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The forest for the trees

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### Author

Sayer, Emma J.

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## The forest for the trees

Forests and Global Change. David A. Coomes, David F.R.P Burslem & William D. Simonson (editors), 2014, Cambridge University Press. 462 pp. £75.00 (hardback) / £35.00 (paperback) / £37.20 (eBook) ISBN: 9781107041851 / 9781107614802 / 9781107777163; <http://www.cambridge.org/>

Forest ecosystems are arguably the most important terrestrial repositories of biodiversity and carbon; they play a key role in regulating global biogeochemical cycles and provide essential resources for millions of people. Current threats from deforestation and climate change have highlighted the need for explicit projections of the impact of these perturbations on forest dynamics and ecosystem processes at local, regional and global scales. Unfortunately, studying change in forest ecosystems is notoriously difficult because many processes take place over timescales that exceed the human lifespan. Consequently, observational and (especially) experimental approaches generally require massive long-term investment of time and resources. The matter is further complicated by the paucity of deliberate comparative studies in different forest ecosystems across the globe.

The book *Forests and Global Change* promises an extensive and timely overview of current research in forest ecology, drawing upon expertise and results from long-term studies that include a variety of approaches across different forest types. Contributions were invited from the plenary speakers at the 2011 Symposium of the British Ecological Society on Forests and Global Change at the University of Cambridge, UK. The book is divided into three parts corresponding to general topics: I) *Forest dynamics and global change*; II) *Species traits and responses to changing resource availability*; and III) *Detecting and modelling global change*. Each section contains a mixture of case studies and more general chapters on the current state of knowledge in particular areas of forest research. Some themes, such as forest dynamics and challenges for predictive modelling, resurface throughout the book.

As in most edited books, the chapters vary a lot in style and breadth, so the editor's introductory chapter is much more than a simple overview: it creates the necessary backdrop to put the subsequent contributions in context and lends more coherence to the book as a whole. Throughout the book there is a strong emphasis on research in temperate and lowland tropical forests, with one case study on Mediterranean forest and a couple of chapters including data from tropical dry forests and savannahs. Fortunately researchers working in boreal and montane forests can also get a lot out of this book because each section contains at least one chapter presenting concepts that are applicable across a broad range of forest types, and many of the case studies discuss the wider relevance of the work.

Although I would not call this a visually exciting book, the chapters are generally well illustrated and there are several very useful summary tables and conceptual diagrams. Colour plates are grouped together at the end of the first section, with the relevant figures reproduced in grey-tone in each chapter; perhaps this was done to keep the price down but it disrupts the flow somewhat when colour is essential for discerning details. I found some of the other colour plates less informative and it is a shame that the only photograph of a forest landscape is too small to appreciate properly. Nevertheless, the colour plates give the eye a welcome break and they are indispensable for the remote sensing images and the graphical representations of carbon stocks and nitrogen deposition.

The first section of the book starts with John Grace's introduction to the energy, water and carbon balance of forests, highlighting the distinct role of forests in the global climate system. I particularly welcomed the explicit com-

parisons between forests and grasslands because many global change experiments are conducted in the latter, where rapid plant growth, shorter generation times and much smaller plot sizes allow researchers to gather vast amounts of data and observe change within much shorter timeframes. Although this in itself is no bad thing, Grace's comparison reminds us of why it is worth tackling the great logistical challenges of assessing the impacts of change in forest ecosystems. The rest of the first section comprises case studies from Mediterranean, lowland tropical and temperate forests; together, these chapters summarise some of the threats facing forests worldwide, including fires, droughts and air pollution, while emphasizing important considerations for monitoring and management.

The section of the book on *Species traits and responses to changing resource availability* contains a wealth of detail and includes case studies of forest responses to resource availability at the phylogenetic-, species- and community level. The chapters in this section will be valuable to researchers and students working in any forest ecosystem; there is plenty of food for thought and impetus for future research on plant traits. For example, Jerome Chave's overview of floristic shifts in Amazonian forests covers a lot of ground relevant to other forest types, highlighting important considerations for studies of plant functional traits and their incorporation into dynamic global vegetation models. Chave's chapter is also a good lesson in the great value of linking past change with current trends and predictions for the future. This is complemented nicely by Michael Scherer-Lorenzen's journey through time to cover historical research on forest biodiversity, comparing more than two centuries of studies on tree species mixtures with current approaches in functional diversity research. These two chapters underline how much we could miss by focusing too narrowly on a specific field of research and succumbing to the convenience of Google Scholar and the pdf instead of spending a few quiet hours at the library.

I also surprised myself by thoroughly enjoying Purves and Vanderwel's detailed description of model construction to improve understanding of coexistence in forests. I am one of those people whose eyes tend to glaze over when presented with equations and model formulations, but the authors give such an excellent account of the thought processes during model development and the reasoning behind each step that I found myself being drawn in. I feel I have learned a lot from this chapter, and it also set the scene for the modelling approaches described in the final section of the book.

The book concludes with a look at current methodologies for detecting and modelling change in forest ecosystems. The main message I gleaned from this final section was that although new methods and technologies have helped us cover a lot of ground in the last few years, there is still a very long way to go. Personally, I would have saved Harald Bugman's chapter until last, as it gives a good synopsis of the challenges we face in forecasting the effects of change in forests. Nonetheless, all the chapters in this section provide the reader with valuable information on the merits, caveats and limitations of the different approaches and highlight next steps in various fields of forest research.

My only real complaint about the book as a whole is that it focuses almost exclusively on aboveground processes. The importance of soil resources is emphasized repeatedly in several chapters and research on belowground processes was well represented at the symposium, yet there is no chapter dedicated to the belowground subsystem. With so much novel and exciting work on e.g. mycorrhizas, root traits and belowground competition, not to mention the importance of forest soils in the global dynamics of carbon and water, I feel that at least one chapter on current research into belowground responses to change would not have been amiss. Biotic interactions also only receive a relatively brief mention in a couple of chapters, despite the growing threats of inva-

sive species, pests and pathogens for forest health, which surely constitute an important aspect of global change.

Overall, these are fairly minor issues with an otherwise excellent book and I certainly recommend *Forests and Global Change* to colleagues and students. The book strikes a good balance between providing a broad and general overview of current forest research and illustrating important concepts and considerations with specific case studies. It also offers ideas for future work along with plenty of food for thought and, although it is not a textbook, some of the chapters will be a good resource for introducing general concepts in forest ecology. In summary, *Forests and Global Change* is

a good read and delivers what it promises: a timely and up-to-date synthesis of research on global change in forest ecosystems.

Emma J. Sayer

Lancaster Environment Centre,  
Lancaster University  
[e.sayer@lancaster.ac.uk](mailto:e.sayer@lancaster.ac.uk)

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