

FOREWORD

I was introduced to the science of estuaries as a graduate student in the early 1980s, studying the ecology of oyster populations in Chesapeake Bay. To undertake this research, I needed to learn not only about oyster biology, but also about the unique physical and chemical dynamics of estuaries. Further, to understand the relevance of my work, I needed to gain some knowledge of the oyster fishery, its management, and the underlying laws and policies. This experience, along with other opportunities for interdisciplinary study and research, has served me well in my career. It is hard to imagine ecosystems more conducive to such diverse learning and investigation than estuaries.

Working in the field of estuarine ecology taught me other lessons. One was that the traditional experimental model of scientific investigation, where one variable is isolated and all others controlled, is not a productive one for most ecological research. My oysters demonstrated interactive responses to changes in water temperature and concentrations of suspended solids (Jordan 1987), so that investigating either of these variables in isolation would have given at best an incomplete model – more likely an incorrect one. A second valuable lesson was that much of ecological theory, circa 1980, relied too much on cogitation and too little on data. From these and other experiences, I developed my personal style of research: observe, then analyze, then theorize; a model that is the reverse of many scientific investigations. In systems as complex as estuaries, often we don't know what model or hypothesis to test until we've had a thorough encounter with data. Or at least this was the case before the past decade or so. These days, so much data and scientific information have accumulated that I find myself asking younger scientists to define their model or hypothesis and then justify why they need to collect new data. It seems the era of exploration is giving way to a new era of data mining, modeling and synthesis.

All natural systems have infinite complexity for the committed reductionist, but estuaries manifest great complexity even at superficial levels of investigation. They are highly dynamic over brief spans of time and fine spatial scales. They are integrators of terrestrial, atmospheric, oceanic, and riverine influences, and subject to perturbations arising from any of these sources. Estuaries are centers of human populations, commerce, and biological productivity, contributing to and receiving from society far more than would be predicted by their modest geographic footprints. They are receptors, processors, and transporters of materials; producers of great quantities of seafood; and places of major concern for the ecological, sociological, and economic consequences of habitat loss, pollution, overexploitation of natural resources, and rising sea levels. Estuaries are especially sensitive to such influences, delivering feedback to society in the forms of diminished fisheries, impairment of recreation and tourism, and losses of other services and amenities. These losses are reflected in the many restoration and management programs that have been established for specific estuaries around the world, and the substantial body of research and modeling that they have stimulated.

This book reflects the interdisciplinary nature of estuarine research, ranging from physical science to socio-economics. Although wide-ranging, it is not fully comprehensive, nor is any other recent volume of which I am aware. Having taught estuarine ecology to graduate students for several years, I once had thoughts of writing or editing a textbook to replace the estimable, but dated, *Estuarine Ecology* (Day et al. 1989). This need remains unfulfilled, although I learned recently

that a new edition of *Estuarine Ecology* is in preparation. Our volume is not intended to be a textbook; as directed by the publisher, its principal audience is the scientific community. Nevertheless, the authors and I have tried to make it more comprehensive and readable than a mere collection of scientific articles, so that it might serve as a text for graduate students until something better comes along.

I am writing this essay on the shores of Santa Rosa Sound, a ravishingly beautiful coastal lagoon on Florida's Gulf of Mexico coast, part of the Pensacola Bay estuarine system. Every time I step from my office to the outdoors, I'm reminded that estuaries are not just about the science, management, and policy we write about in this book. They are places where the beauty and joy of nature strike us, demand our attention, and refresh us.

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References

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- Jordan, S.J. (1987). *Sedimentation and Remineralization Associated with Biodeposition by the America Oyster Crassostrea virginica (Gmelin)*. Ph.D. Thesis, University of Maryland, College Park.

¹ The views expressed in this chapter are those of the author and do not necessarily reflect the views or policies of the U.S. Environmental Protection Agency. This is contribution XXXX from the Gulf Ecology Division, and a product of EPA's Ecosystem Services Research Program.