

knowledge about, and methods for measuring, carbon sources and sinks in terrestrial systems. The authors contend that the terrestrial carbon cycle is particularly unpredictable because of the influence of human activities and that restoration activities can help to stabilize and improve carbon uptake and storage. Chapter 3 provides an overview of emerging international carbon markets, which have the potential to support restoration of forest systems, and explores the potential conflict between carbon market goals and restoration aims. Chapter 4, by Robert Costanza, contrasts the business as usual future scenario with a restored earth scenario, and provides a general overview of ways to achieve a sustainable and desirable future. Chapter 5 briefly articulates the importance of local, cultural aspects to complement (and to some extent counter) sophisticated ecological techniques and trends towards national and international standards for restoration practice. Chapter 6 encourages consideration of the ethical dimensions of restoration, including attention to democratic participation in planning and implementation.

The first chapter in Part II, by David Lamb, details two interesting case studies—from Australia and Vietnam—that underscore the importance of incorporating underlying macroeconomic factors into restoration planning at larger, landscape-level, scales. Chapter 8 looks at restoration efforts across various ecosystems in China, with mini case studies for some of these. In Chapter 9, William Mitsch discusses wetland restoration from a global perspective, providing specifics on wetland loss across the globe as well as brief case studies from the USA and the Mesopotamian marshlands. Comin coauthors Chapter 10 on restoration in coastal areas, defining the various coastal systems (including urbanized coastal zones), their benefits to humans and threats to their future. Richard Forman covers urban systems in Chapter 11, with planning case studies from Boston and Barcelona, as well as more global discussions of collaborations between urban planners and natural resource planners. Chapter 12 addresses the role of ecological modelling, with a very focused look at two specific models that have been applied in various systems across the world. Amos Brandeis concludes the book with a chapter on two restoration projects situated in areas of conflict, the Alexander River Restoration Project, on a cross-border river in the Middle East, and the Lake Bam project in Burkina Faso. Brandeis details the challenges and opportunities for cooperation across divides to implement restoration activities.

While uneven in quality, the chapters across this book are a step in the right direction for planning and implementing restoration beyond local scales and in determining the distinction between local, landscape/regional and global scale restoration efforts. Happily most of the cases are of areas not previously covered in restoration literature. Particularly important is the book's effort to address the political, economic and cultural context for restoration planning and implementation.

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Trophic Cascades: Predators, Prey, and the Changing Dynamics of Nature edited by John Terborgh and James A. Estes (2010), xx + 464 pp., Island Press, Washington, DC, USA. ISBN 9781597264877 (pbk), GBP 27.00.

Scientists are facing a confluence of challenges with regard to preserving biodiversity and ecosystem function. Climate change, habitat destruction, introduced species, biodiversity loss, loss of topsoil, and increased additions of nutrients and pesticides are all recognized as major drivers of global ecological change. However, the loss of top-down forcing that results from the decline of apex predators (and megaherbivores) has largely been neglected both by ecologists who aim to explain the functioning of the natural world and conservation practitioners who try to preserve what remains. Fortunately, this book effectively synthesizes the knowledge needed to appreciate the role of top-down forcing as a ubiquitous force in nature at a critical time when many systems are experiencing habitat degradation, species loss and, at times, ecosystem collapse as a consequence of predator extirpation.

In this book John Terborgh, James Estes and the many contributors convincingly demonstrate that the Hairston, Smith and Slobodkin (HSS) hypothesis or the 'green world hypothesis', which proposes that the collective regulatory action of predators prevents herbivores from depleting vegetation, characterizes many natural systems. A trophic cascade is a term used to describe instances in which predator additions or deletions induce effects that cascade down food chains or food webs and affect biomass of organisms at least two trophic levels below (e.g. predator effects on primary producers).

Unfortunately, the current trend in most ecosystems is predator removal by human activities, herbivore release, and reductions in primary producer biomass and diversity, leading to drastic changes in the structure and function of ecosystems. Therefore, preserving/restoring many ecosystems requires us to reverse this trend and effectively conserve apex predator populations.

Trophic Cascades is a comprehensive, clearly written work divided into four main sections and has an extensive section of cited literature. The first section synthesizes the evidence for trophic cascades in a variety of aquatic systems: lake and many marine habitats, including intertidal, near-shore and open-ocean. Starting with aquatic ecosystems is logical as aquatic systems provide the classic examples of trophic cascades, including starfish effects on rocky intertidal communities, sea otter influence on kelp forests, and the role of predatory fish in lakes. The second section dispels the myth that trophic cascades are all wet by providing numerous examples of trophic cascades in terrestrial ecosystems from the tropics to high latitudes. The third section needs to be read by all conservation practitioners. It examines the effects of meso-predator release, trait mediated effects, body size and behaviours of both predators and prey, and interactions among predators, herbivores and fire in structuring vegetation, and also includes a crucial chapter on alternative states in ecosystems. I found the fourth or synthesis section to be somewhat redundant, reiterating many of the previously provided examples. However, this section is important to emphasize that top-down regulation should be universally accepted by professional scientists and conservationists.

Because climate change dominates much of the current scientific discourse it would have been nice to see a chapter that modelled and quantified the effect of predator presence or absence on carbon sequestration in various ecosystems. It is clear that ecosystems are typically 'greener' (i.e. have more plant biomass) in areas with apex predator populations at ecologically effective sizes but to what extent? This addition would have added strength to the argument that apex predators should be preserved and have possibly attracted a broader readership to this issue.

Altogether, *Trophic Cascades* is an important addition to both the ecological and conservation literature. No doubt it will be widely discussed because the HSS hypothesis and the concept of trophic cascades has

received uneven acceptance among ecologists working in different ecosystems. This, as the book often points out, is probably a result of the difficulty in conducting rigorously controlled experiments on apex predators that require large ranges to sur-

vive. Nevertheless, the wealth of knowledge presented in this book indicates that declines in biodiversity and ecosystem services typically follow the loss of apex predators. As such, we need to adopt the advice of Michael Soulé (Chapter 20) and

'never remove or discourage native predators'.

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