CONTAMINATED SOILS, SEDIMENTS, AND WATER
Volume 13

Analysis
Bioremediation
Brownfields
Chemical Oxidation
Environmental Fate
Environmental Forensics
Ethics in Environmental Practice
Heavy Metals
Modeling
Regulatory
Remediation
Risk Assessment
Sediments

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Foreword

For the biosphere to sustain human life ecosystem components must function collectively to provide the physical, chemical, and biological services on which we depend. Energy flux, matter cycling, temperature amelioration, gas exchange, water provision, and pH constraints are among the large-scale processes on which life depends. For these and the infinitely intricate web of interactions at lower levels of the biogeochemical hierarchy to continue, each ecosystem structure and function must operate within individual limits that allow the aggregated holistic enterprise to prosper.

In the middle decades of the past century, medical researcher Hans Selye postulated and documented a General Adaptation Syndrome of consistent physiological responses of organisms to diverse challenges. His original vision of G.A. Syndrome has needed some tweaking to accommodate subsequent findings regarding the importance of nonspecific inflammatory response and the pathogenic nature of gastrointestinal ulcers. But Selye’s elucidation of changes in structures and functions of an organism fighting for homeostasis under threat provided a useful framework for understanding relationships between stress and health.

Stresses beyond the individual level in the ecosystem engender homeostatic resistance (for example, fecundity drops in some populations when trophic resources are limited) and potential for permanent alteration when pushed beyond response thresholds. By analogy, ecosystem “stresses” can be characterized diagnostically and treated when long-term consequences are anticipated.

The “good earth” of the ecosystem—soils and sediments—is the source of many of the biogeochemical responses to environmental stress, and a critically important component that, when “broken”—impaired at substantive levels—must be “repaired”—restored—for the system as a whole to function effectively. Stewardship of soils and sediments for sustainability requires that we diagnose impairments, reduce or eliminate impairments by remediation, and assist whole-system recovery by restoration. The papers gathered in this volume provide a rich source of resources for evaluating, remediating, and restoring stressed soils and sediments. The authors are practitioners at the cutting edge of the field of environmental management. Their contributions published here represent reports from the front lines on the state-of-the-science of analysis, assessment, management policy, remediation technology, and regulation. The compendium you hold in your hands is a source of information to help you keep up-to-date and a challenge to you to build out the next steps in soil and sediment assessment and management. We look forward to working with you to maintain and enhance the health of the biosphere for our children and their children.

David F. Ludwig, Scientist

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