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[Review of Forests and Global Change, D.A. Coomes, D.F.R.P. Burslem, and W.D. Simonson, Cambridge University Press, 2014, ISBN 978-1-107-04185-1]

This book forms one of a series of thirteen Ecological reviews published by Cambridge University Press. It comprises fifteen scientific review papers by invited experts on aspects of the topic of the impact of global change in forests. The articles cover a variety of approaches, with some describing the more general aspects of change in forests and others being specific to particular situations, but which have a wider relevance. The collection begins with an introductory paper on forests and global change and the remaining articles are divided into three broad sections; the first being Forest Dynamics and Global Change, the second, Species Traits and Responses to Changing Resource Availability and the third, Detecting and Modelling Global Change. The strength of this collection is the variety of topics covered, the expertise of the authors and the up-to-date information it contains. The book would make a valuable addition to the library of any forest scientist or advanced student with an interest in the link between changes in our environment and forests.

The first section on Forest Dynamics and Global Change begins with a useful overview by John Grace of the interactions between forests and the climate, while the remaining three papers discuss changes in forests in particular parts of the world or specific biomes. A paper by Valladares et al. describes predictions and drivers for forest change in the Mediterranean, and the importance of fragmentation and the impact of fire on forest regeneration. Six management recommendations are made to improve resistance and resilience to climate and other drivers of change. The impact of climate change on tropical forests is discussed in a paper by Phillips and Lewis. Using a network of sample plots in the Americas and in Africa the authors found that since the 1980s these forests have become more dynamic and faster growing, an outline likely to be due to higher levels of atmospheric CO_2. They caution that this trend may not continue as other factors determining growth become limiting. The final paper in this section, by Canham, focuses on North America. In this region it is difficult to disentangle natural and human induced change as humans have had an influence for many millennia. The paper discusses five important influences of forest change; land clearance, fire, logging, pests and pathogens and atmospheric pollution. Of these the most important currently is possibly the impact of exotic pests and diseases.

The second section entitled Species Traits and Responses to Changing Resource Availability begins with a critique by Chave of the prediction of an Amazonian dieback of tropical rainforest due to increasingly frequent and severe droughts. The author examines evidence for the resilience of the Amazonian forests and also the robustness of current dynamic global vegetation models, focusing particularly on difficulties defining plant functional types. The paper concludes that there is little evidence of an Amazonian dieback but warning that tropical rain forest trees are poorly adapted to dry conditions and that droughts are likely to become more severe and frequent.

This is followed by a paper by Purves and Vanderwel on coexistence of tree species in forests. They present a framework that links traits and rates of change in vegetation to its state and apply this to the Lotka-Volltera model of population growth and then to the PPA model, a forest specific model. The function of biodiversity in forest processes is described by Scherer-Lorenzen. He defines three important features of biodiversity in forest productivity; niche complementarity, the sampling effect and ecological insurance. Niche complementarity suggests a greater number of species will increase productivity by enabling more efficient use of resources as higher diversity is linked to ecological insurance meaning that a diverse community is more likely to contain species able to withstand or tolerate environmental change. The author examines evidence for this, noting that such evidence is difficult to obtain, although a global network of sites has now been established. The next paper, by Oliveira-Filho et al. describes how vegetation classification at near-continental scales needs to incorporate floristics in addition to physiognomy. Differences between two Brazillian seasonally dry tropical forests, Cerrado and Caatinga were compared and floristic differences were found at family, genus and species level. The variables that best explained differences in floristics were found to be related to the level of deciduousness. This provided a better explanation of the differences in the vegetation than the current classification of Cattinga versus Cerrado vegetation.

The following two papers examine the impact of water and nutrient availability respectively on forest change. Comita and Englebrecht examine the effects of drought on the dynamics and distribution of tropical forests. This is important as it is forecast there will be changes in both quantity and variability of precipitation in much of the tropics. They review the results from past studies and also present new information from a study in Panama where they found that tropical forests are sensitive to changes in precipitation, with tropical seasonal forests and those subject to periodic drought events being particularly affected. Periods of low water availability will particularly impact drought sensitive species, confining them to wetter areas. In contrast increases in water availability may not necessarily improve performance of drought sensitive species as other limiting factors may come into play. The chapter by Kobe et al. investigates the role of nutrients on forest change. Productivity of both temperate and tropical forests is strongly linked to nutrient availability and man's activities are modifying this, for example the increase in nitrogen through burning of fossil fuels and use in agriculture. Forecasting the future influence of nutrients on forests is made difficult by the variation in their distribution across many scales, the fact that specific nutrients affect particular tree attributes, and the complex mechanisms that allow trees to capture limiting nutrients. Furthermore most studies have concentrated on N and P yet base cations can have a strong influence on forest productivity and distribution.

The final section is entitled Detecting and Modelling Forest Change and begins with a chapter by Asner on using chemical signatures to identify trees through remote sensing. There are limited sources of information for mapping changes in the distribution of trees species due to environmental change and the use of a CAO designed spectrometer offers a means of rapidly appraising species diversity. This uses 480 spectral bands to allow rapid identification of different canopy species through their reflective signatures; 70% of trees with the same signature were found

to be the same species. In the next paper Bugmann examines the challenges of forecasting changes in forest dynamics. He found that while observations are important, experiments and the use of dynamic models are more useful tools for forecasting change. Of the models examined, forest gap models appeared to offer great potential and some of the chapter provides a useful discussion of the constraints to current models. The following chapter by Muller-Landua et al. looks at the difficulties of estimating changes in forest biomass. There are few long term data sets, and short term measurements may not reflect long term changes. Factors reducing the precision of estimates of biomass include sampling bias (e.g. correct sampling of the gap/age distribution of forests) and measurements errors (e.g. diameter measurements of buttressed trees). While remote sensing techniques such as LiDAR can provide landscape scale data on biomass there will always be a need for ground based plots. In the final chapter, Newton and Echeverria present results from a number of research projects investigating the effect on anthropogenic disturbance on forest biodiversity. The comparison aims to find some general responses in tropical forests to human impacts. Most impacts were found to be local in context but some general observations were noted across the studies; including that deforestation increased fragmentation and lead to an increase in secondary forest, early successional stages in primary forest and a decline in old growth forest. Also, they concluded that understanding life history traits was crucial to forecasting the impact of human disturbance on particular tree species. The New Forest in the UK was used as a case study to show that human disturbance and maintenance of high levels of biodiversity are not always in conflict. A long history of human impacts at the New Forest has resulted in a mosaic of habitats that support high levels of biodiversity.

In conclusion the book provides a useful overview of current knowledge on the impacts of global forest and is recommended for an educated audience, with an interest in a broad overview of the topic.

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