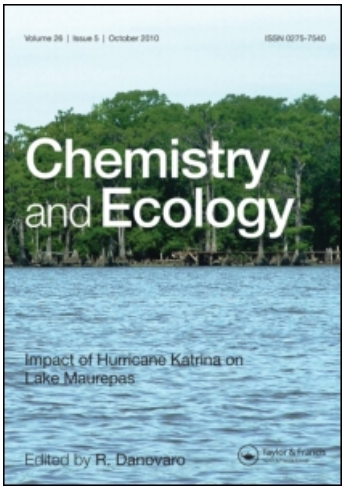

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Book Reviews

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Book Reviews

QUANTITATIVE ECOLOGICAL THEORY: AN INTRODUCTION TO BASIC MODELS, by M. R. Rose, Croom Helm, London & Sidney 1987. 203pp. ISBN 0-7099-2289-2. Price £2.50 (paper); £10.95 (hardback)

As the sleeve notes make clear, this book is intended to be used as a manual on the construction and use of mathematical models, rather than as a general ecological text. As such the origins of this work as a set of lecture notes from a course teaching theoretical ecology are obvious. The reader is expected to work through the detailed proofs and also the exercises provided at the end of each chapter in what amounts to a refresher course in mathematics. This results in a text which requires a considerable amount of effort from any reader who is not completely fluent in the use of calculus and matrix algebra.

In general the reader is given sufficient information to make the proofs clear, on the assumption that he has some, albeit perhaps rusty, familiarity with the operations involved in differentiation and integration. In places this treatment seems slightly overdone and risks losing a lot of readers at an early stage in the book. For example it seems somewhat excessive to devote half a page of calculus to the proof that the function for change in population numbers has similar form to that for population density given the assumption that the area occupied remains constant. I am sure that most readers will find that this is more a proof of the rules of calculus used rather than an aid to an understanding of the behaviour of the models involved. One or two other minor errors may also tend to confuse the reader, for example a short piece of text describing the manipulation of a formula to obtain a function "which just has x on the right hand side" is followed by an equation with x appearing on the left.

The chapters follow a logical progression through population growth of a single species, competition between two species, predation, simple ecosystems (i.e. three species), complex ecosystems and finally models of migration. Each chapter is also structured to develop from relatively simple models through to more complex models with perhaps more realistic behaviour, and consideration is given to both continuous-time and discrete-time models. As such this work provides a fairly comprehensive summary of the deterministic population dynamics models which have formed the basis of much theoretical ecology. It is perhaps unfortunate that no consideration is given to stochastic models, as although it would not be possible to consider these in the same detailed and systematic manner as the rest of the text, it might prove to be informative where points of comparison can be made.

The warning contained in the introduction that it is not a general textbook should be heeded. Thus the ecological interpretation of the assumptions made in each model and the resulting predictions tend to be overlooked in the detailed mathematical analysis which comprises the majority of the text. However, this book undoubtably has a role to play in providing a tutorial for serious students interested in developing their mathematical skills and in analysing population models.

KEITH SADLER

CHEMISTRY AND ECOLOGY, by Merril Eisenbud, Environmental Radioactivity from Natural, Industrial and Military Sources. Third Edition, publ. 1987, Academic Press, New York, London, 475 pp.; hardback $55. ISBN 0-12-235153-3

Public awareness of the balance between the benefits and hazards of nuclear exploitation—for health, energy, or defence—has been heightened in the wake of the Chernobyl accident. Professor Eisenbud's book ENVIRONMENTAL RADIOACTIVITY is a welcome reanalysis of the issues at a time when progress towards nuclear disarmament but also pressure to continue with the development of nuclear energy are topics of current debate.

The first edition of this book was published in 1963, now 25 years

ago, when the primary interest lay in nuclear fall-out from weapons testing, along wth the development of nuclear weaponry, and the future potential of nuclear power. At the time of the second edition (1973), these interests were still in the ascendancy; in later years the perception of needs for defence and power have changed, along with that of their risks. This current edition reflects this change, especially since the incidents at Three Mile Island and Chernobyl opened up so many issues to scientific and public questioning.

The introductory chapters of this book outline the history of nuclear developments since the beginning of the century. It sets out the basis of radiation protection standards, the nature of radioactivity and its transfer through atmospheric, terrestrial and aquatic pathways. There are chapters on the production and processing of nuclear fuels, on the operation of nuclear power reactors, and on radioactive waste management. The near-field and short term effects of fall-out from nuclear explosions or releases are described, as well as longer term and global effects. There is a useful catalogue of accidents that have resulted in environmental contamination, as well as an Appendix listing the significant properties of selected radionuclides. A final, somewhat speculative, chapter analyses social aspects, particularly the issue of actual versus perceived risks. There is a substantial reference list, and an effective index.

In dealing with such a broad ranging scope, and so clearly setting out the scientific basis of understanding, Professor Eisenbud has drawn on his uniquely extensive experience of working in the former Atomic Energy Commission, in the nuclear industry, and in academic research and teaching. A profound wisdom has been distilled from these activities and also from the exercise of providing advice to government and other agencies on nuclear developments, the attendant risks and environmental problems arising. Within the covers, and 450 pages or so of text, some hard decisions have, no doubt, had to be made about what to include, and what to omit.

For my own taste, I would have liked to see more detailed analysis of environmental pathways of some radionuclides, especially in the marine environment which seems likely to be the principal route of waste disposal, at least for Europe, in the decades ahead. Here, public perception seems at odds with scientific findings, perhaps because some crucial aspects are not well enough established. Medical uses are also scarcely covered—and indeed,

are excluded in the title—yet they are central to the issue of public perception.

This is a serious work, worthy to be on the shelf of any academic called on to cover even a part of the canvas covered. It ought to be available, also, to any who make public pronouncements of the risks of nuclear developments, although its cool appraisal of the relative dangers of this and alternative strategies will perhaps not find favour with some who hold extreme views. As a source of sound information and wise guidance it is to be recommended; at the modest price, it should be within the reach of any professional scientist who desires to be well-informed on this ever topical subject.

G. HOWELLS