Forest Landscape Ecology
Transferring Knowledge to Practice
Forest Landscape Ecology
Transferring Knowledge to Practice

Edited by

Ajith H. Perera
Ontario Forest Research Institute
Sault Ste. Marie, Ontario
Canada

Lisa J. Buse
Ontario Forest Research Institute
Sault Ste. Marie, Ontario
Canada

and

Thomas R. Crow
USDA Forest Service
Arlington, Virginia
USA
Foreword

Forested landscapes have provided many important testing grounds for the development and application of landscape ecological principles and methods in North America. This central role of forests in landscape ecology emerged for several reasons. Forest cover is prominent in many regions of North America, from the temperate deciduous forests of the east to the coniferous forests of the north and west. Changes in forest spatial patterns are readily apparent to the human eye—natural disturbances and timber harvests alter the arrangement of forest age classes across the landscape and this, in turn, influences many species and ecosystem processes; land-use changes have produced profound fluctuations in forest cover over several centuries; increasing residential development in rural areas is often concentrated within forests; and public lands include many forested landscapes. Management actions, such as varying the amount, size, and location of harvests, also represent landscape-scale “experiments” that provide valuable opportunities for study. Finally, forest patterns are readily detectable from remote imagery, and are thus amenable to study at broad scales. For these reasons, forests have provided motivation and many opportunities for studying the complex relationships between patterns and processes in many areas.

The importance of landscape-level considerations in the management and conservation of forested landscapes has become increasingly important, and a variety of stakeholders are involved. The discipline of landscape ecology has developed concepts and methods that can be directly applied in forested landscapes, but to be most useful, these need to be more widely available. Included are principles and theory that relate spatial patterns at multiple spatial and temporal scales to ecological and anthropogenic drivers; methods for quantifying and evaluating spatial patterns in both discrete and continuous variables; and models for projecting the consequences of alternative scenarios. This book contains numerous examples from landscape ecology and concrete suggestions for increasing its utility in forest ecology and management.

Increasing the applicability of landscape ecological concepts and methods in the management of forested landscapes is a worthy goal. Much remains to be done, although there is perhaps a longer and richer history of such activities than suggested by the new terminology of “knowledge transfer.” This term emerged relatively recently as a more inclusive term for integrating the basic and applied aspects of science, and providing opportunities for practitioners to learn about recent scientific
developments. Although basic and applied sciences have been well integrated in landscape ecology as it matured, “bridging the gap” seems to be a perennial challenge. Thus, acknowledging the importance of knowledge transfer and continually improving its effectiveness remains critical. Scientists and practitioners need a two-way dialogue in which the science is made clear, accessible, and relevant to those seeking to apply it. In turn, the practitioners must make their management needs and challenges clear, as these often catalyze new developments in the science. It is also of paramount importance that the researchers who are producing new knowledge work actively to transfer that knowledge to other users. Communicating with users should be an integral part of the overall process, and researchers should seek and use all available communication opportunities.

By providing interesting examples and a synthesis of knowledge transfer, this volume makes a significant contribution to the applications of landscape ecology in forested landscapes. However, as the authors note, knowledge transfer is necessary but not sufficient for applications of landscape ecology to be successful. The chapters within provide readers with ideas and examples for successfully translating the science of landscape ecology into practice. The book should be of broad interest to all those interested in understanding and managing forested landscapes, and in particular to current and future researchers committed to making the knowledge they develop available to a wide audience of users. This volume clearly helps chart the course.

Monica G. Turner
Eugene P. Odum Professor of Ecology
University of Wisconsin
Madison, Wisconsin
March 2006
Preface

Forest landscape ecology has matured rapidly over the past two decades in North America, and the result has been the development of a substantial body of published knowledge. From our vantage point as landscape ecologists in forest management agencies, we have seen the potential for using landscape ecological knowledge in forest policy development, land-use planning, and resource management increase over the same period. We have also observed the difficulties faced by forestry professionals in their attempts to apply landscape ecological concepts. We see a growing role for those who develop landscape ecological knowledge: to synthesize and transfer that knowledge to users to ensure appropriate application of this knowledge. At the same time, transfer and extension are relatively new concepts to many researchers. It is this context that inspired us to compile this book.

Our goal is to introduce the topic of knowledge transfer to researchers in forest landscape ecology and to demonstrate how transfer efforts can be effective. We do so by reviewing general aspects of knowledge transfer and extension, critically examining aspects of transfer that are unique to forest landscape ecology, and highlighting several successful examples of knowledge transfer. This book captures the knowledge, experience, and insights of a group of authors with diverse backgrounds, ranging from university academics to researchers in forest management agencies and nongovernmental organizations, and diverse expertise, ranging from extension and knowledge transfer to landscape modeling. Our intended primary readership is developers of forest landscape ecological knowledge, whether they are academics, researchers, technologists, or graduate students.

This book is not a comprehensive treatise on knowledge transfer; it is meant to be a primer for landscape ecologists, written primarily by landscape ecologists. We encourage readers to consult the vast body of literature on organizational learning, extension, and knowledge transfer to gain an in-depth appreciation of these subjects. As well, we were unable, despite our best efforts, to find a user willing to share their perspective in this book. This does not diminish the importance of the need for readers to understand the user’s expectations.

We thank the colleagues who improved the chapter contents by peer review: Jim Baker, Larry Biles, Jiquan Chen, Joe Churcher, Tom Clark, David DeYoe, Michael Drescher, Dave Euler, Paul Hessburg, Louise Levy, Jim Manolis, Eric
Norland, Bruce Pond, Volker Radeloff, Janet Silbernagel, Susan Smith, Fred Swanson, Michael Wimberly, and Kim With. We also gratefully acknowledge those who assisted us in producing this book: Trudy Vaittinen for improving the illustrations, Janet Slobodien for being our patient liaison at Springer, and Geoff Hart for language editing.

Ajith H. Perera, Lisa J. Base, and Thomas R. Crow
March 2006
Contents

1. Knowledge Transfer in Forest Landscape Ecology: A Primer
   Ajith H. Perera, Lisa J. Buse, and Thomas R. Crow
   1

2. Transfer and Extension of Forest Landscape Ecology: A Matter of Models and Scale
   Anthony W. King and Ajith H. Perera
   19

3. A Collaborative, Iterative Approach to Transferring Modeling Technology to Land Managers
   Eric J. Gustafson, Brian R. Sturtevant, and Andrew Fall
   43

4. Development and Transfer of Spatial Tools Based on Landscape Ecological Principles: Supporting Public Participation in Forest Restoration Planning in the Southwestern United States
   Haydee M. Hampton, Ethan N. Aumack, John W. Prather, Brett G. Dickson, Yaguang Xu, and Thomas D. Sisk
   65

5. Transferring Landscape Ecological Knowledge in a Multipartner Landscape: The Border Lakes Region of Minnesota and Ontario
   David E. Lytle, Meredith W. Cornett, and Mary S. Harkness
   97

6. Applications of Forest Landscape Ecology and the Role of Knowledge Transfer in a Public Land Management Agency
   Lisa J. Buse and Ajith H. Perera
   129

7. Moving to the Big Picture: Applying Knowledge from Landscape Ecology to Managing U.S. National Forests
   Thomas R. Crow
   157
Contributors

Ethan N. Aumack  Grand Canyon Trust, 2601 N. Fort Valley Road, Flagstaff, AZ 86001, USA
Lisa J. Buse  Ontario Ministry of Natural Resources, Ontario Forest Research Institute, 1235 Queen St. E., Sault Ste. Marie, ON P6A 2E5, Canada
Meredith W. Cornett  The Nature Conservancy, 1101 West River Parkway, Suite 200, Minneapolis, MN 554415, USA
Thomas R. Crow  USDA Forest Service, Research and Development, Environmental Sciences, 1601 N. Kent Street, Arlington, VA 22209, USA
Brett G. Dickson  Colorado State University, Department of Fishery & Wildlife Biology, Fort Collins, CO 80521, USA
Andrew Fall  Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6, Canada
Eric J. Gustafson  USDA Forest Service, North Central Research Station, 5985 Highway K, Rhinelander, WI 54501, USA
Haydee M. Hampton  Northern Arizona University, Center for Environmental Sciences and Education, NAU Box 5694, Flagstaff, AZ 86011, USA
Mary S. Harkness  The Nature Conservancy, 1101 West River Parkway, Suite 200, Minneapolis, MN 54415, USA
Anthony W. King  Oak Ridge National Laboratory, Environmental Sciences Division, Bldg 1509, MS 6335, Oak Ridge, TN 37831, USA
David E. Lytle  The Nature Conservancy, 6375 Riverside Drive, Suite 50, Dublin, OH 43017, USA
Ajith H. Perera  Ontario Ministry of Natural Resources, Ontario Forest Research Institute, 1235 Queen St. E., Sault Ste. Marie, ON P6A 2E5, Canada
xii Contributors

John W. Prather* Northern Arizona University, Center for Environmental Sciences and Education, NAU Box 5694, Flagstaff, AZ 86011, USA

A. Scott Reed Oregon State University, College of Forestry Extension Service, Richardson Hall 109, Corvallis, OR 97331, USA

Viviane Simon-Brown Oregon State University, College of Forestry Extension Service, Richardson Hall 109, Corvallis, OR 97331, USA

Thomas D. Sisk Northern Arizona University, Center for Environmental Sciences and Education, NAU Box 5694, Flagstaff, AZ 86011, USA

Brian R. Sturtevant USDA Forest Service, North Central Research Station, 5985 Highway K, Rhinelander, WI 54501, USA

Yaguang Xu Northern Arizona University, Center for Environmental Sciences and Education, NAU Box 5694, Flagstaff, AZ 86011, USA

*Deceased February 2006
1

Knowledge Transfer in Forest Landscape Ecology: A Primer

Ajith H. Perera, Lisa J. Buse, and Thomas R. Crow

1.1. Why Should Forest Landscape Ecologists Focus on Knowledge Transfer?

1.2. What Factors Influence Knowledge Transfer?
   - 1.2.1. The Generation of Research Knowledge
   - 1.2.2. The Potential for Applications
   - 1.2.3. Users of the Knowledge
   - 1.2.4. Technological Infrastructure
   - 1.2.5. Barriers to Knowledge Transfer

1.3. What can Forest Landscape Ecologists Do to Advance Knowledge Transfer?
   - 1.3.1. Understand the Basics of Knowledge Transfer
   - 1.3.2. Play an Active Role

1.4. Summary

Literature Cited

1.1. WHY SHOULD FOREST LANDSCAPE ECOLOGISTS FOCUS ON KNOWLEDGE TRANSFER?

The science of landscape ecology has evolved rapidly from a relatively obscure topic, then a young discipline, to a popular focus for researchers. This evolution is reflected in a recent issue of *Ecology* (2005:86(8)) that is dedicated to the topic *landscape ecology comes of age*. As the knowledge base of landscape ecology expands and its range of topics broadens, researchers are becoming increasingly aware of the value of landscape ecology applications in managing both terrestrial and aquatic resources (Gutzwiller 2002; Liu and Taylor 2002).
In particular, the concepts of landscape ecology have increasingly been integrated into the study of forested environments in North America over the past two decades. In fact, the very first research paper in the inaugural issue of the journal *Landscape Ecology* addressed spatial patterns in a harvested forest landscape (Franklin and Forman 1987). The focus of forest landscape ecology, at least in a North American context, is large tracts of land where the cover is dominated by forests (i.e., the matrix) interspersed with areas where forest cover may be temporarily absent due to disturbances such as harvesting and fire (i.e., patches) (Perera and Euler 2000). This differs from the traditional milieu of landscape ecology, in which forest cover exists in patches (i.e., is fragmented) within a matrix of nonforested area and the transformation of forest patches to nonforest cover is usually permanent.

Viewing forested landscapes as broad-scale ecosystems and studying their composition, spatial patterns, spatial interactions, temporal change, and range of functions have direct applied value because most forests in North America are managed at broad scales to provide a range of uses: resource extraction, recreation, and conservation. Efforts to elucidate various broad-scale ecological patterns and processes in forested landscapes are essential to attaining the broad forest management goals of conserving forest biodiversity and attaining forest sustainability, as well as to understanding and mitigating the regional and global consequences of local forest management.

Although the value of landscape ecology applications is increasingly recognized, the transfer of knowledge in landscape ecology from those who develop it to those who apply it is not commonly identified as an explicit role for researchers. A literature search, for example, in the journals *Ecology*, *Ecological Applications*, *Forest Ecology and Management*, *Landscape Ecology*, the *Canadian Journal of Forest Research*, and *Forest Science* from 1960 to 2005 shows that no publications on landscape ecology or forest landscape ecology during that period contained any of the following keywords in the publications’ titles, keywords, or abstracts: knowledge transfer, technology transfer, and extension. Furthermore, the topic of knowledge transfer was not addressed until 2004 at the annual meeting of the U.S. chapter of the International Association for Landscape Ecology, traditionally the principal gathering of landscape ecologists in North America. Although an extensive literature on knowledge transfer exists in social science journals, landscape ecologists do not readily encounter such studies. As a result, knowledge transfer remains for them an obscure topic of study.

Few developers of knowledge in forest landscape ecology, however, would dispute that the necessary next step in the evolution of the field is to move from the accumulating wealth of scientific and technical knowledge to applications of that knowledge. Forest landscape managers are in urgent need of such applications in formulating policies, planning the use and conservation of resources, and developing management strategies. As is the case with mature applied sciences such as agriculture and forestry, the progression from concepts and principles (i.e., knowledge in its primary form) to application of those concepts and principles requires forest landscape ecologists to engage explicitly and actively in knowledge transfer.