Book Reviews

Models for Ecological Data: An Introduction

By James S. Clark Princeton University Press,
Princeton and Oxford, 2007
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38.95. Cloth 632 pp., 163 figures, 21 tables. Lab
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GBP 11.95. Paper 152 pp.

In the life sciences, quantitative methodological innovations filter down only rather slowly from the super-numerate clans of our research community to the more empirically inclined. Once exotic and cutting-edge methods of analysis diffuse through our ranks over the decades and finally come to be seen as merely standard operating procedures. Key to the pace of change is the provision of clear and sufficiently accessible texts that articulate the benefits of new techniques, and ease their perceived complexity. James Clark writes that environmental scientists ''are witnessing a transformation in how models and data are used to draw inference and make predictions'', and his book is among the first to attempt to bring the power of this transformation to bear on what most of us do.

In a superb preface, Clark makes the case for why we need to start thinking about statistics differently – in short – describing what hierarchical Bayesian models can do for us. I cannot paraphrase more clearly what he writes himself:

… data that meet the assumptions of classical statistical models remain scarce, limited by our capacity to control the environment, the temporal and spatial extent we can afford to examine, and the ability to see relevant variables. … classical methods make demands that environmental data rarely meet.' He describes persuasively how our concept of data is expanding in ways that cannot be 'shoehorned in to classical models'.

Clark refuses to become mired in the philosophical battleground underlying the frequentist-Bayesian debate. Not that he does not have a view; he regards the shift to a Bayesian perspective as so inevitable

that further argument is pointless. He adopts a very and, to my mind, admirably pragmatic approach, using sequential chapters of this book to show what classical approaches are good for, where their limits are and how a hierarchical Bayesian approach allows us to see more.

In eight, substantial, chapters, the text leads the reader on an escalating journey from basic parameter estimation using maximum likelihood, confidence and prediction envelopes, and model selection, up to more complex models incorporating hierarchical structures, fitted using computationally intensive Bayesian machinery. It then moves through a lengthy, thorough discussion of modern methods for the treatment of time and space-time based data. It is an ambitious agenda, and in some places it works well. Clark adopts a non-standard organization, with little emphasis on technical background (which he recognizes most people find 'no fun' and requires too great a time-investment) – instead the text is well provided with examples, a lengthy set of mathematical and statistical appendices, and comes with an accompanying lab manual (written for R).

The book attempts to maintain an ambitious and potentially powerful balance of philosophy and pragmatism, detail and scope, theory and example, accessibility and sophistication. I found that while overall the book generally succeeded in striking these balances, there were frequent local imbalances. Paroxysms of detailed development ('The third stage Wishart hyperprior is conjugate with the covariance matrix for the normal distribution of random individual effects') are intermingled with some exquisite summaries of complex issues that will be enlightening to all. While the book is targeted at the motivated graduate student and the practising investigator, those not fairly conversant with these ideas already will struggle to get as much as is intended out of it without working very meticulously through all the material – and this will take more time than many people have. I see

few short-cuts in getting to grips with this material – certainly, much of it was beyond easy reach of most of our quantitatively predisposed reading group. The addition of a glossary, improved index, and more carefully explained notation would help.

I agree with Clark that a shift to a Bayesian perspective is ultimately inevitable. This book makes the case powerfully, and succeeds in conveying some of the methodology. The revolution will continue. Perhaps the irony is that in trying to encompass so much, Clark has accidentally made the full power of his arguments clear to only a few. This is a useful contribution, but inevitably, not the last word.

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Oceans Past. Management Insights from the History of Marine Animal Populations

'History is bunk' or so Henry Ford was supposed to have said. What he actually said was "History is more or less bunk. It's tradition. We don't want tradition. We want to live in the present, and the only history that is worth a tinker's damn is the history that we make today". The trouble is the history we make today has unfortunate consequences for those who are to come, and *Oceans Past. Management Insights from the History of Marine Animal Populations* is an illustration of how human activities can and have profoundly altered the world in which we live. Of course, history is not just tradition but the record of past actions and we can only learn from the outcomes of past actions if a record has been kept. It constantly amazes me how many written records there are and how far back in time they go.

This book is another contribution from the Census of Marine Life through its History of Marine Animal Populations, or HMAP, subproject. The book deals with an eclectic collection of studies that deal with the invasion by invertebrates (a periwinkle), the Florida sponge fishery, the cost of food in restaurants and what this says about availability, changes in fishing technology, various aspects of whaling and politics of maximum sustainable yield over the period just after its first introduction in the literature.

As mentioned, history relies on documents and those consulted by the authors contributing to this book are diverse. Restaurant menus are probably the most esoteric but they are being used increasingly by fisheries biologists in an attempt to determine what was available on the market in past times and how values for different species have changed. In the chapter exploring menus, Glenn Jones reproduces a number of menus from the past, which make interesting and sometimes amusing reading. As with many of the figures in this book, which are all black and white, readers can examine colour versions by referring to a web site based at the University of Hull, UK. A conclusion from the study is that prices showed that, even as early as the 1850s, retail prices for seafoods in the USA were higher than the general rate of inflation, which leads the authors to conclude that considerable pressure was being put on the stocks even at that early date.

Several chapters on finfish and on whales describe available data from old maps that provide locations of catches in several of the world's oceans. For example Chapter 7, *There she blew! Yankee sperm whaling grounds, 1760–1920* by Bannister, Josephson, Reeves and Smith, uses several map sources to show the distribution of sperm whale catches throughout the world's oceans. They demonstrate how different maps can be used to check the veracity of each. This cross-checking is, of course, a basic requirement in historical research where the accuracy of a single source cannot be relied on. However, if several sources tell the same story, then it is likely that the truth is revealed.

The diversity of topics does mean that it is not easy to see a common theme emerging from the book. At best, the various articles point fishery biologists to historical records they probably did not know existed. They also illustrate how we have known about many of the contemporary problems with fisheries for over a century. This is not a good reflection on humanity's efforts to deal with the overexploitation of renewable resources and points up the responsibility that we now have to make amends.