Soil in the Environment

Daniel Hillel


Reviewed by Ardell D. Halvorson*

This well written book explains to the reader how soil is one of the major essential components for sustaining terrestrial life on earth. The complex and dynamic interactions that occur in soil are explained in easily understandable terms. Dr. Hillel describes soil as “the earth’s dynamic processor and recycler of vital materials and energy, the seminal crucible within which life in the land domain is generated and sustained.” He attempts to broaden the reader’s knowledge of soil and soil functions and stimulate an interest and better understanding of the importance of soil to sustaining life today and the importance of preserving it for future generations.

Chapter 1, “Soil as a living body: Its dynamic role in the environment” introduces the reader to soil and its complex and dynamic nature, and a definition of soil. Chapter 2, “Soil in the history of civilization” tells the story of the early development of agriculture in Africa and the Near East and the importance of soils to beginning civilization. Chapter 3, “Soil formation” describes in general terms how soils develop and how parent material, climate, biotic community, topography, and time influence the type of soil present at a given location. Chapter 4, “Soil Classification” discusses the soil ecozones of the World and soil classification schemes for several regions of the World, including photos of different soil profiles. Chapter 5, “Soil physical attributes” describes the solid phase, liquid phase, and gaseous phase making up a body of soil and how they influence soil functions. Textural classes, particle-size distribution, clay structure, organic matter, and cation-exchange capacity are discussed. Chapter 6, “Soil-water statics” describes how water is held in soil, and effects of matric and osmotic soil water potential on the movement of water within a soil profile. Chapter 7, “Soil-water dynamics” discusses the flow of water in saturated and unsaturated soils. Chapter 8, “Soil-water cycle” discusses water storage in and loss (evaporation, transpiration, and drainage) from soil and its relationship to groundwater. Chapter 9, “Soil-water and soil-energy balances in the field” discusses the water balance in the root zone of plants, energy requirements for water movement and change in soil, and role of water in warming and cooling of soils. Chapter 10, “Soil chemical attributes and processes” provides information on how soil organic matter, soil acidity, oxidation–reduction processes, and soil salinity influence soil plant nutrients and plant growth. Chapter 11, “Soil fertility and plant nutrition” presents the role of soil in the mineral nutrition of plants. Soil fertility management, fertilizers, soil amendments and essential plant nutrients are discussed. Chapter 12, “Soil biodiversity” discusses the role of soil flora and fauna in maintaining soil productivity and biodiversity. Chapter 13, “Soil and water management” discusses the effects of tillage on soil susceptibility to erosion and loss of soil organic matter. Soil management effects on soil compaction and soil productivity are discussed. Irrigation water management practices, including drainage, are discussed. Chapter 14, “Soil erosion and conservation” describes the processes of wind and water erosion and factors contributing to the severity of soil erosion, such as tillage management and drought, as well as suggested methods and practices to reduce soil erosion. Chapter 15, “Soil pollution and remediation” addresses the role of soil in filtering pollutants from contaminated water and waste disposal by humans as well as the effects of waste disposal on soil quality. Chapter 16, “Concluding overview” discusses the importance of sustaining our soil productivity to supply the food, fiber, and energy needs of an increasing World population with a diminishing land area suitable for sustainable food production. Appendix A: “Role of soil in the mitigation of global warming” provides good background information on the role of soil and crop and soil management in mitigating global warming. Appendix B: “The role of soil in the global food supply” provides a discussion on agricultural management practices needed to manage our soil resource to sustain its productivity for future generations.

The book includes figures and tables, a glossary of terms, a bibliography, and index. The figures and tables, however, are seldom referenced or discussed in the text; they are apparently included to provide important data or show concepts. Many chapters also contain additional short text sections that describe in more detail or explain a critical component of the chapter.

This book presents a great overview of the complex and dynamic nature of soil in our environment and its importance in sustaining terrestrial life on earth. Dr. Hillel is accurate in saying that “soil science should, indeed must, be included in the curricula of all students of the life sciences and the environmental sciences, including biology, ecology, geography, geology, climatology, hydrology, as well as civil and environmental engineering, and even the humanities.” This well written book on soil should be choice reading for students and practitioners of the above-mentioned sciences that need to improve their knowledge of the role of soil in the environment and the need to protect this precious resource for future generations. It could be used as a soils textbook for students not majoring in soil science.

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