Evaluating the Future of Our Forests

Forests and Global Change.
Eds: David A. Coomes, David F. R. P. Burslem, and William D. Simonson
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Reviewed by Norbert Kunert
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My first impressions of the title roused doubts that the authors could efficiently cover such a broad topic as forest and global change for the variety of forests on our planet. My experience with earlier attempts to evaluate impacts of global change on forests was usually disappointing—most prior books focused on temperate forests while ignoring tropical forest ecosystems. However, the diversity of contributing authors was promising, with the result being an astonishing diversity of forest ecosystems covered. The book has one overview chapter followed by 14 that are divided into three sections: forest dynamics, species traits and modeling. Ten chapters deal with possible climate change effects on tropical forests or at least include tropical examples. I will concentrate on these ‘tropical’ chapters which have a distinct and notable emphasis on Neotropical forest ecosystems.

The first and introductory chapter by Simonson et al. gives a very good overview over the topics discussed in the book. Despite of this very good summary, I noticed that the book suffers from the lack of a logical flow quite common in books written by a variety of contributing authors.

In Chapter 2, Grace reviews recent developments in tropical ecohydrology and gives some insights into relatively unexplored and interesting compartments of the hydrological cycle such as the role of VOC’s in cloud forming and locally recycling of water vapor. Phillips and Lewis (Chapter 4) reveal possible changes in biomass due to shifts in precipitation. The effects of rising temperature on respiratory processes and photosynthetic efficiency are briefly discussed, but only in a single paragraph. This is surprisingly little attention to devote to such an important topic—given that temperature is one of the most discussed effects of global change.

Section two includes two interesting chapters about Amazonian forest formations by Chave and Oliveira-Filho et al. (Chapters 6 and 9). Chave links the historical changes in the Amazonian climate with the potential of this ecoregion to adapt to future changes because of the high biodiversity. The next ‘tropical’ chapter by Oliveira-Filho et al. deals with tropical dry woodlands and brings out the importance of an almost constantly misprized vegetation type in the tropics. I enjoyed the historical summary in Chapter 8 by Scherer-Lorenzen; he reviews tree species complementarity and its application in silviculture since the nineteenth century. Another highlight is Chapter 10 by Comita and Engelbrecht emphasizing the drought effects on forest regeneration predicting possible shift in species compositions induced by limited water resources. This is interesting given the potential challenges for forest management approaches that include natural regeneration after sustainable selective logging as management practice. Higher seedling mortality and shifts in selective processes will either favor or hinder the establishment of economically interesting tree species. Further in this section, Kobe et al. discuss the importance of soil resources on tree performance.

In Section Three, Asner (Chapter 12) gives new insights into sensing chemical traits of species, their evolutionary development, and the application of their identification in predicting climate effects—a much needed example of interdisciplinary research. Muller-Landau et al. (Chapter 14) then explain how to minimize errors in predicting changes of ground based biomass estimates. Of special interest in this chapter is how to deal with the variety of growth forms, e.g., buttressed trees, in tropical forests and the standard procedure of forest inventories to measure tree diameter at breast height. The statistical approaches are kept simple and are easy to understand for someone without advanced statistical skills. Finally, Newton and Echeverrìa (Chapter 15) focus on human influences on forests diversity by using a cross-continental comparison. This chapter highlights the importance of multiple case studies for solving conservation issues in emerging landscapes.

Overall, Forests and Global Change provides a deep overview exploring the research needs for a variety of forest ecosystems. I would have liked to see a chapter on tree physiology dealing with tropical forest trees and how they respond to predicted temperature regimes. Nevertheless, the editors and contributing authors achieved their goal of providing detailed and up to date information on forest responses to anthropogenically induced changes in climate. I recommend this book, especially to early career scientist planning to specialize in forest ecology and climate change.