

## Book review

### CLOUT, M.N. & WILLIAMS, P.A. (Eds.) 2009: Invasive species management: a handbook of principles and techniques

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Managing invasive species is no easy business. If you don't have the fire in your belly, a pot of money, and refined knowledge of your invader and its role in the invaded ecosystem – do not try it at home! Mick CLOUT and Peter WILLIAMS's edited volume "Invasive species management: a handbook of principles and techniques" makes the sentiment abundantly clear. While the tone of the chapters is encouraging about management options and the case studies offered are mostly successes, the risks and challenges are evident throughout the book. As well they should be. For every success story of invasive-species control, there are countless, and mostly untold, stories of failure.

This volume is an excellent starting place for anyone interested in invasive-species management. Divided into two sections, the first section contains eight chapters that together introduce readers to the field of biosecurity and the legislative and technical tools that regulate the practice. The section provides an adequate introduction to the problem of invasive species, and clear discussion of the relative strengths and weaknesses of various management approaches, including containment, control and eradication. Keen readers interested in digging further will also find many good references.

The second section of the book contains six chapters dedicated to management techniques for different taxa, including terrestrial and aquatic plants, invertebrates, vertebrates, fish and marine systems. The final chapter addresses the need to consider invasive-species control in a whole-ecosystem context. I had hoped that the second section would be more illuminating to a seasoned invasive species reader. Yet much of the information remained too introductory, lacked case-study specifics, and didn't delve into the juicy ethical and practical challenges that plague the practice of invasive-species management.

For instance, the chapters on terrestrial and aquatic plants provided rather dry lists of management options available, much of which restated information provided in earlier chapters. PARKS and NUGENT's chapter on vertebrate management covered well a range of kill techniques, but did not mention how eradication campaigns have successfully (or not) worked with animal-rights groups. I would have preferred to be introduced to the various tools through more lively engagement with case studies illustrating the full range of challenges.

GREEN and O'DOWD do exactly that in a chapter on invertebrate control. They provide a detailed account of the 2002 helicopter pesticide efforts to control the yellow crazy ant (*Anoplolepis gracilipes*) on Christmas Island. They do a nice job of putting "the flesh on the bones," arguing correctly, in my view, that examples are too often missing from generic discussions of frameworks and principles. My critique of their chapter was that I was left wanting more. It has been nearly eight years since the campaign. I turned each page hungry for the in-depth analysis of the current status of the ants and the viability of impacted populations. The chapter ended with only a vague suggestion of long-term success. This detailed account of an eradication project would have also benefited from the inclusion of numbers on monetary costs and personal hours as these would have demonstrated the significant commitment necessary to succeed at this work.

Overall, the volume offers a great deal, bringing together a wide range of case studies and synthesis of lessons learned. Yet, the volume illustrates that a synthetic theory of invasive control has yet to arrive. For example, we do not really know what works best when and where. In part, this stems from the idiosyncratic nature of invasions, and in part reflects a lack of rigorous data collection and analysis of invasive species-control attempts. Several contributions make claims that are supported only by unpublished studies or that lack support entirely. For example, GRICE claims, without support, that it is easiest to control species in heavily human-inhabited environments. One could easily imagine the exact opposite, and he suggests as much, as challenges imposed by diverse human communities and property boundaries could make containment near impossible. I raise this issue not to scold GRICE, but rather to point to the fascinating, and largely untested questions that remain in this field of practice. The need for rigorous testing is not unique to invasive-species management. My favorite line in the book was GREEN and O'DOWD's comment on generic response frameworks: "What these models fail to do is to educate practitioners – managers and scientists alike – of the cold, hard reality of confronting rapid, expansive, and high-impact invaders. We argue that models like these are only truly, and usefully, heuristic if they are accompanied by detailed case studies that flesh out the abstractions." I couldn't agree more. The cold, hard realities illustrated through detailed case study, including cold, hard data, is needed to improve many areas of natural-resource management – restoration, climate-change adaptation. It's only through shared stories and data, and then through meta-analysis, that robust principles and practice will emerge.

