

BOOK REVIEW

Urban soils. Principles and practice, by Andrew W. Rate (Editor)

Remigio Paradelo Núñez

The book *Urban soils. Principles and practice*, edited (and mostly authored) by Rate (2022), presents abundant information about the properties and functioning of soils of urban areas. These soils are a topic of increasing interest with the intensification of urbanization in the past few decades, which need to be understood as a key component of urban ecosystems. The book covers topics, including the history of urban ecosystems, urban soil genesis and development, spatial variability, functions and contamination, physical and biological properties, their importance for human health, and remediation techniques. A large part of the book is devoted to detailed descriptions of general concepts in soil science, including soil components, functions, processes, and properties, which are undoubtedly essential to understanding urban soils. The book is well illustrated, with informative and useful schemas, plots, and figures summarizing results from scientific papers. The inclusion of questions and exercises at the end of each chapter makes the book a potential textbook for students in soil science.

The book begins with a brief exposition of the history of urbanization and its impacts on soils. The second chapter presents urban soil genesis, using a structure that will be replicated in many other chapters: an introduction to the concept or problem for all soils followed by its application to urban soils. Although this chapter presents diverse examples of urban soils, including those found in landfills or archeological settings, a deeper examination of soil forming factors and processes specific to urban areas—as well as a description of typical horizons or a catalog of urban soil profiles—would have been informative. Future editions might divide the second chapter into two sections, one devoted to formation processes and the other to urban soil morphology.

The third chapter focuses on an important feature of urban soils: their much higher spatial variability than soils formed through natural processes, due to the human decisions that drive the distribution of urban soils. The chapter explains in much detail the statistics used to describe that variability in

urban soils research, including data kriging and spatial representation and statistics using *R*, as well as urban soil sampling strategies.

The fourth chapter, essentially a chapter on basic soil science, without much reference to urban soils, offers an overview of physical, chemical, and biological processes in soils. Despite the chapter's title, "Urban soil functions," little is said about soil functions, but essential concepts such as chemical processes or energy fluxes are well described. Chapter 5 discusses soil physics, one of the most important aspects of soils in urban areas. The negative properties of urban soils, regarding the water cycle, especially compaction and sealing, infiltration, and risk of erosion, are presented first, followed by a discussion of the impacts of these properties on soil functions. The chapter ends with an overview of methods for measuring the physical properties of soils in urban environments.

Two chapters address soil contamination, a critical issue in urban ecosystems: chapter 6 for inorganic pollutants and chapter 7 for organics. The primary pollutants of concern, their sources and dynamics in soils, and the factors that influence their concentrations are discussed in detail, along with methodological and legal/regulatory issues. A summary table of typical concentrations for the most common pollutants would be a useful addition to each chapter. Besides, chapter 6 provides very complete explanations of basic concepts in soil chemistry, including fractionation, speciation, and availability, whereas chapter 7 presents a detailed case study on PAH concentrations in the Pearl River Bay.

Chapter 8 is the last devoted to soil properties, in this case their biological properties. The chapter is comprehensive, with content ranging from the composition of soil fauna to methods for soil microbiome identification and community composition studies using DNA techniques. The chapter also discusses the different types of urban soils, for example, natural, constructed, and different land uses, including urban

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. *Urban Agriculture & Regional Food Systems* published by Wiley Periodicals LLC on behalf of American Society of Agronomy and Crop Science Society of America

gardens, grasslands, green infrastructure, and the impacts of urban soil properties and use on living organisms.


Each of the next three chapters addresses specific dimensions of soil functioning. The dynamics of elements and chemical compounds, for example, C, N, S, and organics, are discussed together—along with brief considerations of risk assessment—in chapter 9. This chapter is less coherent than others: Risk assessment in urban soils deserves a chapter on its own, and the remaining material could be treated separately as a standalone chapter or integrated into others. Chapter 10 discusses the importance of urban soils for the UN Sustainable Development Goals before focusing more precisely on the relationship between urban soils and human health. Chapter 11 offers a comprehensive overview of the topic of soil remediation with a scope well beyond urban soils. It includes clear explanations of remediation processes and techniques—though only a few directly related to urban soils—as well as regulatory issues on contaminated soils from different countries. The book ends with a chapter on the future of urban soils and topics that are and will be essential for cities and our society in general: urban agriculture, climate change, soil protection, and land planning. A final glossary of terms completes the book's content.

Overall, the book offers a comprehensive overview of aspects of soil science that are relevant for the understanding of urban ecosystems. Although some sections lack information specific to urban soils, this may be an indication of the need for more research on these soils rather than a shortcoming of the book. In summary, *Urban soils* is a useful

book that will interest several groups of readers: researchers in urban soils, soil scientists in general, students in soil science courses, and specialists from other disciplines working on urban ecosystems and urban development.

CONFLICTS OF INTEREST

The author has no conflicts of interest to declare that are relevant to the content of this article.

Remigio Paradelo Núñez 

*Departamento de Edafología e Química Agrícola,
Universidade de Santiago de Compostela, Santiago de
Compostela, Spain*

Correspondence

Remigio Paradelo Núñez, Departamento de Edafología e Química Agrícola, Universidade de Santiago de Compostela, Facultade de Farmacia, 15782 Santiago de Compostela, Spain.

Email: remigio.paradelo.nunez@usc.es

ORCID

Remigio Paradelo Núñez  <https://orcid.org/0000-0002-4165-177X>

REFERENCE

1. Rate, A. W. (Ed.) (2022). *Urban soils. Principles and practice*. Springer Nature.