Recovering river systems: A synthesis of science, politics, and policy


Do not be deceived by the title. *River Ecology and Management: Lessons from the Pacific Coastal Ecoregion* does not cover the same ground as *Upstream* (NRC 1996) or “Return to the River” (ISG 1996), which are detailed analyses of the demise of the Pacific salmon. Some of the material is similar, but the presentation is different. This is a book for graduate students and watershed managers interested in the role of science in natural resource policy.

Most of the policy issues covered in *River Ecology and Management* concern stream and watershed restoration because the Pacific Northwest has few lessons to offer on the broad topic of ecosystem sustainability. For example, since the enactment of the Northwest Power Planning Act in 1980, over $5 billion has been spent toward the goal of doubling the salmonid runs in the Columbia Basin by the twenty-first century (Court Smith, Oregon State University, personal communication), yet now, at the turn of the millennium, the geographic extent of threatened and endangered salmonids is the largest contiguous area declared under the Endangered Species Act. It ranges from the Canadian border south into the middle of Northern California and from Montana and Idaho westward down the Columbia Basin to the Pacific Ocean. How can we explain this predicament when, paradoxically, some of the best natural resource scientists practice in that region? Largely, the failure to stem the decline of salmonids results from the lack of integration of natural sciences into public policy and from decision-makers’ poor understanding of the management of risk and uncertainty (Naiman 1992, Lee 1993). This is the major premise of the book produced by Robert J. Naiman and Robert E. Bilby.

The two editors not only are accomplished stream scientists but also participated in joint management programs such as the state of Washington’s Timber/Fish/Wildlife Analysis. They are well qualified to speak to the issues of watershed science, watershed management, and human dimensions of policy formation, which are the topics addressed in *River Ecology and Management*. This book is intended to be a general text, not a niche-marketed regional description.

Research for the book focused on the Pacific Northwest for two main reasons: first, the region is a huge testing ground for natural resource research and management; and, second, the integration of watershed science and management and its human dimensions is best accomplished where the lessons are more contextual, as they are in the Pacific Northwest. In many ways, the book is an updating of Calow and Petts (1992), but with important differences. The contributors and the editors of *River Ecology and Management* place greater emphasis than Calow and Petts on the advantages of hierarchical classification for viewing temporal and spatial scales of lotic systems, for explicitly recognizing spatial and temporal variations in research, for monitoring and management design, and for adaptive management (sensu Holling 1978, Walters and Hilborn 1978). Calow and Petts (1992) use three river systems from different parts of the globe to illustrate the variety of circumstances influencing the management of rivers, in contrast to Naiman and Bilby’s (1998) sole use of the Pacific Northwest. Naiman and Bilby’s more formal treatment of the human dimensions of law, sociology, and economics creates a better understanding of the cultural issues affecting river management and leads to a better concept of how to integrate science into policy.

There were no weak chapters. All contributors are well recognized in their fields (e.g., Keller Suberkropp, Michael Murphy, Anne Hershey, Gary Lambert, Gordon Reeves, Peterison, James Agee, Frank Triska, Rick Edwards, and James Karr in the natural science section). In this limited space, I can highlight only a few chapters that struck a responsive chord with me. Among my must-read chapters are those by Loveday Conquest and Stephen Ralph on statistical design and monitoring and by Leslie Reid on watershed analysis. As most stream scientists will attest, experimental and monitoring designs are fraught with pitfalls. Sites within watersheds are highly autocorrelated, spatial extents are large, independent replicates are difficult to come by, intercorrelation among factors are common, and sampling windows are small. These two chapters provide students with a broad philosophical perspective about design policy.
and analysis and solid advice about developing a conceptual framework from clear objective formulations.

David Montgomery and John Buffington’s elegant presentation on the relation of channel processes to a hierarchical classification scheme of stream habitat extends the heuristic idea to an application. They distill the complexity of channel structure formation to two basic processes—discharge and sediment supply—and add the influence of large woody debris as a special case of sediment. Because the classification is based on processes, it is testable and useful as a predictive tool for restoring channel complexity and structure.

Several chapters stress the importance of perceiving stream ecosystem processes as having different temporal and spatial dynamics, a concept that is not well appreciated by land managers. Lee Benda, Daniel Miller, Thomas Dunne, Gordon Reeves, and James Agee (chapter 11) argue that unless the fact of differing temporal and spatial dynamics in stream ecosystem processes is acknowledged in land-use planning, natural events will have severe rather than intermediate impacts, because there won’t be enough habitats for the required diversity to allow for the persistence of biota. Attempts to suppress natural disturbances will inhibit the creation of new habitats and will inevitably lead to an artificially catastrophic event. In separate chapters, Robert Naiman, Kevin Featherston, Steven McKay, and Jiquan Chen (chapter 12) and Richard Edwards (chapter 16) illustrate, using examples of riparian and hyporheic processes, that ecosystem processes cannot be fully understood unless the role of temporal and spatial variation is taken into account.

I found the social science contributions interesting for various reasons. Having only a passing knowledge of those disciplines, I was fascinated by their ideas. For instance, some of Margaret Shannon’s ideas about organizational dynamics (chapter 21) were revelations to me (e.g., that means and ends often become confused during negotiation, perhaps as a defensive response to criticism). On the other hand, I wondered whether the consensus building and the friendship networks that sociologists promote might be weaknesses rather than strengths. Isn’t it as important to identify disputes and subject them to tests, and to prevent old-boy networks through peer review, as it is to build consensus? Is this the cultural gap between natural sciences and social sciences that must be bridged before we can resolve resource issues?

The last two chapters, 26 (Robert Naiman, Peter Bisson, Robert Lee, and Monica Turner) and 27 (Michael Healey), take on the task of creating the science-policy synthesis. Both address aspects of Adaptive Management in terms of managing uncertainty and determining the ability of ecosystems to meet all economic and societal demands and values. One of the most important messages was that the practice of adaptive management is to take bold, rational steps in terms of experimental policy and to guard against small incremental steps, which, although less painful, may lead to cynical self-protection by special-interest groups. Timid managers practice incrementalism in response to political pressure.

Surprisingly, given several landmark federal court decisions on the allocation of natural resources to Native Americans, this book does not discuss the tribal perspective on resource values. Few people realize that Native Americans have rights to harvest natural resources on 70% of the Columbia Basin accessible to anadromous salmonids; these rights were granted in exchange for the land that Native Americans were forced to cede to the US government (Columbia River Intertribal Fish Commission 1999). Battle over natural resource allocation on ceded lands occurs in the upper Midwest, the Southwest, and the northeastern United States. Unless ethnic division and resource allocation problems are addressed, they will hinder the management of rivers and the production of high-quality, sustainable goods and services.