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Review: Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution

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BOOK REVIEW

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Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution. 2000. Committee on the Causes and Management of Coastal Eutrophication, National Research Council. National Academy Press, Washington, D.C. 405 pages. ISBN 0-309-06948-3. US \$54.95

During the past two decades, our increasing awareness of the detrimental environmental effects of nutrient overenrichment on the health of estuaries and near-coastal ecosystems has stimulated significant scientific research and public policy debate. Although scientific research and public policy analysis have historically been too isolated from each other in the “primary” and “grey” literatures, this volume purposefully and successfully addresses both arenas simultaneously in a way that should become a model for how complex environmental issues are addressed in the future. The numerous contributors brought together by the National Research Council should be commended for providing a timely and thorough analysis of the causes and wide-ranging effects of nutrient pollution on our coastal marine ecosystems.

The tone and direction of *Clean Coastal Waters* is clearly set in the Preface and in Chapter 1, where the goals of providing a comprehensive overview of our current understanding of the nutrient overenrichment problem (from the sources of nutrients to factors that regulate differential susceptibility of individual ecosystems and the ecological and economic effects) are outlined and four target audiences (coastal and watershed managers, scientists, federal agencies and Congress, and the Executive Branch of the federal government) are identified. For federal and state policy makers, Chapters 1 and 2 provide a succinct overview of the broad-ranging effects of nutrient pollution on the eutrophication process, harmful algal blooms, and habitat loss. This is followed by an argument for the need for a national strategy to address nutrient overenrichment. The clear (and likely correct) assumption of the authors is that policy makers do not want to have to wade through the detailed science to get a sense of the “big picture.” Unfortunately, this results in most of the presentation in these chapters reverting to “classic textbook arguments” that do not take full advantage of

new approaches to assess societal needs that are discussed in later chapters. The authors do, however, clearly identify a series of recommendations for state and local managers and federal agencies that will be necessary for scientists and managers to effectively address and manage nutrient pollution in the next decade.

The remaining chapters in *Clean Coastal Waters* provide a strong supporting framework for the recommendations outlined in Chapter 2. These materials are divided into two major sections, Part II—Understanding the Problem and Part III—Understanding Abatement Strategies. These sections are followed by a comprehensive list of references and numerous appendices detailing specific information obtained during the committee’s work.

In Part II, a clear argument is made for the unique role that nitrogen plays in nutrient overenrichment of estuarine and coastal waters and for the potential effect of changes in nutrient ratios, particularly for silica, on the ecology of coastal ecosystems (Chapter 3). In Chapter 4, the authors discuss the potential ecological and economic–societal effects of nutrient overenrichment on our coastal ecosystems. This discussion provides a clear presentation of both the positive and negative effects of nutrient overenrichment and helps focus the reader on both the complexity and potential magnitude of the eutrophication process. Perhaps tellingly, potential economic effects are discussed in brief in 10 pages at the end of Chapter 4. The fact that we still lack a strong economic argument for the potential negative effects of nutrient overenrichment is not a fault of the authors; however, it lies at the core of our difficulty in bringing our scientific understanding to bear on a policy and management community that often focuses myopically on the economic measuring stick. In Chapter 5, the authors provide a strong overview of our current knowledge of the sources of nutrients to estuaries and coastal waters, including much recent insight provided by retrospective projections to pristine conditions and the national assessment provided by the U.S. Geological Survey SPARROW model. Part II concludes with a discussion of the factors that determine the susceptibility of different estuarine and coastal ecosystems to nutrient overenrichment (Chapter 6). As with the previous chapter, this effort provides a comprehensive overview of the current state of our understanding of eco-

system susceptibility to nutrients and correctly identifies the need to develop quantitative measures of susceptibility as a priority.

In Part III, the authors go beyond the “academic” arguments for the need to manage nutrient inputs to our coastal waters and discuss how this can be achieved by combining current resources and programs with additional new efforts. Chapter 7 focuses directly on the role that monitoring and modeling will need to play in implementing successful nutrient management strategies. In Chapter 8, the authors discuss the issues that arise in setting goals for nutrient overenrichment management strategies and in determining the most effective policy alternatives to achieve these goals. By combining examples from Europe with ongoing U.S. efforts to determine water quality standards (e.g., the U.S. Environmental Protection Agency total maximum daily load, TMDL, process) and criteria, the authors provide a background from which the process of managing nutrient overenrichment in our coastal waters can be moved forward. Finally, in Chapter 9, the authors provide concrete examples of how nutrient sources can be reduced and controlled. The presentation cor-

rectly emphasizes that although the management of individual ecosystems will be different by necessity (i.e., different sources, susceptibility, and societal values), a national strategy for mitigating the effects of nutrients on our coastal waters is essential to manage this complex and multijurisdictional environmental problem.

Clean Coastal Waters is a “must read” for individuals involved in the policy, management, and scientific efforts to assess and mitigate the increasing effect of nutrient overenrichment in our coastal waters. This compilation provides the most current assessment of our knowledge of the nutrient overenrichment process and, perhaps more importantly, provides an example of how science and management should be able to come together to address a complex and insidious environmental problem. As such, it should also be a great reference for students who might be interested in careers at the interface of science and public policy.

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