

will motivate researchers to think above the plot scale and in terms longer than the average funding cycle. There is obviously much that remains to be learned about integrating commercial forest management and biodiversity conservation at operational scales, especially when the human dimension is included, but the book makes clear that maintenance of biodiversity in forested landscapes will need both strict protection and ecologically sound management.

Francis E. Putz

Department of Botany, University of Florida, FL, USA

E-mail address: fep@botany.ufl.edu.

Fax: +1 352 392 3993.

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Jake F. Weltzin, Guy R. McPherson (Eds.), *Changing precipitation regimes and terrestrial ecosystems: a North American perspective*, The University of Arizona Press, Tucson, 2003, ISBN#: 0816522472. 237 pp.

Climate change goes far beyond changes in temperature. Cloud cover, humidity, rainfall patterns, and wind flows are essential aspects of the climate system and may also undergo major changes in the coming decades and centuries. Changes in precipitation—whether in the total amount, seasonal variations, or likelihood of extreme events such as droughts and flooding rains—are especially important and may drive major changes in ecosystems, natural resources and human welfare.

And yet changes in precipitation have received relatively little attention in discussions of future climate change. Temperature almost always get the center stage. Perhaps this is because changes in precipitation anticipated with global warming are so complex, showing very strong variations over space and time? Or perhaps it's because global climate models still show little agreement on the expected patterns of future precipitation change? Some regions are expected to become drier, while others will become wetter. Unfortunately, climate models still cannot predict the details of this with great confidence. Variations in rainfall from season to season, year to year, and even decade to decade will also

change dramatically—another aspect of the climate system that is still poorly understood. And the exact manner of precipitation matters a great deal: whether as rain or snow, occurring at day or night, or from storm or drizzle. So it is not a simple matter to discuss future precipitation change, we must grapple with changes in an entire precipitation regime, and all of the ecological consequences they imply.

That is why a new book, “*Changing Precipitation Regimes and Terrestrial Ecosystems: A North American Perspective*”, is so welcome. This edited volume explores how changes in precipitation regimes (including precipitation amounts, and their variations in space and time) may affect terrestrial ecosystems of North America, with a particular emphasis on the ecosystem of arid and semi-arid regions.

This edited volume resulted from a symposium convened on this topic as part of the 1998 meeting of the Ecological Society of America. The editors and authors are some of the most knowledgeable scientist in the field, with expertise in the field observations, data analysis, ecosystem modeling, and experimental methods (including some very ambitious precipitation exclusion experiments, where rainfall is artificially diverted away from plants). As a product of a meeting of the Ecological Society of America, it is only natural that ecologists dominate the author list. But there is a smattering of hydrology and climatology in the text as well.

The writing is very authoritative, and draws upon the expertise of this outstanding group of scientists. Chapters range across several ecosystems, including shrublands, grasslands, savannas, and deciduous forest. The authors also take a variety of different perspectives, including experimental manipulations, field observations and modeling. Ronald Neilson's chapter on the variety of precipitation and how it affects the distribution of vegetation cover across the United States is particularly well done. This chapter provides a wonderful overview of the precipitation climatology of North America, drawing upon excellent “synoptic climatology” literature from the last several decades, to show us how features like the “prairie peninsula” are created. This chapter alone is worth the price of the book.

While the text shines in areas related to vegetation ecology, I think that the book would have benefited from an overview chapter on the climatology of

precipitation regimes found across North America, and perhaps an overview on the key hydrological determinants of soil moisture and river flow. There is also a notable lack of discussion of fire and other moisture-sensitive ecological disturbances. Adding some more climatology and hydrology meat to this otherwise thorough volume would have been extremely valuable.

Overall, this volume will be extremely helpful to those who are concerned about climate change and ecosystems in North America, especially in water-sensitive regions. It would probably be most useful to graduate students and professional scientists, but a well-read non-specialist would also benefit from this book.

Jonathan Foley

University of Wisconsin, Madison, USA

E-mail address: jfoley@wisc.edu.

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James L. Wescoat Jr., Gilbert F. White, *Water for Life: Water Management and Environmental Policy*, Cambridge University Press, ISBN: 0521369800, 342 pp.

For seven decades Gilbert F. White has been a strong voice for environmentally sound water management. He and James L. Wescoat have delivered a fine volume to continue that theme. Despite a few shortcomings, the authors have taken a significant step forward in producing an accessible text that addresses the complexity inherent in applying scientific knowledge, social attitudes, and constant vigilance to water management and environmental policy efforts. This is an excellent primer for anyone who is just getting their feet wet, so to speak, on these issues. It is thoroughly illustrated and flooded with citations. Additionally, the 35-page guide to Internet resources is a treasure trove for researchers, students and teachers.

The book's structure sets the tone for its message. Rather than opening with the scientific information, as many texts do, Wescoat and White first introduce historical and social aspects as being integral to water management and environmental policy. The second chapter, Challenge and Opportunity, summarizes issues that water managers face in the 21st century,

concluding that the challenge is "to identify which combinations of research and administrative policy offer promising opportunities to exercise genuinely positive methods of achieving a sustainable world." Flowing from that, the third chapter, Unfolding Recognition of Ecosystem Change, provides an excellent overview of the connections among people, water and the natural environment—past and present. Encapsulating one of the book's key messages, this chapter concludes, "Natural waters are not just H₂O cycling through the biosphere, but waters that give life to, constitute cherished habitats for, and are precariously transformed by all of the creatures of the biosphere, with varying degrees of recognition, consciousness, and sound judgment".

The authors have infused the book with historical information. The opening chapter provides a summary of how humans have approached water management throughout history, moving from simple personal withdrawals from rivers and lakes to constructing large scale, multi-purpose dams. In several places the authors discuss water management activities with long histories (e.g. greywater use, rainwater harvesting, non-structural alternatives) that are being re-introduced in modern society. Even in the chapters explaining water sources the authors invoke history. They do not simply present the hydrological cycle as we understand it today, for example, they also note how our understanding has evolved over time. In discussing urban drainage issues, Wescoat and White invoke Roman water laws and Greek geographers to highlight that our concern about this issue "has ancient roots." Through these passages, the authors suggest that we do not often enough internalize lessons from the past.

Related to this historical relevance is the consistent attention to the lack of "ex-post evaluation" of water management efforts. The authors note that for all of the environmental assessments related to proposed dams, there have been very few studies of the *actual* impacts after a dam was built. They then thoroughly discuss the value in studying past efforts to learn what has worked, what has not and if not, why not. In the chapter, Impounded Rivers and Reservoirs, the authors rely heavily on reports from the World Commission on Dams to make their point about the importance of evaluating impacts once a dam (or any management technique) has been employed.