stimulation Emphasizing molecular approaches and biosynthetic pathways of microbes, this one-of-a-kind reference focuses heavily on the role of microbes in the degradation and removal of xenobiotic substances from the environment and presents a unique management and conservation perspective in the field of environmental microbiology. Soil Bioremediation is perfect for undergraduate students in the fields of environmental science, microbiology, limnology, freshwater ecology and microbial biotechnology. It is also invaluable for researchers and scientists working in the areas of environmental science, environmental microbiology, and waste management.

Biomangement of Metal-Contaminated Soils - Mohammad Saghir Khan 2013-11-27

Heavy-metal contamination is one of the world's major environmental problems, posing significant risks to agro-ecosystems. Conventional technologies employed for heavy-metal remediation have often been expensive and disruptive. This book provides comprehensive, state-of-the-art coverage of the natural, sustainable alternatives that use a wide range of biological materials in the removal/detoxification of heavy metals, consequently leading to the improvement of crops in these soils. Novel, environmentally friendly and inexpensive solutions are presented based on a sound understanding of metal contamination and the roles of plants and microbes in the management of these toxic soils. Written by worldwide experts, the book provides not only the necessary scientific background but also addresses the challenging questions that require special attention in order to better understand metal toxicity in soils and its management through bioremediation.

Microbial Rejuvenation of Polluted Environment - Deepak G. Panpatte 2021-01-18

Pollution is one of the most serious issues facing mankind and other life forms on earth. Environmental pollution leads to the degradation of ecosystems, loss of services, economic losses, and various other problems. The eco-friendliest approach to rejuvenating polluted ecosystems is with the help of microorganism-based bioremediation. Microorganisms are characterized by great biodiversity, genetic and metabolic machinery, and by their ability to survive, even in extremely polluted environments. As such, they are and will remain the most important tools for restoring polluted ecosystems / habitats. This three-volume book sheds light on the utilization of microorganisms and the latest technologies for cleaning up polluted sites. It also discusses the remediation or degradation of various important pollutants such as pesticides, wastewater, plastics, PAHs, oil spills etc. The book also explains the latest technologies used for the degradation of pollutants in several niche ecosystems. Given its scope, the book will be of interest to teachers, researchers, bioremediation scientists, capacity builders and policymakers. It also offers valuable additional reading material for undergraduate and graduate students of microbiology, ecology, soil science, and the environmental sciences.

Advances in Remediation Techniques for Polluted Soils and Groundwater - Pankaj Kumar Gupta 2021-12-13

Advances in Remediation Techniques for Polluted Soils and Groundwater focuses on the thematic areas for assessment, mitigation, and management of polluted sites. This book covers advances in modelling approaches, including Machine Learning (ML)/ Artificial Intelligence (AI) applications; GIS and remote sensing; sensors; impacts of climate change on geogenic contaminants; and socio-economic impacts in the poor rural and urban areas, which are lacking in a more comprehensive manner in the previous titles. This book encompasses updated information as well as future directions for researchers working in the field of management and remediation of polluted sites. Introduces fate and transport of multi-pollutants under varying subsurface conditions Details underlying mechanisms of biodegradation and biotransformation of geogenic, industrial and emerging pollutants Presents recent advances and challenges in assessment, water quality modeling, uncertainty, and water supply management Provides authoritative contributions on the diverse aspects of management and remediation from leading experts around the

world

Advances in Bioremediation of Wastewater and Polluted Soil - Naofumi Shiomi 2015-09-09

The pollution of soil and groundwater by heavy metals and other chemicals is becoming a serious issue in many countries. However, the current bioremediation processes do not often achieve sufficient remediation, and more effective processes are desired. This book deals with advances in the bioremediation of polluted soil and groundwater. In the former chapters of this book, respected researchers in this field describe how the optimization of microorganisms, enzymes, absorbents, additives and injection procedures can help to realize excellent bioremediation. In the latter chapters, other researchers introduce bioremediation processes that have been performed in the field and novel bioremediation processes. Thus, the readers will be able to obtain new ideas about effective bioremediation as well as important information about recent advances in bioremediation.

Electrochemically Assisted Remediation of Contaminated Soils - M. A. Rodrigo 2021-06-15

This book provides an overview of the current development status of remediation technologies involving electrochemical processes, which are used to clean up soils that are contaminated with different types of contaminants (organics, inorganics, metalloids and radioactive). Written by internationally recognized experts, it comprises 21 chapters describing the characteristics and theoretical foundations of various electrochemical applications of soil remediation. The book's opening section discusses the fundamental properties and characteristics of the soil, which are essential to understand the processes that can most effectively remove organic and inorganic compounds. This part also focuses on the primary processes that contribute to the application of electrochemically assisted remediation, hydrodynamic aspects and kinetics of contaminants in the soil. It also reviews the techniques that have been developed for the treatment of contaminated soils using electrochemistry, and discusses different strategies used to enhance performance, the type of electrode and electrolyte, and the most important operating conditions. In turn, the book's second part deals with practical applications of technologies related to the separation of pollutants from soil. Special emphasis is given to the characteristics of these technologies regarding transport of the contaminants and soil toxicity after treatment. The third part is dedicated to new technologies, including electrokinetic remediation and hybrid approaches, for the treatment of emerging contaminants by ex-situ and in-situ production of strong oxidant species used for soil remediation. It also discusses pre-pilot scale for soil treatment and the use of solar photovoltaic panels as an energy source for powering electrochemical systems, which can reduce both the investment and maintenance costs of electrochemically assisted processes.

Remediation of Hazardous Waste Contaminated Soils - Donald L. Wise 2018-10-03

"This unique, single-source reference offers a thorough treatment of the remediation of soils contaminated by hazardous wastes and the scientific and engineering issues that must be addressed in creating practical solutions for their reclamation.

Advances in Microbe-assisted Phytoremediation of Polluted Sites - Kuldeep Baudh 2022-08-16

Advances in Microbe-assisted Phytoremediation of Polluted Sites provides a comprehensive overview of the use of phytoremediation to decontaminate polluted land through microbial enhanced phytoremediation, including the use of plants with respect to ecological and environmental science. The book discusses the potential of microbial-assisted phytoremediation of the contaminant, including heavy metals, pesticides, polyaromatic hydrocarbons, etc., with case studies as examples. Key subjects covered include plant-microbe interaction in contaminated ecosystems, microbe-augmented phytoremediation for improved ecosystem services, and success stories on microbe-assisted phytoremediation of contaminated sites. With increasing demand for land-space for social, industrial and agricultural use, the theoretical millions of hectares of contaminated sites around the world are a resource sorely needed that currently cannot be utilized.

Decontamination of this land using ecologically-sound methods is paramount not only to land use, but in the prevention of toxic substances deteriorating local ecosystems by reducing productivity and contaminating the food chain - which can eventually aggregate in food chains and pose the potential risk of non-curable diseases to humans such as cancer. Provides novel information on the potential for microbial inoculants to be used in phytoremediation Discusses principles and

mechanisms of plant-microbe interaction for enhanced phytoremediation with improved soil health Investigates phytoremediation solutions for a multitude of contaminants, including heavy metals, fly ash, petroleum, arsenic, TPH, mining effluents, fluoride, lead and other major pollutants
Microbial Rejuvenation of Polluted Environment - Deepak G. Panpatte 2021-01-15

Pollution is one of the most serious issues facing mankind and other life forms on earth. Environmental pollution leads to the degradation of ecosystems, loss of services, economic losses, and various other problems. The eco-friendliest approach to rejuvenating polluted ecosystems is with the help of microorganism-based bioremediation. Microorganisms are characterized by great biodiversity, genetic and metabolic machinery, and by their ability to survive, even in extremely polluted environments. As such, they are and will remain the most important tools for restoring polluted ecosystems / habitats. This three-volume book sheds light on the utilization of microorganisms and the latest technologies for cleaning up polluted sites. It also discusses the remediation or degradation of various important pollutants such as pesticides, wastewater, plastics, PAHs, oil spills etc. The book also explains the latest technologies used for the degradation of pollutants in several niche ecosystems. Given its scope, the book will be of interest to teachers, researchers, bioremediation scientists, capacity builders and policymakers. It also offers valuable additional reading material for undergraduate and graduate students of microbiology, ecology, soil science, and the environmental sciences.

Bioavailability of Organic Xenobiotics in the Environment - P. Baveye 2013-03-14

In the continuing fight against organic environmental xenobiotics, the initial success attributed to bioremediation has paled, in part due to the low availability of xenobiotics entrapped within a soil or sediment matrix. This has generated a very significant wave of interest in the bioavailability issue. However, much experimental evidence is puzzling or contradictory, mechanistic theories are embryonic, and implications for the practice of bioremediation or concerning the natural fate of xenobiotics are still tentative. The debate in Europe and the USA is vigorous. Eastern Europe, following the liberalisation of the economy and political life, is evolving in a similar direction. In many cases, however, limited access to literature sources, severe language barriers, and the lack of a strong pluridisciplinary tradition are hampering the adoption of state of the art techniques. Originally intended to allow scientists in East European countries to become acquainted with the key aspects of the bioavailability debate that is unfolding in the scientific literature in the West, and with its implications for bioremediation efforts, the present book presents a very complete coverage of the theoretical and practical aspects of the (limited) bioavailability of organic xenobiotics in the environment.

Environmental Pollution and Remediation - Ram Prasad (Professor of botany) 2020

This book presents state-of-the-art environmental remediation processes. Environmental protection and management is a global concern, especially in the context of industrial regions. Over the years, several conventional, engineering-based physicochemical decontamination methods have been used in the remediation of polluted sites. However, these methods are expensive and have limited efficiency. Drawing on research and examples from around the world, this book offers a comprehensive review of and insights into green technologies and sustainable remediation alternatives. It discusses the emerging importance of nanotechnology, chemo and biosensors, indicator species, microbe-based remediation of organic compounds, and ex-situ remediation methods. Addressing the growing global need for a holistic overview of the environmental remediation of polluted sites, it will appeal to teachers, researchers, scientists, capacity builders, and policymakers. It also serves as additional reading material for undergraduate and graduate students of biotechnology and environmental sciences.

Handbook of Research on Microbial Tools for Environmental Waste Management - Pathak, Vinay Mohan 2018-04-27

The remediation of environmental pollutants has become a relevant topic within the field of waste management. Advances in biological approaches are a potential tool for contamination and pollution control. The *Handbook of Research on Microbial Tools for Environmental Waste Management* is a critical scholarly resource that explores the advanced biological approaches that are used as remediation for pollution cleanup processes. Featuring coverage on a broad range of topics such as biodegradation, microbial dehalogenation, and pollution controlling treatments, this book is geared towards environmental scientists,

biologists, policy makers, graduate students, and scholars seeking current research on environmental engineering and green technologies.

Assisted Phytoremediation - Vimal Chandra Pandey 2021-09-21

Assisted Phytoremediation covers a wide range of uses of plants for remediation of environmental pollutants. It includes coverage of such techniques as root engineering, transgenic plants, increasing the biomass, use of genetic engineering and genome editing technology for rapid phytoremediation of pollutants. In order to improve the efficiency of plant remediation, genetic engineering plays a vital role in the overexpression of genes or gene clusters, which are responsible for degradation and uptake of pollutants. The book presents state-of-the-art techniques of assisted phytoremediation to better manage soil and water pollution in large amounts. This book is a valuable resource for researchers, students, and engineers in environmental science and bioengineering, with case studies and state-of-the-art research from eminent global scientists. This book serves as an excellent basis from which scientific knowledge can grow and widen in the field of environmental remediation. Provides a clear picture of how to design, tune, and implement assisted phytoremediation techniques Offers a comprehensive analysis of current perspective and state-of-the-art applications of assisted phytoremediation Introduces the potential of genetic engineering as a rapid, cost-effective technology for environmental remediation using plants

Green Sustainable Process for Chemical and Environmental Engineering and Science - Dr. Inamuddin 2021-06-02

Green Sustainable Process for Chemical and Environmental Engineering and Science: Biosurfactants for the Bioremediation of Polluted Environments explores the use of biosurfactants in remediation initiatives, reviewing knowledge surrounding the creation and application of biosurfactants for addressing issues related to the release of toxic substances in ecosystems. Sections cover their production, assessment and optimization for bioremediation, varied pollutant degradation applications, and a range of contaminants and ecological sites. As awareness and efforts to develop greener products and processes continues to grow, biosurfactants are garnering more attention for the potential roles they can play in reducing the use and production of more toxic products. Drawing on the knowledge of its expert team of global contributors, this book provides useful insights for all those currently or potentially interested in developing or applying biosurfactants in their own work. Provides an accessible introduction to biosurfactant chemistry Highlights the optimization, modeling, prediction and kinetics of key factors supporting biosurfactant-enhanced biodegradation processes Explores a wide range of biosurfactant applications for remediation and degradation of pollutants

Biomanagement of Metal-Contaminated Soils - Mohammad Saghir Khan 2011-08-30

Heavy-metal contamination is one of the world's major environmental problems, posing significant risks to agro-ecosystems. Conventional technologies employed for heavy-metal remediation have often been expensive and disruptive. This book provides comprehensive, state-of-the-art coverage of the natural, sustainable alternatives that use a wide range of biological materials in the removal/detoxification of heavy metals, consequently leading to the improvement of crops in these soils. Novel, environmentally friendly and inexpensive solutions are presented based on a sound understanding of metal contamination and the roles of plants and microbes in the management of these toxic soils. Written by worldwide experts, the book provides not only the necessary scientific background but also addresses the challenging questions that require special attention in order to better understand metal toxicity in soils and its management through bioremediation.

Environmental Risk Assessment of Soil Contamination - Maria C. Hernandez Soriano 2014-03-26

Soil is an irreplaceable resource that sustains life on the planet, challenged by food and energy demands of an increasing population. Therefore, soil contamination constitutes a critical issue to be addressed if we are to secure the life quality of present and future generations. Integrated efforts from researchers and policy makers are required to develop sound risk assessment procedures, remediation strategies and sustainable soil management policies. Environmental Risk Assessment of Soil Contamination provides a wide depiction of current research in soil contamination and risk assessment, encompassing reviews and case studies on soil pollution by heavy metals and organic pollutants. The book introduces several innovative approaches for soil remediation and risk assessment, including advances in phytoremediation and implementation of metabolomics in soil sciences.

Contaminated Soils, Sediments and Water: - Edward J. Calabrese 2010-10-29

Volume 9 of the series presents 38 technical papers covering a wide range of environmental issues, including Bioremediation, Chemical Oxidation, Heavy Metals, MTBE, Phytoremediation, Radiation, Regulatory and Legal issues, Remediation, Risk Based Cleanup and Site Assessment. Contributing authors are drawn from across the spectrum of interest: government agencies, academic institutions, the consulting community and industrial companies.

Bioremediation and Biotechnology - Khalid Rehman Hakeem 2020-01-26

Toxic substances threatens aquatic and terrestrial ecosystems and ultimately human health. The book is a thoughtful effort in bringing forth the role of biotechnology for bioremediation and restoration of the ecosystems degraded by toxic and heavy metal pollution. The introductory chapters of the book deal with the understanding of the issues concerned with the pollution caused by toxic elements and heavy metals and their impacts on the different ecosystems followed by the techniques involved in monitoring of the pollution. These techniques include use of bio-indicators as well as modern techniques for the assessment and monitoring of toxicants in the environment. Detailed chapters discussing the role of microbial biota, aquatic plants, terrestrial plants to enhance the accumulation efficiency of these toxic and heavy metals are followed by remediation techniques involving myco-remediation, bio-pesticides, bio-fertilizers, phyto-remediation and rhizo-filtration. A sizable portion of the book has been dedicated to the advanced bio-remediation techniques which are finding their way from the laboratory to the field for revival of the degraded ecosystems. These involve bio-films, micro-algae, genetically modified plants and filter feeders. Furthermore, the book is a detailed comprehensive account for the treatment technologies from unsustainable to sustainable. We believe academicians, researchers and students will find this book informative as a complete reference for biotechnological intervention for sustainable treatment of pollution.

Soil pollution: a hidden reality - Food and Agriculture Organization of the United Nations 2018-04-30

This document presents key messages and the state-of-the-art of soil pollution, its implications on food safety and human health. It aims to set the basis for further discussion during the forthcoming Global Symposium on Soil Pollution (GSOP18), to be held at FAO HQ from May 2nd to 4th 2018. The publication has been reviewed by the Intergovernmental Technical Panel on Soil (ITPS) and contributing authors. It addresses scientific evidences on soil pollution and highlights the need to assess the extent of soil pollution globally in order to achieve food safety and sustainable development. This is linked to FAO's strategic objectives, especially SO1, SO2, SO4 and SO5 because of the crucial role of soils to ensure effective nutrient cycling to produce nutritious and safe food, reduce atmospheric CO₂ and N₂O concentrations and thus mitigate climate change, develop sustainable soil management practices that enhance agricultural resilience to extreme climate events by reducing soil degradation processes. This document will be a reference material for those interested in learning more about sources and effects of soil pollution.

Remediation of Hazardous Waste Contaminated Soils - Donald L. Wise 1994-03-30

"This unique, single-source reference offers a thorough treatment of the remediation of soils contaminated by hazardous wastes and the scientific and engineering issues that must be addressed in creating practical solutions for their reclamation."

Metal-Contaminated Soils - Jaco Vangronsveld 1998-11-20

An unfortunate by-product of industrialization is the contamination of soil and water resources with toxic metals, which becomes an environmental concern when the concentration in soils begins to affect human health. Current remediation methods applicable to contaminated soils are expensive and environmentally invasive since they are based primarily on civil-engineering techniques. This book represents an overview of efforts in exploiting biological and chemical processes to reduce the inherent risk associated with metal-contaminated soils. It presents a comprehensive, up-to-date analysis of in situ immobilization and inactivation of toxic metals by means of plants, microorganisms and invertebrates.

Environmental Contamination - Ming Hung Wong 2012-07-24

Bringing together the research of 62 distinguished scientists in one volume, Environmental Contamination: Health Risks and Ecological Restoration offers a comprehensive view of the remediation of

contaminated land. A one-stop resource, it covers historical and emerging contaminants, the issues of bioavailability of chemicals and their associated human health risks, and the latest remediation technologies. The book also contains numerous case studies, many of them drawn from the Asia-Pacific region, that look at the effects of rapid industrialization. The chapters are inspired by presentations and discussions held during the 2010 Croucher Advanced Study Institute workshop, entitled Remediation of Contaminated Land—Bioavailability and Health Risk. With the speed and scale of recent socioeconomic development, particularly in regions with less stringent environmental regulations, it is evident that various industrial activities have given rise to tremendous environmental degradation and severe health problems. The book begins with a description of current problems and future trends of pollutants, as well as their impact on the environment and human health. It then focuses on emerging contaminants, such as flame retardants and electronic waste. The book also examines research on environmentally friendly and sustainable solutions to remediate contaminated lands, exploring cutting-edge bioremediation and phytoremediation technologies. Chapters discuss arsenic biomethylation, copper homeostasis, microbial transformation of phthalate esters, the potential function of paddy fields in phytoremediation, the use of constructed wetlands for pollution control, phytostabilization of arsenic-contaminated sites, and more. This timely book provides readers with a highly focused reference on some of the most urgent environmental and health issues and research topics. These include e-waste recycling and arsenic and heavy metal contamination of rice—issues that are relevant for many countries around the world.

Environmental Pollutants and their Bioremediation Approaches - Ram Naresh Bharagava 2017-07-06

This book is a compilation of detailed and latest knowledge on the various types of environmental pollutants released from various natural as well as anthropogenic sources, their toxicological effects in environments, humans, animals and plants as well as various bioremediation approaches for their safe disposal into the environments. In this book, an extensive focus has been made on the various types of environmental pollutants discharged from various sources, their toxicological effects in environments, humans, animals and plants as well as their biodegradation and bioremediation approaches for environmental cleanup.

Bioremediation of Contaminated Soils - Donald L. Wise 2000-06-09

This volume focuses on innovative bioremediation techniques and applications for the cleanup of contaminated media and sites. It includes quantitative and design methods that elucidate the relationships among various operational parameters, and waste chemistry that defines the cost effectiveness of bioremediation projects. It also presents numerical models.

Urban Pollution - Susanne M. Charlesworth 2019-01-04

Multidisciplinary treatment of the urgent issues surrounding urban pollution worldwide. Written by some of the top experts on the subject in the world, this book presents the diverse, complex and current themes of the urban pollution debate across the built environment, urban development and management continuum. It uniquely combines the science of urban pollution with associated policy that seeks to control it, and includes a comprehensive collection of international case studies showing the status of the problem worldwide. *Urban Pollution: Science and Management* is a multifaceted collection of chapters that address the contemporary concomitant issues of increasing urban living and associated issues with contamination by offering solutions specifically for the built environment. It covers: the impacts of urban pollution; historical urban pollution; evolution of air quality policy and management in urban areas; ground gases in urban environments; bioaccessibility of trace elements in urban environments; urban wastewater collection, treatment, and disposal; living green roofs; light pollution; river ecology; greywater recycling and reuse; containment of pollution from urban waste disposal sites; bioremediation in urban pollution mitigation; air quality monitoring; urban pollution in China and India; urban planning in sub-Saharan Africa and more. Deals with both the science and the relevant policy and management issues. Examines the main sources of

urban pollution. Covers both first-world and developing world urban pollution issues. Integrates the latest scientific research with practical case studies. Deals with both legacy and emerging pollutants and their effects. The integration of physical and environmental sciences, combined with social, economic and political sciences and the use of case studies makes *Urban Pollution: Science and Management* an incredibly useful resource for policy experts, scientists, engineers and those interested in the subject.

Spatial Modeling and Assessment of Environmental Contaminants

- Pravat Kumar Shit 2021-02-05

This book demonstrates the measurement, monitoring and mapping of environmental contaminants in soil & sediment, surface & groundwater and atmosphere. This book explores state-of-art techniques based on methodological and modeling in modern geospatial techniques specifically focusing on the recent trends in data mining techniques and robust modeling. It also presents modifications of and improvements to existing control technologies for remediation of environmental contaminants. In addition, it includes three separate sections on contaminants, risk assessment and remediation of different existing and emerging pollutants. It covers major topics such as: Radioactive Wastes, Solid and Hazardous Wastes, Heavy Metal Contaminants, Arsenic Contaminants, Microplastic Pollution, Microbiology of Soil and Sediments, Soil Salinity and Sodicity, Aquatic Ecotoxicity Assessment, Fluoride Contamination, Hydrochemistry, Geochemistry, Indoor Pollution and Human Health aspects. The content of this book will be of interest to researchers, professionals, and policymakers whose work involves environmental contaminants and related solutions.

Phytoremediation of Environmental Pollutants - Ram Chandra 2017-12-14

Phytoremediation aids to augment bioremediation as it uses broad range plants to remediate soil, sediment, surface water and ground water that have been contaminated with toxic metals, organic, pesticides and radionuclides. This book serves to disseminate detailed up to date knowledge regarding the various aspects of phytoremediation and plant-microbe interaction. The book highlights process and molecular mechanisms for industrial waste detoxification during phytoremediation in wetland plants, role of endophytic bacteria for phytoremediation of environmental pollutants, constructed wetland treatment system for treatment and recycling of hazardous wastewater, amongst other relevant topics. Key Features: Focuses on phytoremediation process for different pollutants, mainly heavy metal detoxification in the presence of other co-pollutants. Includes plant-soil-microbe interactions in phytoremediations and remediation of contaminated water. Explores life cycle assessment of industrial waste contaminated site with organic pollutants. Discusses hyperaccumulator versus non-hyperaccumulator plants for environmental waste management. Includes bacterial assisted phytoremediation and siderophore formation in specific environmental conditions.

Research Anthology on Emerging Techniques in Environmental Remediation - Management Association, Information Resources 2021-11-26

As industry develops globally, environmental pollution grows to be an increasingly serious problem with each passing year. While there are many things that individuals on every level of power can do to mitigate the harm done to the environment, environmental remediation is a step to take to save our soil and water resources. As this problem is ongoing, it is essential to be knowledgeable in the emerging techniques made within the field of environmental remediation. The *Research Anthology on Emerging Techniques in Environmental Remediation* is a comprehensive resource on the emerging techniques and developments made within the field of environmental remediation. With global contributing authors, this book explores environmental remediation within diverse settings and international standards. Covering topics such as pollution and contamination, nanotechnology, and agriculture, this book is an essential reference for scientists, chemists, environmentalists, government officials, professors, students, researchers, conservationists, and academicians.