

Ecology, 89(2), 2008, pp. 594–595
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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

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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).