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Landscape pattern and ecological process: an important update of a classic textbook

Turner, Monica G., and Robert H. Gardner. 2015. **Landscape ecology in theory and practice: pattern and process.** Second edition. Springer Science + Business Media, New York, New York. xx + 482 p. $99.00 (hardcover), ISBN: 978-1-4939-2893-7 (acid-free paper); $69.99 (e-book), ISBN: 978-1-4939-2794-4.

Key words: landscape ecology; pattern; scale; spatial ecology; textbook.

Landscape ecology is the study of the causes and ecological consequences of spatial pattern. It is a satisfying mix of geography and ecology—drawing on the tools of both disciplines to answer questions at scales that often, but not always, dwarf those of traditional ecological studies. Although still a relatively young discipline, landscape ecology has matured significantly since being brought to North America from Europe by Richard Forman and others in the early to mid 1980s and adopted and adapted by a small group of enthusiastic ecologists.

When I first discovered landscape ecology in the 90s, like me, it was still finding itself. There were multiple definitions and descriptions of the field—some quite divergent. There was a pervasive, almost suffocating focus on tool development—remote sensing, geographic information systems, and landscape metrics. All cool, new tools that allowed us to measure patterns in new ways and at scales we couldn't have dreamed of just a few decades earlier. In those days, a meeting of the U.S. Regional Association of the International Association of Landscape Ecology was part GIS tradeshow and part landscape-metrics bake-off. I exaggerate—a little.

Despite this heavy focus on tools, it was an exciting time for landscape ecology. There were enough observations and tools to start formulating theories and testing them. Questions of scale and scaling were paramount—identifying the appropriate scale of observation, scale domains, scale dependence, and scaling up. Hierarchy theory, fractals, and percolation theory were imported and assimilated. An understanding of the effects of landscape heterogeneity on organisms, populations, ecosystems, and disturbance dynamics was beginning to form—an understanding that drew from metapopulation theory, island biogeography, and patch dynamics.

It was at this time, that Monica Turner, Robert Gardner, and Robert O'Neill wrote the first edition of *Landscape ecology in theory and practice*. It quickly became *the* landscape ecology textbook. It provided an introduction to the field, and with its companion lab-guide, *Learning landscape ecology: a practical guide to concepts and techniques*, served as a mainstay of many a landscape ecology class—including mine. However, in a rapidly evolving field, such a textbook is soon out of date. By 2009, I had stopped using it in favor of a collection of papers—some foundational and some new—that covered a greater breadth of topics, shed new light on old questions, and posited new ones.

Turner and Gardner's second edition of the text does exactly what it should. It doesn't simply provide updated examples and color images—although it does do that. It also puts concepts and subjects into the perspective that an additional 15 yr has provided—deemphasizing some, elevating others, and introducing several additional subjects that were just beginning to be explored at the publishing of the first edition. That said, some things remain the same. The book is still structured in a series of chapters well arranged both for a thorough introduction to the field and for an upper-level undergraduate or graduate university course. Each chapter concludes with a set of discussion questions and suggestions for further reading.

But back to what is new. What exactly is different about the second edition? Perhaps most importantly, the text has been expanded to cover several key subjects that were only mentioned in passing in the first edition. The first of these is spatial statistics. Chapter 5 provides a nice introduction to spatial statistics with examples of autocorrelation analyses and variograms. The new edition also contains a chapter titled "Landscape dynamics in a rapidly changing world" (Chapter 9), which covers climate change, land-use change, and ecosystem services from a landscape perspective. As one can imagine, these topics are not covered in depth, but the chapter provides enough of an introduction and key references to enlighten the undergraduate student and send the graduate student down the right path. For example, climate change is covered in five and a half pages—pages that define the phenomenon and then go on to discuss agricultural impacts, species range shifts, and impacts on disturbance regimes.

In addition to these new chapters, there are many new chapter sections and smaller additions that together paint a picture of a discipline that has matured, expanded, and become an essential part of modern ecology. For instance, the second edition introduces the reader to landscape genetics, species invasions, behavioral landscape ecology, and the influences of landscape heterogeneity on species interactions. These, along with the new chapters, are all welcome additions.

There was some clear restructuring that also reflects the maturation of the field. For example, scale, which occupied an entire chapter in the first edition, has been integrated into the introduction and then referenced throughout the book. This restructuring represents a realization that scale is an integral aspect of the field and not merely a subject to be listed alongside other areas of inquiry. This was a good move. Similarly, the authors added a helpful introduction to models—expanding the chapter by that name to provide a much more useful introduction to modeling for students of landscape ecology.

One particularly nice feature of the book is the guidance to new researchers that is sprinkled throughout. The authors have expanded this guidance. These sections and text boxes speak directly to the new graduate student and provide invaluable advice. One such text box suggests software for landscape-pattern measurement, another software for spatial statistics, and yet another a checklist to complete before undertaking spatial-pattern analyses. There are two sections labeled “READ THIS FIRST,” which urge best practices and caution against analytical pitfalls. These are all wonderful sections—to which many a graduate advisor will send her or his students.

If I were to level any criticism at the book, it would be a minor one. If anything, the authors could have gone a bit further down the road they laid-out for the second edition—they could have scaled back some of the basic elements and included more on the state of the science. For example, the description of numerous landscape metrics still occupies a significant portion of the text. These formulas and descriptions can be found elsewhere (e.g., in the pages of the FRAGSTATS manual) and precious space need not have been wasted on them here. On the flip side, the application of the tools and concepts of landscape ecology to conservation and management have expanded so dramatically over the past decade and a half that many more pages could have been dedicated to these new applications.

That said, it is important to remember that *Landscape ecology in theory and practice* is a textbook and thus thoroughly documenting the fundamentals is essential. The text does provide the reader with a comprehensive introduction and a solid toolkit for undertaking one’s own landscape ecological studies. Perhaps most importantly, *Landscape ecology in theory and practice* remains *the* landscape ecology textbook. The additions and modifications made in the second edition more than make-up for the shortcomings that caused me to turn the somewhat outdated first edition aside years ago. I will be using this new edition in my landscape ecology class in the fall, and I suspect many others will be as well.

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Parks need science

Beissinger, Steven R., David D. Ackerly, Holly Doremus, and Gary E. Machlis, editors. 2017. **Science, conservation, and national parks.** The University of Chicago Press, Chicago, Illinois. xiv + 440 p. $130.00 (cloth), ISBN-978-0-226-42295-4; xiv + 440 p. $45.00 (paper), ISBN-978-0-226-42300-5; $45.00 (e-book), ISBN: 978-0-226-42314-2.

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Protected areas have become the “Leatherman” tools of land management—if you have a problem, a park will solve it. From their origin in conserving stunning geological features to impress the Europeans, through scenery viewing and nation building, to providing ecosystem services and even local development, parks have been expected to do it all. Little appreciated among all these large-scale problems is a vital service that parks have been providing as laboratories for conducting science. Some of the science is the “S” science—science for its own sake—but a lot of it is “s” science with a strong tie to park management.

Science, conservation, and national parks emanates from a summit held at the University of California, Berkeley in March 2015 that built on the fact that much of the early and influential research done in US national parks was done by Berkeley faculty and graduates. Proud of this historical connection, Berkeley scientists have been working for a number of years on a wide range of national park issues from cultural studies and archaeology to geology and wildlife. The ambitious goal of the summit was to “secure a future for parks by enabling and catalyzing a community of