

While much of the book seems to bring back the now-discredited so-called noble savage approach, it makes the reasonable case that a social movement for food sovereignty will be based on production systems that will conserve biodiversity and build on the functioning of the local ecosystems. Fair enough, but what about the many parts of the tropics where the land is being abused. Haiti is only the most dramatic example but many others could be quoted. The book applauds the 'fundamental right of farmers to land, water, seeds and other means of production,' yet says little about the many conflicts over these key inputs, especially as populations increase and large corporate farmers become more attractive to those providing food to the growing urban consumers. While it is reasonable to support social movements for food sovereignty, ignoring the impacts of the wealthy is likely to make such support more difficult rather than easier.

A more important concern for the readers of this journal is that the authors repeatedly cite extinction as a normal process, and consider the charismatic mega-fauna as doomed to probable extinction, despite all the efforts seeking to avoid such a fate. They want us to be more concerned about bacteria and other soil microorganisms (which undoubtedly do deserve more attention), while downplaying the mammals that 'happen to look more or less like us.' Bats, mole rats, sperm whales, and indeed most other mammals hardly fit this description, but this is a minor issue compared to some of the fundamental ecological arguments the book makes. For example, to argue that 'species diversity tends to decrease as the intensity of management of the ecosystem increases' only holds for agricultural lands; many protected areas being managed to maintain high biodiversity require intensive effort to achieve their goal. Perhaps recognizing those seeking to conserve biodiversity as 'resource managers' rather than 'conservation practitioners' would give the authors a broader perspective. Their repeated argument that stopping extinctions is bad conservation policy will not convince many of us, especially when so many extinctions are the result of human actions that could be avoided. The current rate of extinction is widely agreed to be about 100 to 1,000 times the normal background rate, but this fairly fundamental figure is not cited or refuted in this book, which instead argues that agro-ecosystems are 'critical repositories of biodiversity.' While this may well hold for many species, it can hardly be accepted as a generality for biodiversity (which is never actually defined in the book). Certainly

well-managed and diverse agricultural landscapes can support numerous species, and do so in many parts of the tropics. Thus the argument of maintaining diversity in the agricultural landscape is well taken and deserving of support. But this is only part of the story, as over half of the planet's land is not used for agriculture and needs to be managed better to conserve biodiversity. Further, the Millennium Ecosystem Assessment identified invasive (non-native) species as one of the five major drivers of ecosystem degradation, yet this book seems to welcome these additions to ecosystems (considering them as part of 'migration rates') as a way of replacing the species that have unfortunately been driven to extinction.

Bottom line: the book argues that 'a serious conservation programme should focus on the type of agriculture practiced within the matrix, rather than on what happens solely in the fragments of natural habitat.' But this either-or argument makes the choice too stark. Rather, we need to manage the matrix as a whole, giving appropriate attention to all parts of the landscape and working closely with the people living on the land, with some of us devoting particular attention to those areas richest in biodiversity while others seek to manage their agricultural lands to contribute to the overall social goal of maintaining the living wealth of our planet.

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Island Bats: Evolution, Ecology, & Conservation edited by Theodore H. Fleming and Paul Racey (2010), vi + 547 pp., The University of Chicago Press, Chicago, USA. ISBN 9780226253305 (hbk), USD 65.00/GBP 45.00.

As someone whose work deals exclusively with British bats, this book opened the door to an entirely different dimension of the bat world to me. The result of a symposium on island bats held at the 2004 annual meeting of the Association for Tropical Biology and Conservation, the book is a collection of new research surrounding this vast subject.

The introduction of the book provides a useful background of how various research surrounding tropical island biology has contributed to our understanding of evolutionary, ecological and conservational thinking. It also offers a fundamental insight into the problems facing tropical island ecosystems, both historic and recent, as well as summarising the features of

island bats and other species, thus providing a practical foundation of knowledge on the subject that prepares the reader for the beefier topics of research that the book goes on to present.

Part one, discussing evolution of island bats, contains four chapters that present new research and hypotheses surrounding this subject. The section begins with a chapter from Heaney and Roberts, who explain how different methods of measuring genetic variation in Philippine fruit bats can be combined to provide a clearer picture of evolutionary history of populations of these species. The next two chapters both look at how sea barriers have affected dispersal and genetic variation in fruit bats in southern Wallacea and the Caribbean respectively, demonstrating how bat dispersal has only been possible during periods of very low sea level. In the final chapter in this section, Fleming et al. propose and test four hypotheses on dispersal by undertaking statistical analyses of data from three phyllostomid bat lineages. They relate this work back to the research presented in the first chapter, giving this section of the book a well-rounded feel.

Part two is the largest section of the book, containing seven chapters exploring the ecology of island bats. The first chapter in this section provides an excellent starting point by exploring endemism in island species and the factors that influence long-term persistence. Chapter 6 goes on to present an extensive study on the roles of pteropodid bats in re-establishing tropical forests of Krakatau, concluding that the significance of the role of bats has been previously underestimated. Interestingly, the authors also demonstrate the potential implications of this study on other oceanic islands and fragmented habitats. Willig et al. continue the theme of looking at the effects of island characteristics on bat ecology, as well as introducing the subject of hurricane-induced disturbance into the mix. Chapter 8, the only chapter focused on roosting ecology of island bats, looks at the roles of cave roosts in protection from weather events and energetic advantages, while the next three chapters go on to examine further the impacts of natural disasters on bat ecology. In a stark change of subject, and the only chapter to present a socio-biological subject matter, the last chapter in this section presents a fascinating study of the effects of flying fox consumption in Guam on neurodegenerative disease amongst the local human population.

The final section of the book contains four chapters that examine the all-too-relevant subject of conservation of island bats. The first three chapters of this section present discussions surrounding the main

threats to, and new ideas for the conservation of, bats on Madagascar, the tropical Pacific islands and insular South-East Asia, and New Zealand. The penultimate chapter in particular, in which O'Donnell examines the ecology and conservation of New Zealand bats, presents some pleasingly positive ideas regarding the achievability of successful bat conservation on the island, some of which one hopes could be applicable to other islands. This section and the whole book is superbly concluded by a poignant chapter contributed by Jones et al., providing an overview of the importance, challenges and opportunities to island bats on a global scale.

This format of back-to-back research papers makes the book a challenging and sometimes taxing read. However, the chapters compliment and flow into one another in a logistically pleasing manner that is immensely helpful to the reader. The book contains full referencing throughout and a comprehensive array of tables and figures, including a colour photo gallery, that support the information provided in the individual chapters effectively. These factors, combined with the impressive collection of new research covering the vast breadth of this complex subject matter, make this book an encyclopaedic goldmine for researchers studying island bats, as well as an excellent starting point for novices to the subject, such as myself. I have no doubt that this book will prove an important protagonist for triggering new and exciting research into the diverse range of factors influencing the evolution, ecology and conservation of island bats.

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Biodiversity, Ecosystem Functioning, & Human Wellbeing: An Ecological and Economic Perspective edited by Shahid Naeem, Daniel E. Bunker, Andy Hector, Michel Loreau and Charles Perrings (2009), xiv +368 pp., Oxford University Press, Oxford, UK. ISBN 9780199547951 (hbk), GBP 75.00; ISBN 9780199547968 (pbk), GBP 37.50.

When the Millennium Ecosystem Assessment (MA) was published in 2005, it popularized the concept of ecosystem

services—the benefits that people (and the ecosystems themselves) receive from the functions of ecosystems, which capture energy from the sun to yield food, water, energy, and much else besides. Biodiversity was not considered an ecosystem service but rather a fundamental contributor to all of the ecosystem services. However, the relationship among biodiversity, ecosystem function, and human wellbeing remained poorly explored, though with hints scattered throughout the assessment (full disclosure: I was a Coordinating Lead Author for the MA chapter on biodiversity in its Responses volume).

But now we have a book that brings together the latest thinking from over 60 of the leading scientists who are working to unravel the many complex relationships among these important variables. The volume does not provide the final answers, but gives some early results and lays out a detailed research programme that will undoubtedly provide new insights that will unravel the interactions between biodiversity, ecosystem functioning, ecosystem services, and human wellbeing. The editors expect that this will finally clarify the consequences of excessive rates of biodiversity loss. And, one hopes, this will lead to improved policy responses, though this step is not taken in the book.

Following a comprehensive introduction that summarizes over a decade of work on the ecological and social implications of the changes that biodiversity is undergoing, largely at the hands (and machines) of humans, several chapters lay out the natural science foundations that explain the complexity of ecosystem functioning, how various scenarios of extinction will lead to declining ecosystem services, and the contribution of work on food webs to a better understanding of biodiversity and ecosystem functioning. This section includes a nice balance among controlled laboratory experiments and observations in the wild.

The third section tackles the challenge of linking ecosystem services to human well-being, with links to climate change, ecosystems managed to provide increased amounts of products for people, crop pollination, disease, and invasive species—all highly topical issues. The section closes with three excellent chapters on economic

aspects of the issues, with a detailed discussion of the economics of biodiversity and ecosystem services (by Charles Perrings and colleagues), the valuation of ecosystem services (by Edward Barbier and colleagues), and modelling biodiversity and ecosystem services in coupled ecological-economic systems (by William Brock and colleagues). This is where the book breaks new ground, and these chapters are particularly commended to ecologists seeking to understand how they can use economics to broaden the appeal of biodiversity conservation for decision-makers.

Finally, the two closing chapters synthesize the main messages by stressing the importance of collecting and sharing data on the traits of species (emphasizing TraitNet, a research coordination network) and asking whether the effects of global change on biodiversity loss and ecosystem functioning can be predicted. They provide no definitive answer to the question they pose, but they do present an improved and more comprehensive conceptual framework that goes beyond that of the MA by including consideration of market forces in the global economy and how ecosystems are linked by biogeochemical fluxes through the atmosphere and hydrosphere.

This is not a book for the general reader, being aimed at a professional audience or advanced university students. It would have been more user-friendly if it had included an abstract for each chapter, but it makes up for this shortcoming by providing a comprehensive set of references and an excellent index. It states very clearly that its main message 'is that biodiversity conservation is an essential element in any strategy for sustainable development.' The readers of this journal will surely applaud this message, while perhaps wishing that the concept of biodiversity were used more consistently throughout the book. Can biodiversity, defined as 'the number, abundance and identity of genotypes, populations, species, functional groups and traits, and landscape units present in a given ecosystem' (p. 150, the first time this critical concept was defined) ever be 'used'? Perhaps that is a question for debate in a graduate seminar.

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