

Economics & Ecosystem Services

Does It Make Economic Sense to Restore Rivers for their Ecosystem Services? 2013. Acuña, V. (Catalan Institute for Water Research, Carrer Emili Grahit 101, 17003, Girona, Spain, vicenc.acuna@icra.cat), J.R. Díez, L. Flores, M. Meleason and A. Elosegí. *Journal of Applied Ecology* 50:988–997.

Forest harvesting reduces the inputs of dead wood into stream systems which in turn can result in aquatic habitat simplification, reduced biodiversity, altered nutrient cycling, and reduced nutrient retention. Through cost-benefit analyses, Acuña and colleagues found that ecosystem service benefits derived from active restoration of dead wood loading in streams exceed monetary costs of such restoration, with the time required to realize the investment of restoration ranging from 15 to 20 years in low- to middle-order streams. Ecosystem services considered in the analyses included fish provisioning, opportunities for recreation and tourism, water purification, and erosion control. If biodiversity conservation is included as an additional ecosystem value, the authors predict that stream restoration would be even more economically profitable.

Book Review

Ecological Restoration

Susan M. Galatowitsch. 2012. Sunderland, MA: Sinauer Associates. Hardcover: \$90.00. ISBN: 978-0878936076. 550 pages.

After many years of promises and false starts, we now have not one, but two texts appropriate to be core references for academic courses in restoration ecology. I will not attempt a formal comparison of the two texts, but this stand-alone review is written with the other text in mind (see my 2012 review of *Introduction to Restoration Ecology*, by Evelyn Howell, John Harrington, and Steven Glass; *Ecological Restoration* 30:426). For example, both texts give less coverage of succession as a driver of regeneration and passive restoration than I believe is due. In particular, the dramatic resurgence of the Eastern deciduous forest in the United States is a shared glaring omission. Both texts also give little attention to the issue of cost-effectiveness of restoration techniques; however, this topic is under-represented in scholarly publications as well.

Ecological Restoration, by Susan M. Galatowitsch, is a well-written, well-produced, and well-illustrated overview of the science of restoration ecology. The text is clear and readable. It recognizes the biological, social, and (to a lesser degree) economic aspects of modern restoration. It deservedly will become a required text in many restoration ecology courses, and should be on the shelves of restoration researchers and practitioners, along with the Howell and others book.

The book is divided into three parts. Part I describes the conceptual, ecological, planning, and management bases for ecological restoration, with chapters on diagnosis and goal setting, planning, social and institutional support, and monitoring and evaluation. These cover the appropriate topics well. As with the Howell text, this book provides a description of recommended restoration protocols that is exhaustive (and to many practitioners may seem exhausting). The fact that most restoration projects (especially local, low-budget projects) do not have the resources to fulfill all of these modeling and organizational recommendations need not discourage them from moving forward, and this could be more explicitly stated in the text. Setting a high standard, however, is not a bad thing.

Part II is devoted to specific restoration activities and taxa, in chapters addressing landforms and hydrology, soil and water quality, plants, invertebrates, and vertebrates. This broad range of restoration activities is handled well. The animal chapters are useful and may help engage a broader audience, but I was expecting more practical planting information, as this activity makes up the great majority of most restoration projects, and is here represented by 10% of the book. But I am perhaps unfair here—this book is not intended to be a practitioners' handbook.

Each of the chapters in Part I and II ends with a useful summary and a section titled “Apply What You’ve Learned”. I encourage instructors to come up with their own set of application thought exercises (and field exercises) adapted to local ecosystems. In fact, is it too soon to ask for a ‘lab manual’ for field courses in ecological restoration? (See, I am spoiled already.)

The 19 case histories that make up the last quarter of the book (Part III) are particularly welcome. They represent a wide variety of habitats, goals, and regions throughout the world, although more than three-fourths are from the developed world (as are most of the planet’s restoration projects). There were even a few examples of mistakes overcome, which can be the most instructive.

As with any book, I have a few quibbles. The anti-Western/Northern sociological bent evident in the first two chapters is both quaint and less than forthright. The idea that prior to European contact, traditional cultures of the world were not also environmentally destructive is a distraction, and demonstrably untrue. And the converse, the fact that the move toward conservation/restoration for non-extractive value over the last century or so is largely a Western innovation, is overlooked. This is perhaps diminished by the fact that modern conservation/restoration seems to be abandoning biodiversity for its own sake as its primary justification in favor of materialistic “ecosystem function,” to its peril (and this book continues the trend).

A couple of select smaller quibbles: I would not call most rangelands “cultivated,” especially in the context of habitat conversion (pg. 36). In Figure 7.28, although the curve fit continues to decline after 50 years, the data indicate no change after 30 years, changing the interpretation non-trivially. But these are relatively minor quibbles, and I do not mean to distract from the great job Galatowitsch has done here.

Restoration itself is rapidly evolving, and any textbook in such a field will need to be periodically updated. For example, climate change and ‘assisted migration’ have rapidly become major topics in restoration, as have ideas about novel ecosystems. I suspect that these will get more coverage in future editions. And there should be future editions of this fine text. This book does an admirable job summarizing the current state of a diverse and ever-changing field.

Truman P. Young (tpyoung@ucdavis.edu) is Professor and Restoration Ecologist in the Department of Plant Sciences and Graduate Group in Ecology at the University of California, Davis, CA 95616. He carries out research on restoration theory and practice in the western United States, and savanna rangeland management and conservation in Africa.



Water

David Lewis Feldman. 2012. Cambridge, UK: Polity Books. \$19.95 paperback, \$49.95 hardcover. ISBN: 9780745650333. 200 pages.

How can you resist a book with a one word title? *Water*. It is both simple and elegant. Despite its little title, this book tackles a big concept—water sustainability, one of the most compelling global challenges of our time. At its heart, this is a book about water governance—and in this way, it is a book about people; how people successfully and unsuccessfully manage water. At 200 pages, it is a compact and fascinating read. It reads more like literature or a best seller and less than an academic treatise on water.

The aim of the book is to convey the magnitude of threats to freshwater sustainability and to point to ways they might be prevented. The author does so by weaving together stories and case studies from across the globe. Some are more well-told stories to students of water policy including unrest over water privatization in Cochabamba, Bolivia, and regional collaboration in the case of the Rhine and Danube Rivers. Many are less well-known stories about restoration of the Los Angeles River, or management and restoration efforts associated with Brazil’s Itaipu Dam.

To more successfully address the threats to freshwater sustainability, David Lewis Feldman argues the need to first confront some myths around water. He outlines these myths in Chapter 2, but they are a recurring theme throughout the book. The first myth is about whom controls water. Here Feldman argues that all forms of power over water are reciprocal and must be accepted as legitimate by others. In cases where power is not widely seen as authoritative, debates over equity and fairness of how freshwater is managed will arise. The second myth is that transnational water conflicts are impossible to resolve or amicably manage. This is not to say that trans-national cooperation and dispute resolution is not easy, but cooperation and clear mechanism for enforcement are possible. The third myth is that public participation alone does not necessarily lead to sustainable outcomes. It may lead to a balance of power but it might also “invite decisional gridlock”.

Readers might be interested in Feldman’s exploration of three cases of freshwater restoration efforts. In Chapter 3, he explores efforts in the Chesapeake Bay, the Parana River on the border of Brazil and Paraguay, and cooperation between Israel and Palestine. In doing so, he concludes that successful restoration efforts do three things: (1) achieve clear consensus among parties over responsibilities for fixing problems along with dedicated flow of fiscal and administrative resources to help solve problems; (2) draw on a set of collaborate tools that span political jurisdictions that are engaged in watershed management; and (3) embrace a basic principle of adaptive management and emphasize economic and community development benefits of restoration along with environmental ones.

Feldman explores what he calls the “bottled water fetish,” or the transformation of freshwater into a consumer item in Chapter 4. Bottled water sales have grown substantially in recent years in part because many people perceive bottled water to be healthier and safer than tap water. Although bottled water is a healthful alternative to unsafe public water supplies in many parts of the world, in many developed countries—where tap water is stringently regulated and inexpensive—it is not a healthful alternative. Here Feldman catalogs the sins associated with bottled water. Bottled water is largely unregulated in terms of quality. Producing, distributing, and transporting bottled water generates a huge carbon footprint. Contaminants have been commonly found in bottled water. But Feldman is more concerned with the inequities and injustices associated with bottled water. While there has been a cultural shift among more educated and wealthy in North America and Europe away from bottled water, minority populations still prefer bottled water. In some cases, corporations are exploiting fears about public water to directly advertise and falsely entice minorities in the U.S.

Finally, in Chapter 5, *Water Ethics and Environmental Justice*, Feldman returns to his earlier work around ethics and the need for ethics in water management. In *Water Resources Management: In Search of an Environmental Ethic*, Feldman argued for principles of fairness, environmental protection, and concern for future generations in water management. With *Water*, Feldman traces the evolution of environmental justice issues around water. He finds that ethics and environmental justice issues around water today are increasingly about broader welfare issues at stake like cost, affordability, and access. This is demonstrated by growing attention to a human right to water by the United Nations General Assembly and a broad array of countries, development organizations, and NGOs around the globe. In addition, the disputes are changing, moving beyond pollution spills and dam construction and into desalination, wastewater re-use, and the privatization of water.

At the end of the day, in this highly accessible and digestible book, Feldman argues that we need to better align governance to the global challenges of freshwater sustainability. At a minimum, this requires public engagement, good information, and political collaboration. It also demands transparency, equality, and fairness. Big challenges lay ahead!

Andrea K. Gerlak (agerlak@u.arizona.edu) is Director of Academic Development with the International Studies Association and Senior Policy Associate with the Udall Center for Studies in Public Policy and the University of Arizona, Tucson, AZ 85712. Her research addresses the interface between science and policy, institutional change and adaptability, and human rights and development.



Human Dimensions of Ecological Restoration: Integrating Science, Nature, and Culture

Dave Egan, Evan E. Hjerpe, and Jesse Abrams (eds). 2011. Washington, DC: Island Press. \$44.99 Ebook, \$45.00 paperback, \$90.00 hardcover. ISBN: 9781597266895. 432 pages.

In their edited volume, Dave Egan, Evan E. Hjerpe, and Jesse Abrams bring together contributions from over 35 practitioners and researchers across the globe. The authors approach the human dimensions of ecological restoration from numerous perspectives such as volunteerism, politics, social sciences, culture, art/design, economics, and education. This was my introduction to ecological restoration and I was genuinely impressed by the number of disciplines, ways of thinking, and approaches that were integrated into one book.

The editors did a fabulous job of thoughtfully organizing the contributed chapters. I'm sure this was not an easy task because there was overlap in the disciplinary elements and scope of the chapters. The editors chose the meta-themes of participation, power, and perspective. Within the theme of participation, they placed chapters into a section on volunteers and another on collaboration. Within the theme of power, chapters fell into either a section on politics, governance, and planning or a section on restoration economics. Within the theme of perspective, chapters were divided into sections on eco-cultural restoration or restoration-based education.

Running through the varied perspectives, a reoccurring theme was present, namely, that ecological restoration is not merely about repairing habitats and ecosystems but equally about repairing the way people view the relationship between humans and the Earth. Throughout the chapters, public participation ranged from involvement in the early stages of visioning and planning, the middle stages of project implementation, to the later stage of engagement in the post-management of ecological restoration. Despite financial benefits of public involvement in restoration, the chapters make it clear that restoration requires public support, philosophically, politically, and emotionally, in order to be successful. Whether examined from the perspective of economics, ecology, education, art, or sociology, the bottom line was that the human dimensions of restoration not only addressed how people relate to each other, but how people relate to the Earth.

Since it is an edited volume of many contributions, the voices of different authors come through. That was great when I liked the author's style, but unfortunate when I didn't. Some chapters were written like very dry textbooks, but most expressed the passion and enthusiasm of personal story-telling. At the start of the sections within each meta-theme, the editors give an overview of the chapters. These recaps of the chapters would have been of greater help to readers if the editors had provided more

background, context, and definitions so that even readers with little familiarity with the discipline (like me) could easily understand the relevance and significance of each contribution.

I particularly enjoyed the section on Eco-cultural Restoration, which included contributions from Robin Kimmerer on Traditional Ecological Knowledge in North America, Ian Rotherham on cultural severance in England, Michelle Stevens and Hamid Ahmed on the Mesopotamian Marshes in Iraq, and Lillian Ball and her colleagues on artistic design in environmental restoration, including a water garden in the shape of a fish in China.

This book was brought to my attention so that I might find parallels between public engagement in ecological restoration and public engagement in scientific research, i.e., Citizen Science. I found it interesting to compare the similarities and differences between the human dimensions of citizen science and ecological restoration. I began with a vague and naive expectation that a book about human dimensions of ecological restoration would primarily be about styles of volunteerism and these styles would look similar to citizen science. Although some chapters included examples of volunteers involved in the nitty-gritty physical work of implementing restoration, the activities bared little resemblance to citizen science because they did not involve data collection. Human dimensions of citizen science often focus on understanding why people volunteer for science and whether the experiences lead to pro-environmental behaviors. I was impressed that the human dimensions of ecological restoration go far beyond understanding why people might participate in collective efforts to pull invasive weeds or plant trees.

Most chapters cover success stories, but some include failures and explorations of why restoration failed. Almost every chapter had some thought provoking ideas, sometimes related to the central idea of the chapter and sometimes tangential. What I found thought provoking may be familiar to ecological restoration practitioners, but I would be thrilled to encounter these ideas explored in the context of Citizen Science. For example, Javier Escalera Reyes (Public Participation and Socioecological Resilience)

made the case that participation is not instinctive: societies foster passive and individualistic attitudes and so people must learn collective behaviors. Allegra Newman (Inclusive Urban Ecological Restoration in Toronto, Canada) explained how race plays into the social construction of green spaces and what that means in terms of restoration and inclusivity. Connecting the dots, she argued for the need to break myths of chronic disinterest of particular groups of people in ecological restoration, and gently leads the reader to the conclusions of the need to shift from a focus on educating and provoking interest to a position of removing barriers to participation. John Bliss and Paige Fischer (Toward a Political Ecology of Ecosystem Restoration) nicely illustrated the inherent politics of how target conditions for restoration privilege particular patterns of human activity and values over others because traditional landscapes were a product of ecology and culture over time.

Citizen Science often has goals of inspiring people through experiential learning and discovery to eventually get something done for the environment. Public engagement in ecological restoration is simply getting something done for the environment. The lessons of participation, power, and perspective are clearly in the minds of restoration ecologists, equally applicable to citizen science, though rarely have I seen these topics addressed. The potential for synergy between the two fields seems clear: restoration efforts involve adaptive management, which is an excellent opportunity to incorporate citizen science methods in the post-restoration monitoring.

Caren Cooper (caren.cooper@cornell.edu) is a Research Associate at the Cornell Lab of Ornithology, 159 Sapsucker Woods Rd, Ithaca, NY 14850 and a Senior Fellow in the Environmental Leadership Program. She carries out research via citizen science methods, co-chairs the publications committee for the newly forming Association for Citizen Science, and blogs about citizen science at Sci-Starter.com, Citizen Sci in the PLoS Blogging Network, and Scientific American. She can be followed on Twitter @CoopSciScoop.

