

## BOOK REVIEWS

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NAIMAN, R. J., AND R. E. BILBY. 1998. **River ecology and management: Lessons from the Pacific coastal ecoregion.** Springer. vii + 705 p. US\$189. ISBN 038798323.

I was skeptical about this book when I was asked to review it. The title suggested that it might be a regional guide—a parochial, site-specific book of local interest only, and it is focused on streams of the Pacific Coastal region of North America. Nevertheless, I have judged it in terms of whether it contributes substantially to the discipline of limnology—presuming that limnology is indeed a discipline, rather than a loose amalgam of fragments of several disciplines or a subset of the larger discipline of ecology.

Limnology is a habitat-defined body of knowledge, and while rivers and streams are included in the field by definition, they are seldom featured in most textbooks. This book arose from a perceived need for such a book by graduate students, resource professionals, and decision makers in the Pacific Northwest. It will certainly serve these people's needs but deserves a much wider audience. Its stated goal is to provide an integrated view of the science-based management of lotic ecosystems of the Pacific Northwest. In my view it meets—indeed, exceeds—this goal.

The bulk of the book deals with physical, biotic, and ecosystem processes. Also prominent, however, are a section on management concerns and a final one that considers future scenarios of management problems and potential solutions. All chapters are well written, superbly edited, and well researched; the exhaustive references to the literature will be a boon to student and established practitioner alike. Chapters have a parallel organization, with a much-appreciated initial overview section and a concluding discussion of the relevance of the chapter topic to management, which succeeds in keeping readers focused on science-based management. Chapters reviewing stream geomorphology, water chemistry, biota, and functional dynamics (trophic structure, metabolism, nutrient cycling, spatial pattern) are among the best reviews of these topics currently available. Were it not for its prohibitive price, this book would compete with the best textbooks in stream ecology in terms of instructional value, lucidity, currency, and balance.

Chapters on the hyporheic zone (R. Edwards) and biodiversity (M. Pollock) are especially effective in drawing together theory and observation to present a new and lucid view of these previously fragmented topics. The chapter on statistical design (L. Conquest and S. Ralph) provides an insightful view of both a philosophical and practical approach to observing large, complex ecosystems over varying scales of space and time. The chapter “Dynamic Landscape Systems” (L. Benda et al.) especially impressed me; it considers streams as branched networks, intimately connected to geomorphic surfaces and reflecting the attributes of that underlying structure. Practicing scientists will welcome the later chapters on river law, economics, and the role of nonprofit organizations in river management. These topics are difficult to distill to their essentials, but this book does it well, and makes it of use not only to managers seeking scientific understanding but also to scientists in need of a more sophisticated view of resource issues. The final chapter (M. C. Healy) provides a philosophical perspective on watershed management and exemplifies the big picture that pervades the book but is all too rare in the resource management literature.

Examples are drawn from widely distributed rivers, some far

from the Pacific Northwest. The editors proclaim early that the book is of general management application, and they have surely met that goal. Other regions will present different specific management challenges, but the approach presented in this book is sufficiently general to be of use everywhere.

So how does this book stack up in relation to my hope that it would contribute significantly to the discipline of limnology? To me, a discipline is a field of study with its own history and traditions and in which theory and application interact actively. Limnology certainly has a long history steeped in tradition. There is no denying, however, that its theoretical foundations are somewhat derivative; this is not to say that limnology and limnologists have not contributed to general ecological theory, only that the latter clearly transcends inland waters. Nor has feedback between theory and application been notable; inland waters have been intensely managed for both quality and quantity, but much of this effort has been technical (engineering). Science-based management schemes have solved many problems, but it is doubtful that these successes have altered the course of limnology significantly. As I read this book, I therefore sought examples of the use and development of theory, especially those that might be uniquely limnological, and places where this theory could both meet management needs and enhance ecological understanding.

Theory abounds in this book. Much of it is derivative and broad; for example, biodiversity theory, energy flow, nutrient cycling, life history theory, and disturbance theory. Little of this is unique to limnology but is best exemplified in freshwaters or best tested and further developed in aquatic ecosystems. Most such ideas are related to spatial processing; in individual lakes (vertically), in connected lakes, and certainly in streams and rivers, interactions are spatially arrayed (e.g., downstream). Nutrient spiraling is one well-known expression of this that goes even further because it provides for the spatial separation of ecological cause and effect and a resulting time lag in causation.

Furthermore, a perception underscored in this book is that this chain of causation is oriented downslope along flowpaths that transect heterogeneous landscapes that interdigitate intimately with the land. Management must acknowledge that rivers are integral components of heterogeneous, hierarchically organized landscapes that are also watersheds. This view is central to limnology and provides a framework upon which to develop further the theoretical foundations of the discipline. This was sufficient to meet my hopes for the book, but it did not stop there. A synthetic chapter on watershed management (R. Naiman, P. Bisson, R. Lee, and M. Turner) provides a venn diagram in which human, natural, and management sciences are juxtaposed to generate a coordinated system that includes natural processes, social goals, and humans as essential parts of the ecosystem, rather than as competing forces, that often leads to environmental degradation rather than effective management.

I congratulate editors Bob Naiman and Robert Bilby and all the contributors on what is a landmark volume in limnology, river science, and watershed management. The price is exorbitant—and worth every penny.

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