

BOOK REVIEWS

Eugene Odum: Ecosystem Ecologist and Environmentalist

BY BETTY JEAN CRAIGE

xxii + 226 pp., 23.5 × 15.5 × 2 cm, ISBN 0 8203 2281 4
hardback, US\$ 34.95, Athens, USA: University of Georgia Press, 2001

When an author decides to write a biography, the risk of its becoming a hagiography is always present. To limit this risk, an author may declare, directly or indirectly, his intellectual engagement and his empathy. And that is the case here. Eugene Odum is pictured as a fighter, a leading scientist who competed with other scientists for financial resources. With his epistemological holistic manifesto, he found a way to exist scientifically and to build a pattern of energetic ecology that has influenced the theoretical and methodological landscape of ecology for more than forty years. Besides, the strict relationship between ecological studies and governmental necessities during the cold war shows clearly, if ever there is still need, that the idea of the scientist screened off from the world, looking for the true reality of phenomena, is an idealized way of interpreting the development of the sciences, particularly those that can have practical repercussions. However, from this point of view, it is interesting to note that, paradoxically, the same political system that made it possible for ecosystem ecology to emerge, to exist as an undisputed scientific discipline, must today cope with its political layers, with the environmentalism and conservationism that finds one of its theoretical and scientific grounds in ecosystem ecology.

The picture of Odum that results is very impressive and illustrates the relationship between science and society, and between academic and government policy. However, further information must be given concerning the general picture of ecology and of holism that emerges in this book. First, where the author is looking for a historical context concerning the emergence of ecology, she neglects the non-Anglo-Saxon European sources of this discipline (Acot 1998). Second, some clarifications are necessary concerning the holistic philosophical background of the Odum's position.

Fundamentals of Ecology (Odum 1971) has recently been called the book that has made the greatest impact on the careers of biologists and ecologists (Barrett & Mabry 2002). This evaluation cannot be necessarily shared by all the scientists in biological sciences, particularly those that work in evolutionary biology, but it is certain that Odum's book is paradigmatic. The holistic perspective presented has influenced generations of scientists.

The importance of the influence of the holistic sociological views of Howard Washington Odum on his son are underlined several times. At worst, it could almost be the case that the holism is a family production. It is important to note, for the reader not already informed, that holism has a long philosophical tradition, in both Western and Eastern philosophy. Just to quote some traditions or authors it is necessary to remember, among others, the philosophical ethics of Vedanta, Buddhism and Taoism. Some holistic positions can be found in, among others, Anaxagoras, Plato, Aristotle, Plotinus, Nicholas of Cusa, Hegel, Kant, Marx, Herbert Spencer, George Henry Lewes, and more recently, Charles Lloyd Morgan, Samuel Alexander, Jan Smuts (the cultural reference of Odum's

holism), Whitehead, Dewey and Wittgenstein. Besides, in the sociological domain, at the end of 19th century Emile Durkheim wrote the holistic rules of sociological method, elaborated later by Marcel Mauss.

An important aspect of the book concerns the world view, that is the ontology, as well as the methodology of the Odum brothers. Their ontological thinking is holistic; they consider the ecosystem as a whole of interdependent parts. However, their methodology is not.

To understand this incoherence, it is important to become aware that the analytical-summative approach is the research strategy of reductionism, it is element necessary, but not sufficient to identify it. Generally, such an approach goes with an atomistic ontology, but not necessarily, as the case of Odum shows us. What distinguishes reductionism is its relationship between theory and law of different levels of organization (epistemological reductionism or inter-levels reduction; Ayala & Dobzhansky 1974; Mayr 1982; Ruse 1988). According to the emergentist approach, specific emergent properties and specific laws characterize any level, while according to a reductionistic approach, the laws sufficient to explain the higher levels of organization belong at more fundamental levels, according to cases, genetics or physics. In accordance with this, hence, the laws that regulate and that can explain the ecology are essentially physics laws. And it is exactly the result of the Odum brothers' approach in the study of Eniwetok Atoll. When they, mistakenly, consider that the primary production of the reef is an emergent property, they have instead discovered a physics property and not, strictly speaking an ecological property (Mansson & McGlade 1993). Thus, from this point of view, the term 'holological' proposed by Hutchinson (1943) is appropriate, while the term 'holistic', if the term involves the concept of emergent properties (Feibleman 1954), represents a misleading interpretation.

In the best of cases, the Odum brothers's approach is representative of a 'systemic reductionism', or 'crypto-reductionism', and not of a truly holistic, and truly emergentist, approach that necessarily must do reference at more higher levels of organization and not only at the 'interaction between parts' of the system object of analysis (Feibleman 1954), among other things, quoted by Odum in the third edition of *Fundamentals of Ecology*. In definitive, the 'holistic' approach of the Odum brothers first involves the reduction of the ecological system to a physical system, while, the properties of community and population are revealed as collective properties and not emergent properties (Bergandi 1995, 2000).

However, all biologists and ecologists interested in the epistemological, theoretical, methodological and sociological aspects of their discipline, historians and philosophers of science, and citizens interested in the conservation of the common natural patrimony will find many interesting elements in this book. These include the mechanisms of concrete scientific research, the necessary conditions that permit a scientist to be creative academically and politically, and the social, economical, and political causes that do or not permit the protection of a specific natural area or the advancement of an ecological sensibility in the society.

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Global Environmental Risk

EDITED BY JEANNE X. KASPERSON AND ROGER E.

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xvii + 574 pp., 23 × 15 × 4 cm, ISBN 92 808 1027 8 paperback, US\$ 39.95, Tokyo, Japan: United Nations Press, 2001

There are many threats to the global environment; species extinction, atmospheric pollution, land degradation, overfishing, groundwater-mining and endemic overconsumption all threaten the very natural resources on which our economies and communities so rely. But how do we come to decisions about what is the best course of action? How can we compare these very different environmental problems? Looking around, we may conclude, only rather poorly. Acute but rare events such as the Chernobyl accident, tend to be noticed much more than chronic processes that creep up slowly and yet have more devastating effects, such as climate change.

This book seeks to address the nature of global environmental risks through five themes: (i) global risks that are the ultimate threat to us all; (ii) uncertainty that is a persistent feature of understanding causation as well as outcomes; (iii) risk that manifests itself in very

different ways at different spatial scales; (iv) vulnerability that is a function of biophysical, social and economic systems and limited human ability to cope; and (v) futures that are not given but must be imagined and negotiated.

The editors divide the book into four logically-connected sections. The nature of global environmental risks is first characterized, with particularly useful chapters by V. Norberg-Bohm *et al.* on international comparisons of hazards, and by S. O. Funtowicz and J. R. Ravetz on uncertainty and ignorance. The latter make the case for a post-normal science constructed from detailed analysis by extended peer communities, and suggest that this is essential for the kind of science needed to address complex and contested global risks. The former contains useful expositions of hazard rankings in a variety of frameworks, such as comparisons of pervasiveness with total consequences. Whether the very different attributes of harm, such as comparisons of direct and indirect effects, spatial and temporal distribution, latency and cumulateness, and irreversibility can be quantified and then used as the authors attempt remains an open question.

Sections two and three first address vulnerability and then a range of case studies on regions facing high-risk, including drought in Mexico, mountain-regions in the Himalayas, sea-level rise in the deltas of both Egypt and Bangladesh, and along the coasts of the low-lying lands of the North Sea. These contain valuable integration of scientific data with the costs of adaptation and the consequent policy options. Methodologically, though, the most interesting part of the book comes in the final section on global environmental futures. It is not until society sets out where it wants to get to (a desirable or even ideal future) and then differentiates it from likely futures if we do nothing (on a business-as-usual path) that it will become possible to accumulate the political will to take on the powerful forces that drive many of the most severe environmental problems.

Envisaging these futures is vital, as it can affect the likelihood of taking action, and the review by T. O'Riordan and P. Timmerman is particularly valuable. The last chapter sets out social visions of future sustainable societies, and indicates how different ways should be found to tell the story. How are science and imagination tied into innovative stories that make a difference? Can these encourage greater creativity and motivate people to act differently? I worry that these will remain useful methods that may themselves never force change on powerful self-interests who will suffer little harm by ignoring them. Nonetheless, this book is a valuable addition to the literature on environmental problems and the development of sustainable futures. My only complaint concerns references. Sadly, for a book published in 2001, the majority are from the 1980s and early 1990s, which is surprising for a book dealing with so many contemporary and rapidly-changing problems. The 56 pages of references contain only 33 dated from 1999 or later.

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Human Dimensions of Wildlife Management in North America

EDITED BY D.J. DECKER, T.L. BROWN AND W.F. SIEMER

447 pp., 28 × 22 × 2.8 cm, ISBN 0 933564 13 9 paperback, US\$ 40.00, Bethesda, MD, USA: The Wildlife Society, 2001

Whenever an edited work emerges that is marketed as a textbook we are usually skeptical of its ability to maintain cohesiveness and flow. This work is a fine example of how individually authored chapters can be brought together to create a comprehensive and authoritative textbook. This book is by no means the first to explore the important topic of human dimensions (HD) of wildlife; however, it is the first to provide educators with a single textbook that can serve as a foundation for courses in HD of wildlife. I can attribute this to dedicated editorial leadership and hands-on involvement of the editorial team in writing chapters (14 of 20 chapters have at least one member of the editorial team as a co-author). Also, there is no coincidence that the list of contributors reads like a who's who of human dimension research.

The book is attractive with numerous (sometimes so numerous that it makes reading choppy) callout boxes highlighting relevant examples. The illustrations are well done, albeit sparse. Additional examples of visualized data from the literature would have been a useful addition. The references provided at the end of each chapter serve as a starting point for students wishing to explore topics in greater detail. Discussion questions are reasonably general, but could serve as a basis for seminar format discussions. The questions are less suited to individual assignments for generation of written answers. The glossary is particularly helpful, as there are currently no dictionaries of terms that include the mix of ecology, environment, economics, and social sciences that constitute HD of wildlife.

The book is divided into four logical sections. The first part, 'Social and community values', establishes the historical and contemporary context for wildlife management and the evolution of the HD field. It also provides a foundation of key concepts that are essential before proceeding. All four of the chapters in this section are well written with the first two chapters being particularly interesting and insightful. The third and fourth chapters focus on some of the theory behind HD, but also incorporate just enough applied examples (usually in callout boxes) to remind students that there is a direct link between society, economics and wildlife.

The second part, 'HD and the essential processes of wildlife management', deals with the integration of HD with other core processes of wildlife management. The chapters include examples of applying the concept of HD to real-life wildlife management examples. These chapters also continue to build on key concepts (for example, identifying and communicating with stakeholders) that are essential for HD.

The third part, 'Applying HD insight to issues in wildlife management', provides real-life examples of how HD research has been integrated into wildlife management in several unique landscapes (urban, suburban, rural) and for different resource user groups (hunting, subsistence). This part is less coherent than the rest of the book. The chapter on restoration of wildlife species (Chapter 16) seems particularly out of place, prefaced by a chapter on hunting participation and followed by a chapter on subsistence. An obvious omission is the incorporation of commercial aspects of wildlife harvest, especially for migratory organisms (for example, marine mammals).

The final part of the book, 'Practical HD considerations', is an odd but interesting collection of chapters. Chapters 18 and 19 walk students through the process of planning and implementing HD

studies. These chapters present information in a concise manner and provide key methodological references. From an educator's perspective, the most interesting chapter is the concluding chapter of the book (Chapter 20, People for people: education for the HD), but it is perhaps the least relevant to students and may have been better served as a module in an accompanying teaching guide.

In my opinion there are two major deficiencies with this book, both dealing with its focus. The first is the regional nature of the case studies. Although the fundamentals of HD do not vary appreciably on a global scale, applying these in different cultural environments does. I feel that with very little effort, this book could have provided a more global approach to human dimensions, particularly considering that wildlife does not recognize political/geographical boundaries. Indeed, the title is even somewhat misleading when you consider the scarcity of Canadian issues (or authors) in a 'North American' textbook and the frequent use of American phraseology (for example, 'in your state'). The second deficiency is that the book considers wildlife to exclude fish and other aquatic animals. This deficiency may be more apparent to me because of my personal interest in aquatic organisms, but I feel that wildlife is broader than large furry and feathered terrestrial organisms. There are several case studies (for example, Ridley's turtle), but this is overshadowed by entire chapters on hunting access (Chapter 14) and participation (Chapter 15). These could have easily been tailored to access to resources and participation in natural resource recreational activities.

The deficiencies that I mention are substantial, but not so major that it would preclude me from strongly recommending this book as a core textbook for undergraduate, or even general graduate, courses. Supplemental readings from the primary literature could be used to round out the deficiencies and would permit the integration of newer materials as they become available. With these additions, this text could be used in a variety of classes ranging from fisheries, wildlife, natural resources ecology and environmental studies. Priced at US\$ 40.00, this book is affordable thanks in large part to the commitment of the publisher (The Wildlife Society) to providing students with access to educational resources without large financial burdens. This text could also be used in continuing education or professional development courses directed at practising wildlife professionals. I wonder at times if certain chapters (for example, chapters 18 and 19) are not directed to wildlife managers. To conclude, I complement the authors and editors for creating what will be the keystone textbook for HD for many years to come.

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Environmental Policies for Agricultural Pollution Control

EDITED BY J.S. SHORTLE AND D. ABLER

x + 224 pp., 18 figs., 24 × 16 × 1.5 cm, ISBN 0 85199 399 0
hardback, US\$ 75.00/GB£ 45.00, New York, USA/Wallingford,
UK: CAB International, 2001

This book aims to provide an economic basis for designing and evaluating pollution control strategies for agriculture. Five authors

contribute, in various combinations, to the seven chapters, which are edited by two of them. The chapters cover links between agricultural pollution and water quality, theoretical economics and empirical research on pollution policy design, methods for policy evaluation, experiences in applying policies in various countries (especially in the USA and European Union) and linkages between world agricultural trade and the environment. This book has been written in response to increasing demands for control of agricultural pollution (mainly characterized as non-point), but in a context where there is no clear way forward. Agricultural pollutants are considered to include sediments, nutrients (nitrogen and phosphorus compounds), pesticides, salts and pathogens.

The book has been written to be 'accessible to interested students, professionals and analysts with varied backgrounds'. The book reaches this target audience as there is something for everyone, whether or not the reader is an economist. However, it is only helpful to a small section of the scientific community, because large parts of the book take on complex economic theory that could leave scientists, including those in environmental conservation, struggling to understand the arguments.

The structure is clear, and the preface is an accurate guide to the content of the book. The figures used to illustrate economic theory are of a high standard and the arguments are well presented. The authors are successful in ensuring that the most up-to-date theoretical advances are incorporated. This is especially true in the last chapter 'Decomposing the effects of trade on the environment', in which the editors advance their framework to tackle non-point pollution control in an international context.

Although it is clear that the authors are experts in their fields of study, several aspects could irritate. The first is the speed with which economic theory is introduced, which makes it hard to understand the first few chapters. The determined non-economist will still gain a general understanding of the principles, but an extra chapter could have given a similar understanding making it easier for the reader. Other aspects include a sometimes difficult style (with overlong sentences) and much self-referencing in the theoretical sections, although this may be the result of the limited scope of the subject matter and the eminence of the authors.

Environmental scientists interested in how their research may be used in the process of regulation and legislation will probably find some of the chapters more interesting. Thus, the introductory chapter on the importance of water quality, and chapters 5 and 6 on how pollution control policies have been used in the USA and the EU will be informative. Unfortunately, the scope of the book omits geographic areas where some very important agricultural pollution occurs. Environmental protection in southern Europe (even parts of the EU) is ignored and developing countries are only given passing reference. More serious is the lack of analysis of environmental protection in recently-communist countries, where the control policies that could be used are likely to be quite different to those of northern Europe or USA.

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Conservation of Exploited Species

EDITED BY JOHN D. REYNOLDS, GEORGINA M. MACE,
 KENT H. RADFORD AND JOHN G. ROBINSON

xx + 524 pp., 23 × 15 × 2.5 cm, ISBN 0 521 78733 5 paperback
 GB£ 29.95, Cambridge, UK: Cambridge University Press, 2001

The deranged Roman Emperor, Nero, fiddled in his Golden Palace while Rome burned. Sometimes conservation biologists seem to do likewise, poring over abstruse algorithms, or engaging in scholastic disputation and casuistry, while, out in the real world, species go extinct. One of the critical ecological issues of our times, reconciling exploitation with conservation, is addressed in this book of 22 chapters, edited by four of the leading researchers in the field: two from the UK (Reynolds and Mace) and two from New York's venerable Wildlife Conservation Society (Radford and Robinson). This book, published in 2001, derives from papers presented at a meeting in London in 1999. Hence some recent literature is missing, one of the costs of book production to be weighed alongside the benefits of gathering a diverse mix of review material in one place. So, have the editors built a 'Golden Palace' (demolished within two years of Nero's death), or will this book help save the planet?

The result of hunting wild animals by humans has been massive depletions, local extinctions, and at least since the mammoths, global extinctions. In general, scientific advice on levels of sustainable take has been disastrously optimistic: we are learning that many species cannot withstand anything near the levels of exploitation to which they have been subjected. For example, Ram Myers and Jeff Hutchings have shown that the now-lost Newfoundland cod was overfished by a factor of ten.

In this book, a Foreword by Robert May sets a helpful tone, echoing Aldo Leopold in advocating an ethic that endows biological diversity and species with their own inherent rights. The opening chapter by Georgina Mace and John Reynolds is a masterly summary of the problem. The editors have done a good job, and there is a refreshing lack of the misleading agricultural jargon found in the fisheries literature, such as 'stock' for 'population' and 'harvest' for 'catch'. There is a mix of chapters on population dynamics, such as the incorporation of uncertainty (Wade), and the human dimension, such as discussions of the failure of management institutions to get exploitation under control (Sanderson and Robinson). Richard Law reviews the still-controversial selective effects of exploitation. The case studies exhibit a satisfyingly broad biodiversity: we get material on kangaroos (Grigg and Pople), elephants, deer and wild pigs (Milner-Gulland), the trade in live birds (Beissinger), the Arctic (Gunn), tropical forests (Reford and Feinsinger), and sharks and skates (Reynolds). Kaiser and Jennings provide a useful ecosystem perspective, but have missed a lot of recent work on aquatic ecosystems. One chapter (Hutton and Dickson) epitomizes the difficulties faced by management as trying to get a silk purse from a sow's ear. The final chapter, by John Robinson, is a perceptive essay on what might constitute 'sustainable use'.

The science presented sometimes lacks essential detail: in population dynamics, alongside making uncertainty explicit, spatial modelling is one of the most important new techniques to emerge in the past decade, but this reader was frustrated rather than enlightened by the material here because there is no information on how results were achieved. I felt that some chapters fit the Nero syndrome: for example, why do we need yet another review of depensation, a clever idea for which there has never been any direct

evidence? And the topic of maximum sustainable yield in fisheries has been better covered elsewhere. It would have been helpful for individual chapters to have had abstracts or summaries, as the introduction by the editors does not give you quite enough information to take decisions as to what to read, and few of us have the leisure to dip into a 525-page volume at random, a sad statement on the pressures of today's science hothouse.

In conclusion, anyone concerned with applied ecology and conservation will find this book of interest: it provides an admirably clear focus on the principal issues in trying to conserve exploited species, and I learned a lot from it. This reasonably-priced book should find a home on the shelf of any conservation biologist, and brings together valuable insights and fascinating case studies that will be useful in university courses on ecology, conservation and population dynamics.

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Communities and the Environment: Ethnicity, Gender, and the State in Community-Based Conservation

EDITED BY ARUN AGRAWAL AND CLARK C. GIBSON

xiii + 205 pp., 1 map 14 × 11 cm, 1 map 10.5 × 8 cm, 3 tables,
 ISBN 0 8135 2914 X paperback, US\$ 23.00, New Brunswick, NJ,
 USA: Rutgers University Press, 2001

This is a book that I will be recommending to colleagues and students; and it should be read by policy makers concerned with community-based conservation. *Communities and the Environment* opens further the black box of 'community' in the conservation context. The book starts by questioning the approach of community-based conservation. Although the editors think that participatory approaches are in the right direction, the central issue is to understand why the consequences of community-based conservation policy frequently fail to benefit all members of the community or do not lead to effective management of natural resources.

In the Introduction, the editors, Agrawal and Gibson, present an insightful and useful history of the development of the conceptual origins of community and of the idea of the role of community in conservation. They critique three aspects of community that are most important to those who advocate a positive role for communities in resource management: community as a small spatial unit, as a homogeneous social structure, and as shared norms. '... these conceptions fail to explain the cause of these features or articulate their effect on natural resource use. They offer, therefore, a weak foundation upon which to base policy' (p. 8).

Their critique will not surprise those who have worked in natural resource management in fieldwork situations. As an alternative, the authors of this volume employ '... a general framework of actors, processes, and institutions to explore more deeply particular cases of communities and natural resources management. ... the authors also investigate three of the most important issues confronting the research and practice of local-level

conservation efforts: ethnicity, gender and community-state relations' (p15).

Melanie Hughes McDermott presents a clear, systematic argument on the history of land rights by upland communities in Palawan, the Philippines. In her interesting article, she explains how local groups have used the idea of indigenous cultural communities to gain rights in land. However, the concept of indigenous cultural communities, held colonial powers, external donor agencies and the state do not reflect actual communities.

Ruth Meinzen-Dick and Margreet Zwartveen present a very informative overview of issues in their critique of unitary models of the household in South Asia. I particularly appreciate their attention to the 'backstage' contributions of women to influence Water Users Association decisions, to carry out tasks to maintain and manage watercourses, and to negotiate access to their water needs for domestic, animal and home garden needs. Yet, disappointingly, they do not discuss intra-household dynamics among women or intra-community differences among women (although they acknowledge differences based on class, caste and ethnicity); rather their discussion focuses primarily on the differences between men and women.

Hsain Ilahiane describes how socio-economic stratification in the Ziz Oasis, Morocco, affects access to and management of land and irrigation. Bettina Ng'Weno has written a very interesting and noteworthy article on the operation of plural-legal systems within the context of fluid community identities, which are made manifest in community inheritance disputes among the Digo of Kenya. Sara Singleton brings a political science perspective on the institutional development of relations between tribes, the state and the federal government to her article on Pacific North-west salmon fisheries. Tania Murray Li includes an excellent theoretical discussion on '... the ways in which boundaries are constructed, the purposes they serve, the processes they obscure, and the consequences that ensue' (p. 157). She supports her argument with her case study of hill farmers in Sulawesi. Bonnie McCay relates the debate on common property resources and community-based resource management to wider theoretical debates of rational decision-making of economic actors and socially embedded actors.

Agrawal and Gibson have done an excellent job editing this volume. There is an unusual consistency in the book as a whole. All the articles are well written. Each article looks at the historical background to the development of ideas central to their argument: community, indigenous land rights, gender analysis, state policy, boundaries, etc. My main criticism is perhaps my disciplinary bias as an anthropologist. Although a central theme is the heterogeneity of communities and the importance of an actor approach, few of the authors look deeply into these issues. I would have liked a few cases that illustrated their proposed approach in detail. It would have taken the analysis one step further into the difficulties of equitable, community-based management of natural resources. This is particularly so given that both the editors, and Elinor Ostrom in her Foreword, criticize the simplistic, universal blueprints of planners who have grabbed onto the community as a panacea for resource management. Nevertheless, *Communities and the Environment* makes a significant contribution to the debate on community-based resource management.

In addition to the editors, compliments should be paid to Rutgers University Press and their book designer. It is unusual today for an academic book to be published without feeling that its quality has been stunted by considerations of costs. This book has been published on good paper, with an attractive font and layout. I

particularly appreciated the extensive bibliography and explanatory notes.

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Coastal Defences: Processes, Problems and Solutions

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xvii + 366 pp., 24 × 16 × 2 cm, ISBN 0 415 198445 hardback, GB£ 90.00, London, UK/New York, USA: Routledge, 2001

Given the rising pressures on coastal environments and the potential for increased vulnerability of coastal locations to coastal erosion and flooding, a clear, well written text on coastal defence is a valuable addition to the rapidly growing coastal management literature. This book provides a comprehensive appraisal of a wide range of engineering solutions used for coastal protection and defence around the world's coastlines.

After a general introductory section, in which the brief historical context to current coastal defence strategies is outlined and a summary of fundamental coastal processes is given, Parts II and III provide detailed consideration of current techniques. These include both traditional 'hard' options, such as sea walls, groynes and offshore structures, as well as the more recent 'soft' approaches, including beach feeding and managed realignment, perceived as being more sympathetic with natural processes. The coverage of each technique follows a similar format: after a detailed description of the design, structure and current rationale for the approach, there is a discussion of possible management issues, including environmental and ecological impacts. Finally, a case for and against each option's use is presented. Part IV explores a limited range of other emerging coastal defence possibilities, including economic and other mechanisms, such as building regulations and insurance measures. Within the final chapter, which draws together the key issues associated with coastal defence, there is a brief discussion of current trends, including perceptions of defence options.

Supplementing the classic coastal geomorphological texts of Carter (1998), Pethick (1984) and others, this book should be a valuable resource for coastal practitioners and professionals in environmental and planning consultancies. However, given its textbook layout and approach, it is considered that it will be of most use for students undertaking geography, planning, coastal engineering, coastal management and other earth and environmental science degrees. Its strength lies in its user-friendly design and readability, including its indexes, the standardized format of the coverage of each option, particularly the summary boxes, clear line diagrams, maps and summary lists of bullet points at the end of each section. There is a good balance between theory and practice, with a substantial number of case studies providing excellent examples of a wide range of coastal techniques and related issues. The discussion of options is enriched by intelligently selected and carefully presented black and white photographs of coastal types, options and impacts. Although the examples and photographs are largely chosen

from the United Kingdom, the text provides a much wider, global view of current practice and issues. My main criticism, however, is the coverage of emerging approaches, including coastal zone management, which is now more commonly referred to as integrated coastal zone management (in Europe) and integrated coastal management (mainly in the USA). There is a considerable and rapidly expanding literature on these areas, including strategic coastal defence approaches and shoreline management, which have only been given somewhat cursory examination here. Even so, this book provides a very worthwhile compendium on coastal defence engineering options and should facilitate sensible, sustainable coastal defence decision-making around the world. I would hope that a more affordable, softback version could be made available soon so that it could gain the wide readership that it deserves.

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Modeling in Natural Resource Management: Development, Interpretation, and Application

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This book reviews many important principles of modelling of value to natural resource scientists and managers. The book is based on papers from a symposium organized by the Biometrics Working Group of The Wildlife Symposium and held at the fourth annual conference of The Wildlife Society in Snowmass, Colorado, USA. The book is organized in three main parts and the focus throughout is on models for wildlife-habitat relations and on the principles of modelling. An introductory chapter provides a review of models in natural resource management. In part I, an overview of models, three chapters describe the types of models and their use in natural resource science and management, use of statistical models, and theoretical and statistical models. Chapter 2, 'Using models in the conduct of science and management of natural resources', is a particularly good review of different types of models and their use, including discussion of the method of multiple working hypotheses. The chapter includes a discussion of the relationship of multiple working hypotheses with adaptive management and the need for methods that emphasize discrimination among competing hypotheses. Discussion of model fit and selection is introduced in the chapter and runs throughout the book. These are important

themes in modelling to support scientific studies and management decision-making. In part II, developing and interpreting models, four chapters review statistical model selection, simulation models and optimal decision-making, and validation and evaluation of models. Chapter 5, 'Statistical model selection: an alternative to null hypothesis testing', continues the theme of evaluating the plausibility of competing hypotheses or models. The use of Kullback-Leibler information and the Akaike Information Criterion to evaluate multiple working hypotheses and model fit is discussed using an example. Chapter 6 examines modelling as a management activity using optimal decision-making and simulation. Part III, applying models, contains chapters on population viability analysis, modelling wildlife resource selection, use of models in complex decision-making, individual based models, and collaboration between wildlife modellers and field biologists. These are important modelling approaches and the authors are careful to describe their appropriate development and use.

This is an excellent book. The chapters are consistently of very high standard and the whole book is very well written, edited and produced. Each of the chapters provides an extremely clear and useful review of relevant literature, as well as detailed examples that

illustrate the development and interpretation of models in natural resource management. Although the book is about modelling and is written with natural resource managers as the primary target audience, there are three increasingly important tools used for natural resource management that are not covered. These are geographic information systems, remote sensing and spatial analysis. All of these have considerable impact in natural resource management and will have a role in development and use of the methods described in this book. Hopefully the book will act as a catalyst for this linkage between the geospatial technologies and modelling.

I recommend this book to all those concerned with resource management. The book is suitable for upper-level undergraduate and graduate level courses in natural resource management, ecology, wildlife management and environmental science, as well as the natural resource managers to whom the book is directed.

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