

An Ecological Text with a Two-Track Academic Mission

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AN ECOLOGICAL TEXT WITH A TWO-TRACK ACADEMIC MISSION

The Ecological World View. Charles Krebs. University of California Press, 2008. 592 pp., illus. \$59.95 (ISBN 9780520254794 paper).

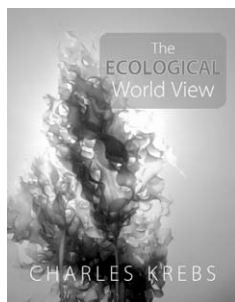
The *Ecological World View*, Charles Krebs's important new textbook, is a lively overview of ecological principles, concepts, natural laws, and mechanisms that can be used to teach both science majors and non-science majors at the college level. That this book is relevant to such a broad range of students is an asset, because since the 1970s—the “decade of the environment”—the curriculum for environmental education has been bifurcated, reflecting two different schools of thought and academic missions.

One mission has been to ensure that *all* college graduates know how natural systems work: this knowledge is necessary for understanding the major environmental issues confronting societies around the globe—climate change, decreasing biotic diversity, genetically modified foods, landscape management in response to disturbance, spread of disease, and human population growth, to name a few. Introductory courses in environmental science and environmental biology for undergraduate non-science majors are the usual route to achieving this environmental literacy.

The other mission is to provide an in-depth course based on ecological principles, concepts, and mechanisms across all levels of ecological organization—organism, population, community, ecosystem, landscape, and global. This is typically an upper-division course structured for students majoring in science (e.g., biology, ecology, genetics, geography, geology) and for students in the applied fields of science (e.g., agriculture, conservation, engineering, forestry, resource management).

For more than four decades as a professor at Miami University of Ohio and the University of Georgia, I have

taught both introductory environmental biology/science courses for non-science majors and ecology courses for science majors. Krebs's *Ecological World View* is the first book I've read that could be adopted to fulfill either academic mission. It is based on sound ecological science—that is, it accurately explains how natural systems work—but it also clearly explains how humans interact with these ecological systems. Krebs is to be congratulated for filling his book with timely examples of major environmental problems, issues, and challenges that can be resolved only by a sound understanding of ecological science coupled with the integration of social, political, and cultural considerations into the problem-solving process.



It is not surprising that Krebs has prepared such a comprehensive ecological worldview. He is an emeritus professor of zoology at the University of British Columbia and a professor in ecology at the University of Canberra in Australia. His distinguished career includes two major books, *Ecology: The Experimental Analysis of Distribution and Abundance* (Harper and Row, 1972) and *Ecological Methodology* (Harper and Row, 1989), and numerous other books, scientific publications, and career awards. I predict that *The Ecological World View* will rank as one of the crowning achievements of his stellar career.

I found all 21 chapters in *The Ecological World View* to be compelling. Each one begins by introducing a current ecological problem or issue under the heading “In the News.” Among those problems or issues are the invasion and geographic extent of the red fire ant (*Solenopsis invicta*); conflicting views on

the management of grizzly bears (*Ursus arctos*) in North America; the population dynamics and control of the house mouse (*Mus musculus*); the spread of disease such as the bird flu virus; strategies to manage the mountain pine beetle (*Dendroctonus ponderosae*); the harvest of old-growth forests; the long-term effects of the *Exxon Valdez* oil spill; policies for the management of large wildfires, such as those that burned in Yellowstone National Park in 1988; and hypoxia resulting from nitrogen inputs within the Mississippi River drainage basin. Concerned citizens, including undergraduate and graduate students, who read about these issues in the news media will appreciate the book's in-depth coverage and descriptions of how these problems are related to principles of ecological science. Throughout the book Krebs is careful to note that interdisciplinary approaches must be employed to find solutions to complex ecological problems with social, cultural, and political implications.

Several stimulating, appealing features make *The Ecological World View* a useful, valuable resource for understanding how ecological systems work. Graphs, diagrams, and charts—in color—include explanatory keys and photographs of plants and animal species. Large maps and other photographs—some of famed ecologists who developed important theories in ecological science—are also in color. Although the book lacks a glossary, ecological principles, processes, and keywords are clearly defined and set in bold font. Following each chapter, which succinctly moves from geographic and behavioral ecology to levels of organization ranging from population dynamics to landscape dynamics, is a summary of suggested readings and a list of questions for discussion.

I, like many others, have long been concerned that ecology be presented and understood in a balanced context, both between evolutionary and systems ecology, and among levels of organization. For example, there needs to be balance between the population- and community-focused evolutionary ecology approach of Robert MacArthur and

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the ecosystem- and landscape-focused approach of Eugene and Howard Odum. See the inside front-cover diagram in *Fundamentals of Ecology* (Odum and Barrett 2005) depicting the need to integrate these two approaches.

In chapter 10, which deals with population and the balance of nature, I became concerned about the balance in the level-of-organization approach when I read that many questions of community ecology will be explored “in the next eleven chapters.” I think that succession, the subject of chapter 11, requires an understanding of both community and ecosystem development. However, I was pleased that chapters 12 and 13, dealing with community interactions such as biodiversity and food webs, were followed with chapters focusing on disturbance ecology (chapter 14), ecosystem ecology (chapters 15 and 16), and landscape ecology (an excellent chapter 17). Thus, the author does provide balance between schools of thought and equal discussion among levels of organization.

The book closes with four chapters on applied ecology: “How to Fish Sustainably” (chapter 18), “Why We Cannot Eliminate Pests” (chapter 19), “Endangered Species and Ecosystems” (chapter 20), and “Human Health and Human Impacts” (chapter 21). Krebs explains the ecological science behind these long-term, global-scale problems and points out that solutions will require the public’s involvement and understanding. He optimistically concludes that if society does decide to address the issues with an integrative approach, solutions can be found.

Earlier in my career, I adopted various editions of G. Tyler Miller’s outstanding environmental science book *Sustaining the Earth* (Brooks Cole, 2003; 6th ed.) for my introductory courses on environmental biology and environmental issues. I consider *The Ecological World View* to be the next generation of such venerable textbooks because it is written in a nontechnical language, yet it covers the history of ecology and its scientific methodology accurately and lucidly. Thus, the science of ecology is made accessible to those who would be concerned and informed environmental-

ists, regardless of their field of study. Few textbooks can accomplish this objective.

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A TREE IS JUST A FOREST’S WAY OF MAKING ANOTHER FOREST

Forest Genetics. Timothy L. White, W. Thomas Adams, and David B. Neale. CABI Publishing, 2007. 704 pp., illus. \$100.00 (ISBN 9780851993485 paper).

Ten thousand years before Mendel’s laws and modern genetics, humans began domesticating crop plants, thereby sowing the seeds of civilization. Nine thousand nine hundred years later, scientists began to apply genetics to the domestication of long-lived forest trees. White, Adams, and Neale, professors at the University of Florida, Oregon State University, and the University of California at Davis, respectively, provide a complete, up-to-date, and instructive overview of forest genetics in this long-awaited book. *Forest Genetics* offers three sections on conservation genetics, tree improvement, and woody plant biotechnology following an introductory section on basic principles of genetics. Books have been devoted exclusively to *Pinus*, or *Populus*, or *Eucalyptus*, but no book other than this one has brought together so many instructive examples on these and all other models of research in forest genetics around the world.

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I doubt that I would be venturing too far out on a limb in predicting nearly universal adoption of this book as the required text for a first course in forest genetics for advanced undergraduate and graduate students. The book might also be used to teach any one of three separate courses (i.e., tree improvement, conservation genetics, and woody plant biotechnology), and in anticipation of this, the authors suggest specific sets of chapters for each course.

Forest Genetics is written and structured to be useful to both students and forestry professionals. Its authors opted for putting important terms in bold-face and defining them in context upon first use, thus avoiding the usual glossary of definitions without context. The page locations of definitions can be found conveniently in the index, thus preserving the ease of using a glossary. Abundant figures, tables, and boxes provide clear illustrations and examples of key points, and these are also indexed for ease of use. Sixty-six pages of carefully chosen references represent a scholarly resource in itself that students will appreciate.

This book may be as valuable to forestry and plant science faculty, who are responsible for subjects other than forest genetics, as it would be to forest geneticists. For example, if you have ever wondered how best to explain to your ecology students the confounding of genetic and environmental influences in phenotypic measurements, this book has a box that beautifully simplifies this lesson (box 6.1). If you have ever wished to see the properties of heritabilities neatly summarized, they are here (box 6.4). A box devoted to the “gene diversity analysis of population structure in *Pinus radiata*” explains, with data and references to the primary literature, why all five populations of this California native need to be conserved. With one glance at figure 3.7, I learned that the Taxodiaceae and the Cupressaceae are the only plant families in which both mitochondrial and chloroplast DNA are paternally inherited, and that the Pinaceae are distinguished by the unique combination of maternally inherited