

Book Reviews

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ECOLOGY OF FRESHWATER AND ESTUARINE WETLANDS FILLS NICHE

Batzer, Darold P., and Rebecca R. Sharitz, editors. 2006. **Ecology of freshwater and estuarine wetlands.** University of California Press, Berkeley, California. xiii + 568 p. \$59.95, ISBN: 0-520-24777-9 (alk. paper).

Key words: biology; estuary; marsh; plant ecology; wetland restoration.

This book aims to fill the need for an undergraduate-level wetland ecology textbook. The editors do an excellent job in covering a variety of topics, some of which are not routinely covered in other wetland or estuarine ecology books. Although this approach may result in a somewhat limited coverage of certain topics, it does allow students to be exposed to a greater variety of topics. Another advantage of the fairly broad coverage provided by this book is that it can be easily adapted to courses with slightly different emphases, allowing instructors to bring in supplemental material as desired in their own areas of expertise.

The book is organized into 12 chapters, beginning with an introductory chapter that, as expected, explains what wetlands are and why they are important. The first chapter then briefly discusses wetland degradation and loss (although perhaps too briefly) and ends with a synopsis of what is covered in the remainder of the chapters. Other chapters cover (in order) wetland geomorphology, soils and formative processes; wetland hydrology; abiotic constraints for wetland plants and animals; biogeochemistry and bacterial ecology of hydrologically dynamic wetlands; development of wetland plant communities; wetland animal ecology; wetland ecosystem processes; U.S. wetland regulation and policy; wetland restoration; flood pulsing and the development and maintenance of biodiversity in floodplains; and consequences for wetlands of a changing global environment. I found the overall organization of the book to be outstanding and the topics covered to be useful, timely, and insightful.

A major strength of the book is the inclusion of a variety of topics that add depth, understanding, and interest to a general wetland ecology text. For example, the inclusion of a section on soil formative processes is a nice addition to a wetland ecology text since many students in biology or ecology curricula may lack sufficient background in soil science. The text provides a basic background of soil science and soil structure that should facilitate a student's understanding of subsequent chapters that deal with redox biogeochemistry and nutrient cycling. The inclusion of a section on redoximorphic soil features adds interest and sheds light on the practical applications of hydric soil identification in the field. Biogeochemistry is literally brought to life by including a discussion of the bacterial community throughout this chapter, particularly as it relates to the dynamic soil redox conditions of wetlands. I was also pleasantly surprised with Chapter 4. Discussing the adaptations of both plants and animals to key common stressors of the wetland environment in the same chapter is novel and should aid students in understanding essential commonalities and differences in the mechanisms involved.

The chapter on wetland plant ecology focuses on the development and dynamics of plant communities in various wetland environments. This is certainly a daunting task for a single chapter. Yet I was impressed with the clear writing style and reasonable balance that was achieved by first presenting

general organizing principles that could be applied to essentially all wetland habitats followed by a concise review of key ecological and successional theories. Clear examples based on relevant literature are provided to illustrate key concepts. This chapter concludes with a discussion of characteristics of selected wetlands that the authors admit reflects a North American perspective. Although this may be perceived as a weakness by some, it is honestly stated, and other books already exist that provide a greater world view of wetland plant communities. Throughout this chapter, a continuing strength of the book as a whole was evident, which is its clarity of writing and accessibility to students, achieved by striking a balance of going deep enough into a particular topic to generate interest and provide adequate explanation without getting bogged down in excessive details. Plenty of citations to pertinent literature are provided for further exploration and enquiry. As is the case throughout the book, reference is made to other chapters where appropriate, which minimizes redundancy, keeps the current topic focused, and improves readability. The editors are to be highly commended for this aspect of the book and also for the straightforward and honest writing style that continually weaves its way throughout this text. There is no hidden agenda here and this type of continuity in writing style makes the book both a pleasure to read, and a model for how science is to be presented.

Wetland animal ecology receives due recognition in this text with clear insights provided regarding ecological distinctions between terrestrial, wetland, and aquatic habitats, as well as trophic dynamics and community ecology. The chapter ends with descriptions of focal wetland animals, something that is sure to be a hit with the students. The chapter on ecosystem processes perhaps could have been broader in scope, but it is well written and does include an interesting discussion of the potential importance of periphyton. U.S. wetland regulation policy is covered succinctly in a later chapter and includes a discussion of functional assessment methods.

Incorporation of a more global perspective emerges in Chapter 10 as wetland restoration is nicely packaged into a very readable chapter with plenty of examples and discussions that include topography, hydrology, soil, vegetation, fauna, and the microbial community. The importance of flood pulsing in developing and maintaining biodiversity is discussed in the next chapter. The editors are to be commended again for excellent organization here as this chapter is logically placed after the chapter on restoration and has the strongest international emphasis.

The book concludes nicely by coming full circle with re-emphasizing the importance of hydrology, but this time as influenced by a changing global environment. This chapter is well written, but I personally would have liked for it to have a little more depth, perhaps by beginning with some summary tables of the current literature on global climate change. This would have been useful for the students, but is not a serious shortcoming since estimates are always being updated and the instructor can provide these types of data. Key management concerns are discussed in terms of temperature increase, carbon dioxide enrichment, altered moisture regimes, and rising sea levels. Again, a realistic and straightforward perspective is inherent in this chapter and the current limitations of science are discussed.

In summary, I found the book to include adequate citations to pertinent references. One possible exception to this is Chapter 2, where I felt that additional citations were warranted. The indexing of subject matter seems thorough and complete. A

glossary is not included, but I found the book to be very reasonably priced and well edited. Be forewarned that there is a limited number of color plates (16 total on only six pages), but I did not feel that there was a need to include additional color plates beyond those provided. All of the figures and gray-tone photographs are well produced and sharp. Overall, the editors and contributors have done an outstanding job in producing a text that does, indeed, fill a somewhat open niche in the realm of accessible and very readable textbooks on freshwater and estuarine wetland ecology. They have provided a timely and fresh window through which students may seek understanding via a realistic perspective that will be crucial to the future stewardship of these marvelous ecosystems. This book is a valuable addition and one that students, instructors, and

researchers alike should welcome and desire to have on their bookshelves.

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FOR THE LOVE OF ROOTS AND RHIZOSPHERE

Cardon, Zoe G., and Julie L. Whitbeck, editors. 2007 **The rhizosphere: an ecological perspective**. Elsevier, Burlington, Massachusetts. xix + 212 p. \$64.95, ISBN: 978-0-12-088775-0 (alk. paper).

Key words: belowground processes; microbiology; microfauna; roots; soil-plant relationship.

A relatively new arrival to the ecosystem equation is the humble plant root, long thought to be an organ whose sole mission was to provide support and nourishment and whose interaction with the environment was thought to be passive at best. The area immediately surrounding the plant root is known as the rhizosphere, and rhizosphere processes are turning out to be an important player on the ecosystem stage. Roots and the compounds they secrete (root exudates) manipulate and mediate interactions within the rhizosphere, affecting other plants, bacteria, fungi, soil chemistry, and other soil dwellers, and the outcome of these interactions have a trickle-down effect on plant physiology, community response, and the ecosystem. *The rhizosphere: an ecological perspective* is a welcome arrival to the field of rhizosphere science, the main aim of which is to provide an overview of recent advances in rhizosphere ecology. Helpful insights on the biology and biochemistry of this underground zone are also provided. The editors compiled several chapters written by different groups. Each chapter was written as a single unit, which resulted in some redundancy in the background information among the chapters. The book was very well written and an easy read; however, the reader should not expect a complete treatise on rhizosphere science, since only some aspects of the topic are addressed in this book.

Chapter 1 (“Root interactions with soil microbial communities and processes”) provides a thorough and lively description of the interactions between roots and microbes. Of particular importance is the information related to specific microbes and groups of microbes present in the rhizosphere of different plant species, and the biology of specific interactions (positive and negative) between roots and soil microbes. The authors also refer to the fact that monocultures of cultivated and non-cultivated plants might affect microbial communities and soil processes, which is a major concern these days with many invasive weeds taking over natural and cultivated fields. Invasive weeds have been credited with diminishing above-

ground and macroscopic biodiversity of plants and animals and here the authors highlight a similar loss of belowground and microscopic biodiversity. Finally, the authors introduce the concept of microbial quorum sensing and illustrate the importance of this mechanism for ecological processes.

Chapter 2 (“Carbon fluxes in the rhizosphere”) provides a more classical review, written in simple language, of the understanding of carbon-derived secretions from roots and the effects of these compounds as carbon substrates for microbes in the rhizosphere. The role of root exudates as signals rather than substrates was unfortunately not discussed. Some interesting ideas are provided regarding the temporal fluctuation of root exudates. Chapter 3 (“Microfaunal interactions in the rhizosphere, how nematodes and protozoa link above- and belowground processes”) is rather redundant, containing information related to microbes already covered by sections in Chapters 1 and 2. The chapter title suggests that it provides information regarding how nematodes and protozoa link above- and belowground processes, but sadly this information was very scanty. However, some interesting information about the effect of mycorrhizae on aboveground processes such as insect herbivory is provided.

In Chapter 4 (“Mycorrhizas: symbiotic mediators or rhizosphere and ecosystem processes”), the responses of mycorrhizae to environmental conditions and their structure and function in a community and ecosystem scale is examined. The chapter reviews current literature on the evolution of mycorrhizae and the nutritional aspects of their symbiosis with higher plants, followed by an interesting section on the interactive aspects of mycorrhizae with plants, bacteria, fungus, and animals. Finally, functional aspects of mycorrhizae at higher scales are described, including issues related to global diversity and climate change. The writing is clear and concise, although the addition of schemes and figures would have greatly facilitated comprehension of the text.

“Soil rhizosphere food webs, their stability, and implications for soil process in ecosystems” (Chapter 5) is, in our view, the most thoroughly developed section in this book. The authors present a rhizosphere food web model composed by assemblages of organisms in food sub-webs. The trophic interactions within the rhizosphere components are described in an enjoyable and well-reasoned fashion and in a hierarchical context. An original and integrative view of the biology of the rhizosphere is provided, including the energy flux and C/N ratios of the main food chains. A complete review of the physiological parameters of the rhizosphere

functional groups is provided. Some fascinating insights into the proportion of the energy that each functional group derives from bacteria, fungus, roots, and debris are included in this section. Reading this chapter was an interesting and inspirational intellectual exercise and will probably constitute a "must read" for students and scientists interested in rhizosphere ecology.

Chapter 6 ("Understanding and managing the rhizosphere in agroecosystems") provides an interesting view of the connection between rhizosphere activity and agricultural management strategies. Agricultural management of the rhizosphere has been practiced in a rudimentary fashion for a long time by means of rotating crops to reduce soilborne diseases. The chapter begins with a brief review of the impact of agricultural activities on the soil and its consequences for the soil biota and the rhizosphere community. Several examples are presented discussing the potential for deliberate management of rhizosphere activities through cultivar-microbe interactions. This section illustrates how small-scale rhizosphere interactions impact large-scale agro-ecosystems. This chapter is a useful introduction of field-scale interactions, particularly to those that are new to rhizosphere biology.

Chapter 7 ("The contribution of root-rhizosphere interactions to biogeochemical cycles in a changing world") outlines information about the effect of elevated atmospheric CO₂ and N deposition on the physiology, productivity, turnover, and biochemistry of plant roots. The results of most of these studies are variable but the clear message is that elevated CO₂ increases the productivity of roots and the deposition of carbon into the environment. The authors very appropriately asked how sustainable this increase in plant/root productivity will be considering the atmospheric CO₂ will continue to increase in the years to come. The picture of the effects of increased atmospheric N is not as clear. Interesting examples of ecosystem feedbacks are provided that are drawn from the authors' research. Of particular interest to us was the correlation between altered production of root defense chemicals due to altered atmospheric conditions and the effect of these changes on the interactions between the plant and other organisms (e.g., microbes, insects, and even other plants) at the ecosystem scale.

Chapter 8 ("The rhizosphere and soil formation") explores the role of rhizosphere activity in the context of the mineral weathering and evolution of soils. Since most works on the rhizosphere focus on the narrow space around living roots, this chapter's broader perspective is invaluable. The authors discuss

how activity near the root has far-reaching effects on the whole soil, and how rhizospheres also have large effects on soil evolution and biogeochemistry.

One glaring omission in this book is a chapter addressing specific methodology used in rhizosphere studies. Anyone who has worked on rhizosphere-related topics knows that designing these studies is technically difficult. Laboratory studies addressing rhizosphere biology topics are often over-simplified and artificial, making it difficult to draw realistic conclusions about the roles of many rhizosphere players. However, new technologies combined with innovative ways to study these interactions *in vivo* have allowed rhizosphere biology to evolve into a scientific field independent of soil science or plant science. Accurate and realistic methodological protocols are the main challenge that must be addressed to further advance studies in this field, and this book fails to address this key topic.

Overall, we enjoyed this book, which is a valuable addition to the literature on the rhizosphere and rhizosphere ecology. The book offers an integrative view of the rhizosphere processes, from the soil volumes surrounding the root and to comprehensive examination of rhizosphere effects on the whole soil and the surrounding community. Most chapters are supported by excellent reviews of the relevant literature. The editing is excellent, although more illustrations would have helped the fluency of reading.

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THE LATEST WORD ON PRIMATE DIET

Hohmann, Gottfried, Martha M. Robbins, and Christoph Boesch, editors. 2006. **Feeding ecology in apes and other primates**. Cambridge Studies in Biological and Evolutionary Anthropology 48. Cambridge University Press, New York. xvi + 523 p. \$130.00, ISBN: 978-0-521-85837-3.

Key words: apes; diet; feeding ecology; primates.

Beginning with Clutton-Brock's now-classic edited volume *Primate ecology* (1977. Academic Press, New York), every few years the field of primatology has seen the publication of a book

or two recounting the state of the science. As the field became less descriptive and more experimental and hypothesis oriented, field studies of primate feeding and diet took on added depth. Among these studies, those of great apes have particular value, for the results may have implications for understanding the ecology of our own hominid ancestor.

Feeding ecology in apes and other primates is the latest installment in this thirty-year effort. It is a largely successful compilation of papers, some review but others with new data. Despite the title, nearly half the papers are not directly about great apes at all, but this does not necessarily diminish the book. The content of the 19 papers is somewhat uneven, however. The first section, "Field studies," contains eight papers. Although some of these are reworkings of already well-

published work, others present new data. Morgan and Sanz report on the sympatric ecology of chimpanzees and gorillas in the Republic of Congo, and Hohmann et al.'s paper contains new chimpanzee field data from Gashaka in Nigeria.

The second section of the book, "Testing theories," contains papers of a more hypothesis-oriented nature. Strongest among these are a novel test of the role of hunger in social aggression in *Cebus* monkeys (Janson and Vogel), which takes optimal foraging theory a step further into the realm of dynamic state variables. Also excellent is an analysis of how the abundance of fruit affects orangutan sociality (Wich et al.), which lends more support to the emerging idea that orangutans are just as social as the abundance of their fruit resource base allows them to be. Finally, adding a paper by Marlowe on human (Hadza forager) feeding ecology was a smart move that gives the section a broader taxonomic anchor.

The last section, "Analyzing nutritional ecology," addresses important issues in linking primate behavior to habitat. Primatologists have traditionally documented a wild primate's diet by percentage of leaves, fruit, flowers, etc., and then ignored the resource base itself. This is because measuring anything meaningful about the caloric or nutritional value of a tropical forest requires a Herculean research program. But some researchers have been tackling these issues, and their hypotheses have become more refined, their methods more sophisticated, in recent years. Ortmann et al. show that there are very diverse approaches to measuring or estimating the quality and composition of wild primate diets, which may be part of the problem rather than the solution. Conklin-Brittain et al. use field data from orangutan and chimpanzee studies to

discuss problems in interpretation using different methods, and also suggest that factors such as gut passage time and fiber levels may be factors as critical to food choice as nutrient properties.

As in the majority of edited volumes, the reader gets the sense that these papers were "thrown" together by authors who had obligated themselves to a contributed paper as the quid-pro-quo for a symposium invitation. Nevertheless, a student of primate feeding ecology will find enough here to justify a careful read, and a view of the future of great ape field studies. They will combine long-term field data with refined ecological theory and increasingly sophisticated laboratory methods in nutritional science to take the science to the next level.

Feeding ecology in apes and other primates is published in Cambridge University Press' "Studies in Biological and Evolutionary Anthropology" series. This series has seen other notable books as well, but sadly the price tag on the book severely limits its market to university libraries and a very small number of specialists. Since the goal of such a book is to educate the next generation of field primatologists, the editors would have done well to consider the ultimate price tag; 19 chapters at \$130 equals nearly seven dollars per paper.

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CROSSING DISCIPLINES FOR ENDANGERED SPECIES

Scott, J. Michael, Dale D. Goble, and Frank W. Davis, editors. 2006. **The Endangered Species Act at thirty.** Conserving Biodiversity in Human-dominated Landscapes. Volume 2. Island Press, Washington, D.C. xiii + 360 p. \$85.00 (cloth), ISBN: 1-59726-054-1 (alk. paper); \$35.00 (paper), ISBN: 1-59726-055-X (alk. paper).

Key words: biodiversity conservation; conservation policy; *Endangered Species Act*.

Any ecologist even vaguely interested in the conservation of life on our planet probably knows these three truths: First, we humans are more sophisticated than ever in our scientific knowledge, our historical understanding, our economic savvy, and our comprehension of political machinations and legal frameworks. Second, no one person knows very much about all of these things, because to understand one component of conservation deeply (say, ecology, or human dimensions, or ethics, or law) makes it difficult to know details of the other pieces. Third, we humans are not doing so well at species conservation, of being good stewards of the planet, of keeping all the pieces.

So it seems reasonable to ask what we could do better. For those of us reading *Ecology*, surely one answer is to work harder to understand more of the multi-faceted components of

conservation that include, but go well beyond, ecological science.

We are given a great gift to facilitate doing that in the two-volume set of books titled *The Endangered Species Act at thirty*. These books evolved from a multidisciplinary gathering in late 2002 of scholars and practitioners (including biologists, economists, geographers, land use planners, lawyers, philosophers, and policy analysts). Volume I emphasizes policy issues (reviewed by Fleishman, Erica. 2007. Retrospection and innovative conservation under the Endangered Species Act. *Ecology* 88:3212–3213). My review here focuses on the second Volume, subtitled *Conserving biodiversity in human-dominated landscapes* and containing 22 chapters edited by J. Michael Scott, Dale D. Goble, and Frank W. Davis.

The Endangered Species Act (ESA) is heartbreakingly important to ecological conservation in the U.S., and this book lines up every conceivable expertise to explain why it is neither an unbridled success nor an abject failure, neither an all-powerful pit bull nor an eviscerated vapidly; the book also launches us to action, exploring how to attain the objectives of the ESA in a complicated world.

There are three main sections: "Conservation goals," "Conservation science," and "Conservation policy and management." I was hooked by Dale Goble's articulate legal and political history of the act (Chapter 2: "Evolution of at-risk species protection"); I suspect I would not be the only ecologist to find it disturbing but revealing to learn that one way the original 1973 ESA was weakened by 1978 amendments was through the addition of pages of regulatory detail that

compromise enforcement because courts more often reverse agency decisions for “procedural rather than substantive errors.” That’s a hard reality for ecologists who tend to operate on the assumption that substantive contributions—or errors—should trump procedural ones!

In Chapter 4, J. Baird Callicott notes that the ESA explicitly embraces only instrumental values for non-human species (keeping with western thinking whereby humans are usually the only species with recognized intrinsic value), but also implicitly confers intrinsic value—that is, a reason for existence outside the marketplace. Because all intrinsic values are not created equal, Callicott explores the space where utilitarian (economic) and intrinsic values intersect, the philosophical ground where decisions get made about endangered species in the real world.

I found the best chapters to be those that effectively cross disciplinary boundaries, or those that do an excellent job of reviewing one disciplinary region in the context of the ESA. An example of the former was “Science and controversy” (Chapter 9), where Holly Doremus provides a general overview of the legislative mandates for science, and discusses the much-touted but little understood policy-speak mantra of “best available science.” She conveys the hopeful message that the legislative record indicates a strong role for science in endangered species decision-making, but underscores that the “thin information base” should be a wake-up call for expanding the basic research required for science-based decision-making under ESA.

The next several chapters are cohesive and well linked, and provide authoritative overviews that tie their topics to the ESA. Mary Ruckelshaus and Donna Darm (Chapter 10: “Science and implementation”) describe the science underlying critical habitat and recovery determinations, setting up the next three chapters: “Distinct population segments” (Chapter 11 by Robin Waples); “Hybrids and policy” (Chapter 12 by Susan Haig and Fred Allendorf), and “Critical habitat” (Chapter 13 by J. Michael Reed et al.). On a non-ecological front, a fine overview of “Benefits and costs” of the ESA (Chapter 14 by Jason Shogren) provides the sobering information that people in the U.S. would collectively be willing to spend something like \$130 billion (about 1% of the national gross domestic product of \$13 trillion) to preserve just 18 different species (<2% of all endangered species), whereas the total annual expenditure by federal and state agencies for protection of all endangered species is about \$270 million; even accepting back-of-the-envelope uncertainty, the disparity is striking.

The most disappointing chapters were those where the authors purported to cross disciplinary areas but failed because their expertise or coverage was too narrow; these chapters would have benefited by pairing authors (e.g., an ecologist with an ethicist). For example, in Chapter 5 Bryan Norton attempts to derive biological insights from a philosophical viewpoint, but the biology is murky and incomplete, leading to a “hypothesis” such as “losses of diversity can create further losses,” certainly, not a clarion perspective placed against the wealth of ecological understanding about interaction strengths and diversity-stability relationships. Likewise, Chapter 17 (earning the award of most inscrutable title: “Arbitrage and options” by Geoffrey Heal) attempts to develop an economic model of mitigation banking to guide recovery planning, but population dynamics

are modeled with a feed-lot mindset, such that money and habitat are interchangeable in supporting isoclines of population size and where “spontaneous increases” in abundance of an endangered species lead to immediate release of land from ESA restrictions. Thankfully, such economic logic bereft of an ecological base is thumped in the next chapter (Chapter 18: “Conservation banking” by Jessica Fox et al.), where economic and ecological insights are convincingly combined to highlight the complexities of population fluctuations and ecological process in conservation banking decisions.

A few chapters provide solid coverage of important conservation topics but only give a token nod to specific implications for the ESA. These overviews include conservation biogeography (Chapter 6 by Mark Lomolino), ecosystem services (Chapter 8 by Shahid Naeem and Claire Jouseau), factors causing endangerment of marine species (Chapter 19 by Paul Armsworth et al.), conservation on the managed matrix (Chapter 20 by Berry Brosi et al.), and “Cities and biodiversity” (Chapter 21 by Timothy Beatley). Although these chapters do reflect the editors’ desire to convey how “biodiversity conservation in human-dominated landscapes requires a different mindset than the view prevailing in 1973,” the literature is filled with books and journal articles describing important general conservation perspectives—the promise of this book is in its examination of the ESA specifically, and ideally all of the chapters would have done that.

In the last chapter, the book’s editors hope that this book and the accompanying volume will “look backward to evaluate the effectiveness of the act over its first three decades . . . and also forward to suggest how it can be used as a cornerstone for conserving biological diversity in increasingly human-dominated landscapes.” This volume of the two-book set contributes strongly to that promise, with well-edited chapters by leaders in many disciplines. There is really nothing like this book, and the ground it covers makes it fundamentally important.

The question now becomes whether we—society in general and ecologists in particular—can embrace and build on the vision of both the ESA and this book. Thomas Scott et al. close their chapter (Chapter 16, “Land use planning”) with a quote from Winston Churchill (“The Americans will always do the right thing . . . after they’ve exhausted all the alternatives”) to both explain the historical lack of integrated management in ecosystems along the wildland-urban interface, and to applaud the essential role the ESA had in prompting Americans to do the right things before it was too late. That strikes a chord of remarkable hope, especially if we can successfully marry our science to all the other fields that can help the ESA to accomplish its noble goal.

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AN EXPANDING RIBBON OF NATIVE GREEN?

Webb, Robert H., Stanley A. Leake, and Raymond M. Turner. 2007. **The ribbon of green: change in riparian vegetation in the southwestern United States.** The University of Arizona Press, Tucson, Arizona. xiv + 462 pp. \$75.00, ISBN: 978-0-8165-2588-1 (alk. paper).

Key words: ecosystem management; land use; repeat photography; riparian ecology; stream geomorphology.

Using extensive repeat photography spanning over a century, *The ribbon of green: change in riparian vegetation in the southwestern United States* challenges the perception of catastrophic losses of vegetated riparian areas in the southwestern U.S. The authors relied on the Desert Laboratory Collection of Repeat Photography in Tucson, Arizona, which provided archival information dating back to an 1863 photo of the Colorado River at Fort Mohave, Arizona. In all, 2724 historical photos of riparian areas were matched with contemporary photos to open over a century-long window on vegetation change along rivers and streams through a broad region, including most of Arizona, a large part of Utah, and sites in California, Nevada, New Mexico, and Sonora, Mexico.

This quarto-sized (24 cm × 31 cm) book contains three major sections. The first section of 45 pages discusses ecological and physiological characteristics of major native and non-native woody riparian vegetation in the region, as well as many factors that influence riparian vegetation change, with a focus on hydrologic and geomorphic processes. Included also are methods of analysis in conducting the repeat photography. The second section, at 340 pages in length comprising the bulk of the book, consists of 23 chapters, each containing a photo exposé, augmented by hydrologic data, of riparian vegetation in a major river or stream basin from the southwestern United States, with a focus on rivers in Arizona and Utah. For each basin, repeat photos from at least five to as many as 15 separate sites are presented. The photos consist of between two and five separate points in time, spanning as much as 137 years. The final section of 26 pages concludes the book with a regional interpretation of changes in riparian vegetation.

The book has many strengths. Perhaps the most striking feature is the high quality of the photographic work as well as the historical tour that the authors provide of so many key landscapes, such as in Grand Canyon and Zion National Parks, from a region renowned for its expansive beauty. This book would set handsomely on anyone's coffee table and could provide much entertainment for anyone who enjoys pondering photos of landscapes that document environmental change. The authors have done an impressive job of translating a century of riverine landscape change across 211 specific sites in a large region into an appealing document that can reach both the scientist and the layperson alike.

Another strong feature of the book is the breadth of the study, spanning most large rivers in Arizona and Utah. The book, and presumably the remaining photographs that were analyzed but not presented, provide a repository of visual information across a large region of the U.S. Additionally, the authors attempt to separate out native and non-native vegetation change, with a focus on woody taxa that are identifiable using the medium of the landscape photograph. They also examine hydrologic records in each of their 23

study basins, including multiple flood series and/or streamflow series from each basin plus groundwater records from approximately half the basins. Their summary results comprise maps of vegetation change in five categories across the study region, broken down by taxon. They conclude that both native and non-native vegetation have shown net increases over the period of study for the region, and hypothesize on causes for these results, implicating lowered groundwater levels, arroyo downcutting, and lowered flow volumes among factors that may have made barren channel banks and low floodplains available for colonization by riparian plants. Also, they conclude that most of the observed vegetation increase occurred since 1940.

There are a number of limitations as well. The authors acknowledge several constraints in using landscape photography, most notably the inability to measure vegetation mass or density on an areal basis. They also acknowledge that repeat photography is necessarily confined to a narrow slice of the landscape, and is subject to obstructions from objects such as near tree branches that may moved into the field of view since the original photo was taken. Further, the locations of the original photos depend on access and the interests of the original photographers, and hence are non-random. Perhaps the most troublesome limitation of the methods as presented, however, was the lack of clarity on the five vegetation change categories (i.e., large decrease, decrease, no interpretable change, increase, large increase) for which the authors admit "where one category changes to another is fuzzy even though the categories of change are broad." Moreover, there is no discussion of QA/QC or validation procedures, and so it is impossible to tell whether their estimates are reproducible. Also, there are no field studies in the sites photographed that would validate the identity and extent of the native vegetation measured. Finally, reference to aerial or satellite photo studies that would corroborate the landscape photos were only mentioned in passing for three of the basins studied. Certainly the photos presented give strong evidence to the invasion of tamarisk (*Tamarix ramosissima*) throughout the region. Also, vegetation overall, including some important native species, does appear to have increased in many of the photographs, and the authors conclude that native species increased significantly through their period of study for most of the region. While provocative, given the limitations mentioned above, however, these results remain somewhat tenuous.

Another important limitation is the timeframe of the study itself, i.e., from the latter 1800s to the present. It has been well documented that significant grazing pressure existed in the southwestern United States by the early 1800s, and channel modifications in the region were underway by the time of many of the earliest photos. The authors acknowledge that repeat photography that establishes the visual condition of woody riparian vegetation at the end of the nineteenth century and the beginning of the twentieth century for many watersheds in their study "is flawed because the initial photography postdates a strong human influence on the watershed." As a result, this reviewer was left wondering whether the book documents the change in riparian vegetation from a historical low point in riparian conditions in the southwestern U.S., rather than from some more natural or at least pre-European settlement state as seems to often be implied throughout the book. Nevertheless, the authors do make a strong case that riparian vegetation in the southwestern U.S. increased over the time period of their

analysis, and they are careful to acknowledge that “how much the late-twentieth-century increases in riparian vegetation can be attributed either to grazing reductions or to other climatic and hydrologic factors remains an open question.”

Given those two major caveats, concerning methods and the time frame of the study, *The ribbon of green: change in riparian vegetation in the southwestern United States* documents riparian vegetation change over the past century over a large region thoroughly and in a very interesting and visually appealing manner. In terms of audience, I would not recommend this book for a general course in riparian ecology or ecosystem management (as suggested by the book jacket); it is too focused and region specific to be a suitable replacement for a more comprehensive text on riparian ecology such as by Naiman et al. (Naiman, Robert J., Henri Décamps, and Michael E.

McClain. 2005. *Riparia: ecology, conservation, and management of streamside communities*. Elsevier, Burlington, Massachusetts). This book is, however, a very positive resource for anyone interested in visualizing and better understanding riparian landscape change within most of the major river basins in Utah and Arizona over the past century.

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Spotlight

RECENT PUBLICATIONS OF PARTICULAR INTEREST

Osborn, Sophie A. H. 2007. **Condors in canyon country: the return of the California condor to the Grand Canyon region**. The University of Arizona Press, Tucson, Arizona. 149 p. \$29.95 (cloth), ISBN: 978-0-938216-87-2; \$18.95 (paper), ISBN: 978-0-938216-98-8. Wonderful color photographs accompany this recounting of the travails and recent rebound of the California condor. Chapters focus on the natural history and behavior of condors, conservation attempts, and the history and future of the condor.

Guy, Christopher S., and Michael L. Brown, editors. 2007. **Analysis and interpretation of freshwater fisheries data**. American Fisheries Society, Bethesda, Maryland. xx + 961 p. + CD-ROM. \$98.00, ISBN: 978-1-888569-77-3 (acid-free paper). A wide variety of statistical techniques in relation to freshwater fisheries questions are discussed in this massive tome. Topics include experimental design, demographic studies, feeding relationships, movement and habitat use, and community and watershed approaches.

BOOKS AND MONOGRAPHS RECEIVED THROUGH SEPTEMBER 2007

- Allan, J. David, and Maria M. Castillo. 2007. **Stream ecology: structure and function of running waters**. Second edition. Springer, New York. xiv + 436 p. \$89.95, ISBN: 978-1-4020-5582-9 (acid-free paper).
- Barbour, Michael G., Todd Keeler-Wolf, and Allan A. Schoenherr, editors. 2007. **Terrestrial vegetation of California**. Third edition. University of California Press, Berkeley, California. xvii + 712 p. \$75.00, ISBN: 978-0-520-24955-4 (alk. paper).
- Braasch, Gary. 2007. **Earth under fire: how global warming is changing the world**. University of California Press, Berkeley, California. 267 p. \$34.95, ISBN: 978-0-520-24438-2 (alk. paper).
- Ciancio, A., and K. G. Mukerji, editors. 2007. **General concepts in integrated pest and disease management**. Integrated Management of Plant Pests and Diseases. Springer, New York. xvi + 359 p. \$199.00, ISBN: 978-1-4020-6060-1 (acid-free paper).
- de Steiguer, J. Edward. 2006. **The origins of modern environmental thought**. The University of Arizona Press, Tucson, Arizona. x + 246 p. \$24.95, ISBN: 978-0-8165-2461-7 (alk. paper).