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## Frontiers of Biogeography

### Title

Invasive species and global climate change

### Permalink

<https://escholarship.org/uc/item/9wd817tn>

### Journal

Frontiers of Biogeography, 7(4)

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### Publication Date

2015

### DOI

10.21425/F5FBG29271

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## Invasive species and global climate change

Invasive Species and Global Climate Change. Lewis H. Ziska and Jeffrey S. Dukes (editors), 2014, CABI, 368 pp. £95 (Hardback) ISBN 9781780641645; <http://www.cabi.org/>

Ziska and Dukes have brought together an interesting range of chapters around an important topic for managing ecosystems in the 21<sup>st</sup> century. The book uses the term 'invasive species' to describe those that have "crossed a major biogeographic barrier (e.g. an ocean), usually with the assistance of humans, and whose introduction has, or will, result in significant negative economic or environmental impacts". The editors freely acknowledge there are alternative definitions and related concepts and it would perhaps have been useful to set these out more clearly in the opening chapter. Nevertheless, the book occupies a clear niche and makes a useful contribution. The scope is broad, including pathogenic microorganisms, vertebrates, invertebrates and invasive plant species. The geographical scope ranges from Antarctica to the tropics and marine, terrestrial and freshwater systems are all covered. Agricultural and natural systems are included. Climate change includes the effects of rising CO<sub>2</sub> levels as well as changes in meteorological variables. There is a strong American influence, with nearly half of the contributors from the USA, but there is a wide range of examples from other countries.

For me the strength of the book is the good use of case studies and examples to complement review material. Multi-author books are a good format for case studies – journals are often not interested in them, but they are a very valuable part of the evidence base for developing new policy and management approaches. Case studies bring a topic to life and ground science in practical experience. The latter sections of the book address management. The application of science to real world problems is strong, whilst at the same time maintaining a scientific approach, with extensive references. A book of this sort is useful not simply in its own right but as a gateway to the more specialist journal literature and this one fulfils that expectation.

An important element of any management response is the availability of reliable information and good data for detecting and anticipating change and methodology for anticipating future impacts; five chapters cover these areas. These include specific examples of resources and more generic reviews of approaches, including distribution- and population-based approaches to modelling (respectively, the chapters by Bradley and Gutierrez and by Ponti). The final three chapters (by Ziska, Westbrooks et al., and Barnes et al.) deal explicitly with the development of management strategies. Economics feature in a number of chapters in the book, mostly by way of providing context; the concluding chapter by Barnes et al. explicitly considers potential opportunities to exploit invasive species as an economic resource.

The chapters vary in style and content. The climate change content is thin in some of them, which is disappointing, but others, such as Webber et al.'s account of invasive plants in Australia, do a really good job of integrating climate change and biological invasions. Most chapters identify evidence gaps and uncertainties and some set out lists of research needs. This is an area where there remain significant challenges and in some cases it is not possible to do much more than to acknowledge that climate change complicates and exacerbates the impacts of invasive species. In others there is already a good understanding of the mechanisms involved and it is possible to identify specific needs for research and development.

This is a book that is likely to be a useful reference for a variety of readers and would make a good purchase for institutional libraries. It will be valuable for researchers in the field and I could see it supplying examples for lectures and student essays up to Masters level. It is also a resource for policy makers, land managers and scientific advisors working at a strategic level to tackle the problems presented by invasive non-

native species. Climate change adaptation is an increasing important topic in its own right and many countries and organisations now have a climate change adaptation strategy, programme or plan. Speaking as someone who is responsible for one, I could see myself dipping into this book for ideas and information.

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Submitted: 15 November 2015

Accepted: 22 December 2015

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