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of the scientists who created it.

Elizabeth N. Shor, the historian at Scripps, is co-author of two of the chapters, on giant creatures and underwater acoustics, but makes her presence felt strongly throughout in supplying historical material to the footnotes sections.

There are bound to be a few errors in such a huge book. I only noticed two: Alfred Russel Wallace (who is given due credit for his role in discovering evolution) spelled his middle name with one “l”, not two, and the voyage of the *Fram*

started in 1893, not 1883.

I thoroughly recommend this book, not only to oceanographers of every kind and age, but also to general readers. It is enormously enjoyable and informative.

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Ecosystem-Based Management for the Oceans

Edited by Karen McLeod and Heather Leslie, Island Press, 2009, 392 pages, ISBN 978-1-59726-155-5, Paperback, \$45 US

REVIEWED BY ANDREW FISCHER

By now, there is no mistaking that the oceans are in peril. But, how do we move forward to address the problems and manage our ocean ecosystems for sustainability? How do we create new solutions to resource management challenges that span biological, social, and political disciplines? The compilation *Ecosystem-Based Management for the Oceans*, edited by Karen MacLeod and Heather Leslie, is probably the most comprehensive attempt at addressing these questions.

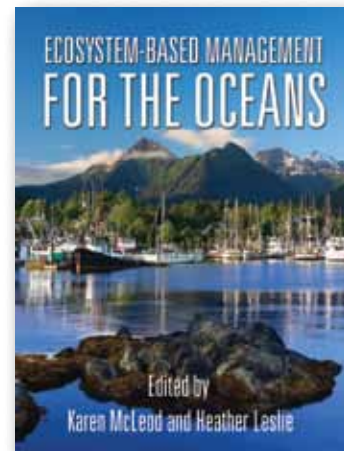
The book is organized into five parts, and each of the 19 chapters is a contribution from a total of more than 40 experts in the fields of marine science and management. Each of the chapters contains black-and-white illustrations

and photographs that support the text, and critical information in each of the chapters is summarized in boxes. The book begins with a foreword by Jane Lubchenco (Administrator, National Oceanic and Atmospheric Administration) and a preface by Anne Guerry (Lead Scientist, National Capital Project’s Marine Initiative) highlighting the interconnectedness and complex relationships among ecology, human interactions, and climate change in the Arctic and Puget Sound ecosystems. They make a compelling case for the urgent need for ecosystem-based management (EBM).

The first part of the volume is titled “Setting the Stage,” and the first two chapters define EBM, provide a guide to the volume, and spell out what resource managers need to implement an EBM approach. Ecosystem-based management is defined as an “integrated approach to management that considers the entire ecosystem, including humans.” The

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basis of this approach is to conserve ecosystems for the long-term delivery of ecosystem services. Another key aspect of the approach espoused by the book is the incorporation of resilience science, or embracing change and how ecosystems respond to myriad human and natural influences. To overcome traditional sector-based management challenges of current ocean management regimes and deliver a robust approach to EBM, Chapter 2 concludes that managers will require, among other things, a comprehensive and clear legal mandate, scientific information that is

cross-sectoral, and a forum for comprehensive ocean planning.

The second part of the book, “A Conceptual Basis for Ecosystem-Based Management,” focuses on key concepts that underpin EBM. Chapter 3 makes a strong case for the ocean as peopled seascapes, or coupled social-ecological systems—systems that integrate people’s institutions and economies, as well as the biophysical aspects. Chapter 4 defines resilience science, and both resilience science and coupled social-ecological systems become key concepts that underpin the remaining chapters of the book. Further conceptual development of EBM in Chapter 5 examines cross-scale ecological interactions. The authors of Chapter 5 suggest that, through examining a simple ecological model of a rocky intertidal community, testable qualitative predictions can be made and incorporated into adaptive EBM management scenarios. In Chapter 6, Lisa Wainger and James Boyd review the economics of natural resource management and economic valuation techniques. They recommend alternative approaches to valuing the long-term functioning of ecosystem services and their increased resilience through methods such as ecological production and ecological demand functions.

The third part of the volume, “Connecting Concepts to Practice,” focuses on implementing EBM. This part looks at four ways to incorporate concepts into the practice of EBM. Chapter 7 examines monitoring and evaluation programs, suggesting that EBM requires an adaptive approach, or a process of learning and change. The monitoring and evaluation of management outcomes or indicators,

in an experimental fashion, should lead to policy refinements that enable management programs to move toward resilience and sustainability. Chapter 8 calls for the incorporation of better nonmarket valuation techniques to determine trade-offs in EBM. Ecosystem services are largely not marketed, and not valuing them properly can lead to inefficient management of coastal and marine ecosystems. Using an example of shrimp aquaculture in Thailand, Chapter 8 further illustrates that the proper valuing of mangrove systems can lead to changes in the current incentives to convert mangroves to shrimp farms. Chapter 9 defines local knowledge (LK) and traditional ecological knowledge (TEK) and discusses the challenges of integrating LK and TEK into western science-based management frameworks. Using the Papahānaumokuākea Marine National Monument and the Olympic Coast National Marine Sanctuary as examples, this chapter shows how LK and TEK have played a role in establishing regulation and management responsibilities in these marine protected areas. Finally, Chapter 10 focuses on the legal and institutional frameworks in the context of EBM. Using the Magnuson-Stevens Act (fisheries) and the Endangered Species Act as examples, the authors show that current legislation contains provisions to permit or require EBM decisions, but, due to the fragmented state of statutory tools in the legislative framework, EBM approaches may not be applied consistently or at all.

The fourth section focuses on case studies of marine ecosystem-based management in practice. The case studies, which are largely set in North America, show how EBM is currently

being implemented, and they illustrate some of the successes and failures of its implementation. At the end of each case study, a “key messages” section summarizes its main points. A large aspect of the success of EBM is based on bringing together stakeholders. A case study from Morro Bay, California, exemplifies the utility of integrating EBM concepts through the development of strong networks of resource managers, stakeholders, and scientists who “share information, learn together, deliberate important trade-offs, and engage in collective action.” In the Gulf of Mexico, scientists are involving resource managers and users in long-term research and monitoring to maintain the resilience of the fishing industry. And, of special note, in Chesapeake Bay, integration of social and ecological sectors is being accomplished through a public sentiment index, a method to incorporate the views and engage interested stakeholders in public decision making and policy formulation. A chapter on the Eastern Scotian Shelf Integrated Management Project demonstrates the strengths of implementing EBM through a national-level legislative basis, and there is a short chapter that looks at some examples of national-level implementation from around the world, including Australia and New Zealand. Part 4 concludes with a chapter entitled “State of the Practice” in which the editors provide a brief analysis of the case studies presented. To finish off the volume, Part 5, “Looking Ahead,” addresses a new ethic for the oceans and strategies for moving EBM forward.

Overall, this book is an excellent compilation of theory and practical examples, assembled in a manner that is accessible to all students and

practitioners in either the natural or social sciences. It tackles the truly challenging topic of how to manage the ocean's ecosystem services, and it presents the information in a thorough, succinct, and digestible manner. A book

on this subject, especially of such scope and depth, is long overdue. It will truly serve as a primer for developing a resilience-based approach to the management of the coupled social-ecological systems of the world's oceans.

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Cold-Water Corals: The Biology and Geology of Deep-Sea Coral Habitats

By J. Murray Roberts, Andrew Wheeler, André Freiwald, and Stephen Cairns, Cambridge University Press, 2009, ISBN 978-0-521-88485-3, Hardcover, 352 pages, \$125 US

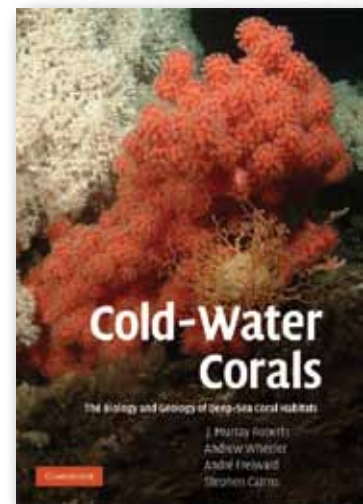
REVIEWED BY SANDRA BROOKE

Cold-Water Corals is the first comprehensive synthesis of one of the most active areas of current deep-sea research. It is a timely contribution to this field, which is experiencing a rapid increase in the number of scientific publications, has been the subject of several directed research programs, and has been the focus of four international conferences to date. The first three authors are recognized authorities on cold-water coral ecosystems in Europe, and the fourth author is a world authority on coral taxonomy. The targeted audience for this book is "professionals and students of marine science." The well-written and easy-to-read format contains numerous topic boxes (12) and case studies (7) that help explain various sections. The book has few typographical errors, a comprehensive index, a fairly complete glossary, and a summary reference section

(relevant to all chapters) that is appropriate to the text. It includes many black and white illustrations, and a 16-page section of color plates.

The text of the book is well organized; its eight chapters follow a logical sequence, and each chapter ends with a useful introduction to the next chapter. Although brief in places, the text is fairly complete. Chapter 1 sets the stage by reviewing the background and history of cold-water coral research and research methods.

Chapter 2 defines cold-water corals taxonomically and ecologically, and discusses their diversity, environmental constraints, and genetic connectivity. An interesting debate related to this field concerns use of the word "reef" and whether the term is appropriate when the structures are not navigational hazards (which is where the word originated). Roberts and co-authors make a strong case in Chapter 2 that from an ecological and biological perspective these cold-water and usually deep-water structures function in a way similar to shallow coral reefs, and, thus, use of the term reef is justified. This chapter does a good job of putting cold-water corals



in a broader perspective so that their importance can be appreciated. One seeming contradiction (or even an error) in this chapter relates to the distribution of the Stylasteridae (p. 42). It is stated that they are "absent from off continental land masses," but then it is noted that they are abundant off Florida (part of the US continental land mass). On p. 45, the same reference (Cairns, 1992b) is used to say that they "rarely occurred off continental land masses." The extensive table listing the 711 valid species (also available in the online appendix) is valuable, but the depth ranges for *Madrepora* and *Lophelia* do not match those in the text.

In Chapter 3, the basic biology of the anthozoa is reviewed, leading off with a treatment of anatomy and morphology. Then follow sections on food supply and