

A GOLDEN ECONOMY OF NATURE

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In 1982, I purchased my first copy of a Ricklefs general ecology textbook, which I was advised was the single most complete reference book to have on one's shelf. *Ecology* (2nd ed., Chiron Press, 1979) was huge—966 pages in black and white, with 80 of those pages a detailed bibliography, and what seemed then to be an extravagant section on the biomes illustrated with large black-and-white photographs. In graduate school, I assisted in a general ecology course in which we used *The Economy of Nature* (2nd ed., also Chiron Press), the boiled-down version for undergraduates.

Since that time, many more textbooks on general ecology have been published, and the criteria for textbook selection in this competitive market have become much more complex. Instructors seek textbooks that will not only provide solid material and an even representation of topics but also appeal to today's students, with brilliant color photos and graphs, "sound bites" of the key ideas, connections to current events, and inexpensive paperback formats. In addition, professors want good support: test banks, innovative Web pages, and digital versions of the graphics to include with computerized presentations.

Suffice it to say that Ricklefs has moved with the times! Not only that, this text is, in my view, in a leadership position with respect to most of these criteria. Since I am immersed in teaching this course, I am very familiar with most of the competing texts. This fall, I read Ricklefs's book side by side with the one I was using as a text and three others.

The text is organized as many are, by beginning with an introduction to the field of ecology, then moving into the physical environment, a presentation of the biomes, and a progression through the subfields of ecology to end with global ecology. Interestingly, this is the only text that puts ecosystem ecology after the biomes and before population and community ecology. I found this organization to be quite effective. It built on the physical environment and biome descriptions beforehand, and provided the big picture for the ensuing chapters.

The text very successfully uses sound bites to convey the most important mes-

sages; headers in the text are full sentences that guide the reader to specific sections very quickly (e.g., "Early and late successional species have different adaptations"). These statements are listed in the table of contents as a nice guide to topics and the big ideas.

Economy of Nature does not rely only on sound bites, however, nor does it skimp on material. It provides a very high level of detail for almost every topic, and context that is rich in history as well as current perspectives. The introduction, for instance, not only presents ecology in the context of the scientific method but also describes the complexity that ecologists face in dealing with processes that vary across multiple temporal and spatial scales. The section ends by emphasizing the importance of understanding the increasing role of humans in the biosphere, which seems appropriate because it represents the direction of the field. There are some environmentalism values that develop here, which I will address more below.

The presentation of the physical environment and adaptations is very thorough. The biome description is rich with color photographs and diagrams, with excellent development of the geographic distributions of climate and biomes through the use of maps, Walter climate diagrams, and Whittaker's delineations. The biome descriptions are short, emphasizing an overview of vegetation and soils, with no description of faunal adaptations. However, given the length of a semester and thus the time generally available to cover the topic, this section is about the appropriate length for presenting in class.

Ricklefs's ecosystem section does an excellent job of linking energy flow and matter cycling. It places greater emphasis on the similarity among the element cycles than do most other texts, a concept that I think is important in enabling students to perceive the big picture (advanced ecology students claim to have memorized the separate nutrient cycles many times but never learn them). While I very much liked having the ecosystem-level foundation for energy, production, and nutrient cycling early in the text, I thought that more linkages back to this

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The Economy of Nature, 5th ed.
Robert E. Ricklefs. WH Freeman, New York, NY, 2000. 550 pp., illus. \$92.30 (ISBN 0-716-73883X cloth).

material could have been included in the following chapters. For instance, the interactions between community structure and nutrient cycling would have been an appropriate and important topic for the community or biodiversity sections later in the text; the book emphasizes only the response of plant competition to nutrient availability. It misses the opportunity to address the role of plant communities or invasive species in altering nutrient availability.

The population and community sections of the book are rich with concepts as well as specific examples and seemed to present ecology in a modest way, in that each of the major lessons includes statements of uncertainty that leave the door open for more exploration. Essentially all the generalities include caveats, such as “predator and prey dynamics *often* increase and decrease,” or “traits of competing populations *may* diverge” (italics added), which I think sets the tone for a field that continues to grow. It is important to note that these sections do not shy

away from mathematical presentations, and to decrease the likelihood of scaring off the students, they provide qualitative descriptions for each equation. In addition, the book links to a Web site, “Living Graphs,” which is an interactive presentation of the equations with graphs. This is probably the most effective linkage between a text and a Web page that I have yet seen. Students may explore the components of equations, see the consequences graphically, and participate in exercises that can be sent to the instructor. I have not yet tried this on students, but I think it will be a real hit.

The last section of the book, “Economic Development and Global Ecology,” works to scale up to the globe and incorporate humans explicitly. This chapter worked least well for me, perhaps because the title led me to think that the focus would be global-scale issues. However, the topics seem to address all human impacts, varying from heavy metals and acid deposition to eutrophication and global change. Moreover, the

coverage of global change was very shallow, including none of the good summary figures from IPCC (Intergovernmental Panel on Climate Change) and other sources of temperature correlations with carbon dioxide, or long-term perspectives of CO₂ variability and human impacts (some of these are presented much earlier, but not in the context of natural variability versus human influences). Carbon dioxide is the only greenhouse gas mentioned at all, and there is only passing reference to sources of greenhouse gases other than fossil fuel burning. Here, the text seems to lose the balance of presenting some uncertainty, with statements such as “warmer temperatures caused by the greenhouse effect will have mixed effects on productivity,” making the assumption that the predictions are correct. There is no discussion of how scientists study these large-scale phenomena and incorporate our understanding into simulation models. My assessment is that it is much more engaging to present evidence, logic, scientific approaches to a system that can’t be replicated or manipulated, and uncertainties. Given the very extensive coverage of global change in our daily dose of media, I think the text should present a more thorough summary. There are opportunities here as well for a discussion on connecting the scientific process and our uncertainties with policymakers’ need for knowledge.

I think that this last chapter tips into values and environmentalism far too much for an ecology textbook. There are prescriptions for the future that are based on the author’s values, for instance, “Energy consumption must be scaled back” and “we must use these abilities to impose self-regulation and self-restraint.” Although I may share these opinions, one of the major messages our students should be getting is that scientists evaluate information based upon logic, and that our job as scientists is to present unbiased information and indicate very clearly where our values enter in. The term *ecology* for the most part has lost its meaning in our society, as the public confuses it with environmentalism. Authors of ecology texts, in my opinion, should be held to the highest of stan-

dards in making clear the distinction between science and editorializing.

The materials that accompany the text as supporting materials for instructors are superb. This is the only textbook I have seen that includes not only vivid color graphics but also all of the photographs in digital form (including .jpg, .gif, and PowerPoint files). The text comes with lecture outlines in PowerPoint, written by Tom Wentworth, to accompany this text. This is a terrific tool. Web content includes self-tests, flashcards, and additional resources on current events. The online tests can be used as exams, with the results e-mailed to the instructor.

Overall, I rate this text as the best of the five with which I am familiar. I very highly recommend it for its evenness and thoroughness of presentation and for the excellent resources for both instructors and students. My only reservations have to do with the last chapter, an outlier because its presentation is not up to the standard of the rest of the book.

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