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## Book review

### **The Historical Ecology Handbook: A Restorationist's Guide to Reference Ecosystems**

D. Egan & E.A. Howell (Eds.); Island Press & Society for Ecological Restoration, 2001, c \$55, ISBN 1-55963-745-5; b \$30, ISBN 1-55963-746-3

The goals of ecological restoration are many and varied, but they often include a return toward some past ecological state. Where re-creation of a former community type at a site is desired, the restoration practitioner needs to piece together pictures of the past community's taxonomic and physical structure. Restoration ecology has been in need of a compendium of tools to help practitioners and academics to understand the composition of former communities; this book goes a long way to meet that need. It is both an introduction and a valuable information source for restoration practitioners, researchers, and advanced university students. Most chapters review techniques for elucidating states of past ecosystems using cultural as well as biological evidence. Additional chapters on case histories demonstrate the application of many of these methods in real-world settings. Adequate bibliographic references for most chapters facilitate further exploration of the methods. Limitations of the book include a focus on North American ecosystems and missed opportunities to make stronger links between the methods discussed and their applications for restoration.

The Introduction gives two reasons why restorationists should be interested in historical ecology. The first is that many ecosystems are sufficiently disturbed that reliable information about their pre-disturbance condition may be best developed through historical evidence of past centuries. Second, an understanding of how natural patterns of change have affected ecosystems in the past is essential if restoration is to encompass a wide range of natural variation and not simply reproduce a hypothetical 'type'. This goal requires information on the broader time scale of hundreds to thousands of years. This important distinction could be better maintained throughout the volume, as methods shift between decadal and millennial.

Both times scales are important for informed restoration. We need to ask not only what is the target community to be restored, but also why is this the best target? Ecological complexity and natural variability, the effects of global climate change, and loss of habitat, species, and genotypes must all be considered. This means the modern or recent past, or even the 'pre-contact' state, may not always be

the appropriate target for restoration. The first step in answering this question is to acquire an understanding of the history of the piece of land that we are trying to restore. The 13 chapters of this book treat techniques for investigating environmental history.

The first six chapters ('Cultural Evidence') span a broad range of human sciences. At one end are methods firmly rooted in the 'harder' sciences: chapters on archaeological evidence and on the rich Government Land Office Surveys, which seem to be rediscovered with awe by each new generation of scientists. At the other end are methods rooted in social science: chapters on ethnobotany, oral history, and written records. These chapters will come as a revelation to most biologists who have been trained in more quantitative methods. Nestled in between is a nice chapter on maps and photographs. As with all the chapters in this book, these varied in their balance of scholarly overview, practical methodologies, and links to restoration ecology.

Chapters 7–13 ('Biological Evidence') describe seven different methods of inferring past history by using biological evidence: (1) interpretation of field observations such as growth forms of trees; (2) dendrochronology, interpreting the growth of tree rings to determine past forest structure and natural variability of climate and disturbances such as fire; (3) pollen studies and how palynology can help to reveal past community composition; (4) how excavations of packrat middens can reveal information about past communities; (5) techniques for determining historic animal assemblages such as zooarchaeology and paleontology; (6) using information from geological soil and hydrology surveys to infer past conditions; and finally (7), using the 'jewels of the plant world', phytoliths, tiny silica particles from plant cells that remain in the soil, to infer the presence of historic plant communities.

Chapter 7 focuses on recognizing the imprint of past agriculture on regenerating eastern deciduous forest. Other biomes and processes are also amenable to such analysis. These include: mining (entrances, tailings, buildings), livestock on range land (old fence lines, livestock trails, water troughs and dams), tilling of grasslands (planigrading, soil patterns), and restoration itself (native species in neat rows, old irrigation and planting materials).

In the final four chapters ('Synthesis'), many of the techniques described previously are applied in a series of case histories. The first two, describing work on Cape Cod and the Indiana Dunes, not only are admirably interdisciplinary in their tools, but share a recognition of

the importance of fire even in the northeastern US, highlighting the problems of reference communities as moving targets. A chapter on the Grand Canyon Ecosystem was tantalizing, but too brief to give the full credit to what may have been a remarkable synthesis. The final chapter, on San Francisco Bay, is largely limited to gleanings from historical records, but it demonstrates how much information can be obtained from these sources.

The chapters vary in both the breadth and the depth of material covered. Most of the techniques are described narrowly, with application to a particular locality, usually the Eastern United States of America. However, many of the chapters include extensive references for the interested reader to investigate the techniques further. The authors are careful to emphasize the uncertainties and limitations associated with each technique. In the end, this book leaves the reader thinking of the many possibilities that lie before us in restoring the planet.

This book is a valuable reference for any restoration ecologist or historical ecologist, and would make an excellent reference for a graduate level course. It is reasonably priced, and its production is high quality. If we were to change anything, we would like to see stronger links between the methods and their implications for restoration in many of the chapters. Some methodological details presented in the volume could simply be referenced. Lastly, a broader biogeographic vision would be helpful, even if it is merely used as a comparison for North American systems.

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