
Preface

Landscapes are diverse, complex, beautiful, and inspirational. Spatial heterogeneity is the most salient feature that characterizes all landscapes. While the physical environment exhibits various spatial patterns on different scales, biological organisms are organized into populations and communities across landscapes. Like other biological organisms, humans live and act on landscapes, and thus have influenced, and been influenced by, landscapes. Unlike other biological organisms, however, humans represent an unparalleled force that has profoundly altered the structure and function of landscapes and even the entire biosphere. A number of worldwide environmental problems, such as land degradation, biodiversity loss, and global climate change, clearly attest to this destructive power of anthropogenic activities. Most, if not all, of the pressing ecological and environmental problems that humanity is faced with today are directly related to human alterations of landscapes. In most cases, humans strive to increase their appropriation of ecosystem goods and services from landscapes while compromising the abilities of ecosystems to perform other functionalities and resulting in serious ecological and socioeconomic consequences. Thus, landscape ecology is essential not only for understanding how Nature works in spatially heterogeneous environments, but also for providing practical guidelines and solutions for maintaining and developing sustainable landscapes.

Landscape ecology has made tremendous progress in theory and practice in recent decades. In the same time, as a rapidly developing discipline it is faced with new problems and challenges. For example, the diversification of ideas and approaches in landscape ecology, which we consider is mostly healthy and inevitable, has caused confusions among landscape ecologists as to what the identity or scientific core of this field is. Also, while all landscape ecologists seem to agree that landscape ecology should be interdisciplinary or

transdisciplinary, little consensus can be found in terms of what interdisciplinarity and transdisciplinarity mean and how they should be achieved.

To address these problems and promote the further development of landscape ecology, Jianguo Wu, then Program Chair of the US Association of the International Association of Landscape Ecology (US-IALE), organized a special session entitled “Top 10 List for Landscape Ecology in the twenty-first Century” at the 16th Annual Symposium of US-IALE at Arizona State University, Tempe, Arizona in April 2001. A group of prominent landscape ecologists worldwide were invited to present their views on the most important research topics, questions, and challenges in the field. Richard Hobbs, then President of IALE, presented an overview of the outcomes of this symposium at the European Landscape Ecology Congress in Stockholm and Tartu, Estonia in July 2001. Afterwards, J. Wu and R. Hobbs developed a synthesis paper based on the diverse perspectives presented at the “Top 10 List Symposium” (Wu, J. and R. Hobbs. 2002. Key issues and research priorities in landscape ecology: An idiosyncratic synthesis. *Landscape Ecology* 17, 355–65). While the “Top 10 List” was successful in identifying key issues and research topics, an important next step was to have in-depth discussions to examine the state-of-the-science and future directions in each subject area. This was precisely the objective of the symposium on “Key Issues and Research Priorities in Landscape Ecology” at the 2003 World Congress of IALE in Darwin, Australia in July 2003, participated by a group of well-established landscape ecologists and organized by J. Wu and R. Hobbs. This book is based on selected presentations at the Darwin symposium, with additional invited contributions.

The book focuses on the prevailing perspectives and prospects of landscape ecology across geographic and cultural boundaries. It covers the theory, methodology, and applications of landscape ecology. The chapters have in-depth discussions of the major achievements, key questions, and future directions in a series of important research topics in landscape ecology. Some of them explore holistic, interdisciplinary approaches and describe innovative applications of landscape ecology principles in conservation, management, planning, and design. We believe that identifying key research problems, synthesizing major advances, and pointing out future directions are necessary for promoting concerted development of landscape ecology and enhancing its “identity.” We do not believe that any individual is in the position to dictate what landscape ecology is or direct where landscape ecology should go. Landscape ecology, as a new paradigm, has to be defined and developed by the community of landscape ecologists and practitioners. We hope that, as a whole, this book reflects the collective view of the state-of-the-science of landscape ecology.

We are most grateful to all the contributors to this book, who are not only first-rate landscape ecologists, but also the most wonderful colleagues to work

with. To ensure the quality of the book, all chapters were peer-reviewed. We sincerely thank all those who participated in the review process, including: Jack Ahern, Gary Brierley, John M. Briggs, Peter Cale, Marie-Josée Fortin, G. Darrel Jenerette, Rob Jongman, Ted Lefroy, Kirk A. Moloney, Michael R. Moss, Jari Niemelä, R. Gil Pontius, Jr., Kurt Riitters, Denis Saunders, Santiago Saura, Austin Troy, Helene Wagner, James D. Wickham, and Xinyuan (Ben) Wu. Our sincere appreciation also goes to Alan Crowden at Cambridge University Press who saw the book through from concept to reality. Finally, we thank Yongfei Bai and Kaesha Neil at the Landscape Ecology and Modeling Laboratory (LEML) of Arizona State University for their assistance with reformatting the references throughout the book.

We believe that this book will be of interest to a wide audience, including graduate students, academic professionals, and practitioners in ecology, environmental science, landscape planning and design, and resource management. In addition to its value as a reference for a variety of research and application purposes, this book could be used for graduate-level courses, or a supplementary text for undergraduate-level courses, in landscape ecology and related subject areas. To help the readers to better understand the contents of the book and to stay abreast with what's going on in the forefront of landscape ecological research, a web site will be dynamically maintained to provide additional materials related to the book (e.g., color figures, chapter abstracts, and related key publications) and information on continuing discussions on the key issues in landscape ecology. The web address is <http://LEML.asu.edu/Landscape-Ecology/>.

This book is dedicated to the next generation of landscape ecologists, and we wish them luck with the exciting and challenging times ahead.