Bioavailability, Toxicity, and Risk Relationships in Ecosystems


Impact of the contaminants on ecosystem and human health is mainly dependent on the availability of these contaminants for plants, microbial biota, and animals in the terrestrial environment. Therefore, the contaminants’ “bioavailability” is the key indicator of potential risk to both ecosystem and human health. Despite its prime importance, it is very difficult or sometimes even impossible to accurately assess bioavailability of contaminants in the terrestrial environment to different ecological receptors.

This book covers fundamental principles relating to bioavailability, environmental and human health risk assessment, the importance of chemical speciation in determining bioavailability, potential role of bioavailability in risk assessment, potential indicators of bioavailability, and case studies demonstrating how reduction of bioavailability could be used to reduce environmental and health hazards due to trace elements.

The book is divided into three main sections that comprise 12 chapters written by various authors who are currently involved actively in relevant research areas. Under Section A, “Fundamental Principles,” Chapter 1 (written by Moore) is titled “Risk Assessment in Environmental Contamination and Environmental Health,” Chapter 2 (Naidu et al.) is titled “Bioavailability of Metals in the Soil Plant Environment and its Potential Role in Risk Assessment,” and Chapter 3 (Sauvé) is titled “The Role of Chemical Speciation in Bioavailability.” Under Section B, “Indicators of Bioavailability,” Chapter 4 (Brooks) is titled “Microbial Parameters as Indicators of Toxic Effects of Heavy Metals on the Soil Ecosystem,” Chapter 5 (Megharaj et al.) is titled “Metal-Algae Interactions: Implications of Bioavailability,” Chapter 6 (Loeppert et al.) is titled “Absorption and Translocation of Chromium by Plants: Plant Physiological and Soil Factors,” and Chapter 7 (Bujtas et al.) is titled “Plant Soil Metal Relationships from the Micro and Macro Scale.” Under Section C, “Case Studies,” Chapter 8 (Markich et al.) is titled “Effects of Mining Freshwater Biota in Tropical Northern Australia,” Chapter 9 (Berti and Ryan) is titled “In Place Inactivation: Ecological Restoration Technologies (IINERT)” and reviews case studies from the United States that focus on in place inactivation methods for inorganic soils, Chapter 10 (Morrell et al.) is titled “An Acid Revegetation Potential of Acidic Basemetal Metal-Tolerant Grass Species and Lime” and it presents a study from New Zealand, and Chapter 11 (Chowdhury et al.) is titled “Groundwater Arsenic Contamination in India and Bangladesh: Case Study on Bioavailable Geoegenic Arsenic.” The final chapter (Naidu et al.) is titled “Bioavailability, Toxicity and Risk Relationships: The Path Ahead” and summarizes the main findings previously and concludes the book.

This book is done well in compiling important topics and also successful in putting some ill-defined/vaguely defined or yet developing terms and topics in the area of contaminant bioavailability and risk assessment into some perspective. Given the ever increasing interest and need to understand of contaminant bioavailability, toxicity, and risk relationships in ecosystems, this book is a rich source of information. I highly recommend it for established researchers in soil and environmental science, study soil contamination, remediation, and other related fields as their research focus; remediationists; environmental planners; and interested regulatory authorities.

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