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Title

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Journal

Frontiers of Biogeography, 3(3)

Author

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Publication Date

2011

DOI

10.21425/F5FBG12421

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Woodroffe, C.D. (1992). Mangrove sediments and geomorphology. In: Tropical mangrove ecosystems (ed. by A.I. Robertson and D.M. Alongi), pp.7–41. American Geophysical Union, Washington.

Edited by Markus Eichhorn

book review

A comprehensive foundation for the application of biogeography to conservation

Conservation biogeography, by Richard J. Ladle and Robert J. Whittaker (editors)

2011, Blackwell Publishing, 301 pp. ISBN: 9781444335033

Price: £95 (Hardback) / £34.95 (Paperback); <http://eu.wiley.com/>

It is becoming increasingly clear that the diversity of plant and animal species in the world is continuing to decline in spite of ambitious targets set by governments to prevent this (Butchart et al. 2010). It is also becoming evident that the continued functioning of ecosystems depends on this diversity (Isbell et al. 2011). In order to conserve what is left of biodiversity, it is crucial that we understand the diversity of life and how it is distributed across the biomes and ecosystems of the world. Since understanding the distribution of biodiversity is a central tenet of biogeography, it seems obvious that the field of biogeography should be of central importance in conservation.

In this volume, Richard Ladle and Robert Whittaker bring together chapters by a number of biogeographers to summarise progress to date in applying the principles of biogeography to conservation and to identify areas where there is still work to be done. The book is a comprehensive but digestible summary of the field of conservation biogeography and should make essential reading, not only for the students at whom it is primarily aimed, but also for more experienced scientists. The editors profess at the outset that the aim was to achieve a degree of coherence among the chapters, an aim that is achieved remarkably well to give a very coherent text.

The first section of the book provides a brief but interesting history of the conservation movement and the contrasting values held by different sectors of this movement (Chapters 2 and 3), as well as some background to the field of conserva-

tion biogeography (Chapter 1). A distinction is made between approaches that focus on the composition of biological communities and those that focus on ecosystem function through an understanding of ecosystem processes such as nutrient cycling (p. 31). An interesting and growing field in ecology, which receives little attention in the book, uses the functional traits of species to explain the link between the composition of biological communities and the function of the ecosystems that contain them. Functional traits – such as body mass, diet, habitat affinity and development mode of animals, and height and photosynthetic pathway of plants – can help explain how species contribute to the processes underlying the functioning of ecosystems and can also help in predicting how ecosystems will respond to environmental change (McGill et al. 2006).

The second section reviews our current understanding of the distribution of biodiversity, summarises the history of the global protected areas network and describes the methods available for more systematically representing biodiversity in future extensions to this network. There is a strong terrestrial focus here, indeed throughout the entirety of the book, which the authors acknowledge and which is owing to a less complete understanding of the distribution of diversity in the oceans and in freshwater habitats. It is worth noting, though, that the Census of Marine Life, an ambitious \$650 million project that finished recently, has made huge progress towards understanding the biogeography of the oceans

(e.g. see Tittensor et al. 2010). Even in the terrestrial realm, knowledge about the number and identity of the world's species and how they are distributed remains very far from complete: the Linnaean and Wallacean shortfalls respectively (Chapter 4). A recent paper (Joppa et al. 2011) addressed both of these knowledge gaps simultaneously by predicting the spatial distribution of undiscovered plant species, predicting that most new plant species will be discovered in areas already identified as hotspots of plant diversity, emphasising the importance of these areas for conservation. Chapter 5 provides an excellent summary of the many different types of protected areas in the global network and the different values that underpin these, while Chapter 6 provides a useful and succinct review of the enormous and ever-growing literature on systematic conservation planning.

The third section of the book describes how the tools of biogeography can be used to plan for environmental change in conservation. This is the only part of the book where the chapters appear somewhat disjointed, but this is probably owing to the attempt to summarise a vast literature in a very small number of chapters. Nevertheless, the chapters in this section provide excellent descriptions of some of the available methods, from phenomenological models that infer future changes from current patterns (Chapter 7) to more process-based models that use the theory of island biogeography to predict the consequences for biodiversity of shrinking and increasingly isolated natural habitat patches (Chapter 8). Chapter 9 deals with invasive species, which are an important driver of environmental change, and the homogenisation of biological communities, i.e. the erosion of beta diversity. Most of the studies investigating broad-scale patterns of diversity have focused on inventory diversity, commonly measured as species richness, and it is only recently that studies have attempted to map beta diversity (e.g. McKnight et al. 2007) and to relate it to spatial

and environmental factors (e.g. Ferrier et al. 2007).

With a growing need to understand changes in the natural environment and the impact of these changes on human society, the emerging field of conservation biogeography is likely to become increasingly important in providing the necessary theoretical basis and tools for doing so. This book provides an excellent foundation for that field and is highly recommended reading for students, scientists and practitioners of conservation.

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Edited by Markus Eichhorn

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