

# Preface

This volume in the Coastal Research Library (CRL) considers various aspects of coastal environmental management and governance. As the world population grows, more and more people move to the coastal zone. There are many reasons for this drang to the shore, not the least of which are increased opportunities for employment and relaxation in a salubrious environment. But, as population densities increase beyond the carrying capacity of fragile coastal zones and sustainability seems ever more elusive, more than remedial measures seem required. Because governance in the coastal zone has generally failed the world over, it is perhaps time to reconsider what we are doing and how we are doing it. Depopulation of many coastal zones would be a laudable goal, but just how this might be accomplished in a socially acceptable manner is presently unknown. Perhaps some socioeconomic incentives can be devised to lure people back towards hinterlands, but until such goals or efforts are implemented there seems little choice other than trying to make things work with the present state of affairs.

This volume thus considers a range of selected advances that highlight present thought on a complex subject that invariably, one way or the other, involves consideration of coastal natural resources. Whether it is coastal hazards, sustainability of fishers and aquaculture, resolution of environmental conflicts, waste disposal, or appreciation of biophysical frameworks such as coastal karst or impactors such as fluctuating sea levels, more advanced *out of the box* thinking is required to solve today's problems. Approaches to potential solutions are sometimes based on models or perhaps more commonly on an individual's ratiocinative powers where one can deduce logical outcomes. It is unfortunate that in many cases governmental approaches to solutions are lethargic and ineffective, making it all the more imperative to suggest advanced approaches to old problems that linger on. This book thus attempts to highlight some examples of advancements in thought processes, observation, comprehension and appreciation, and better management of coastal resources.

*Environmental Management and Governance: Advances in Coastal and Marine Resources* is subdivided into five parts: Part I, Coastal Hazards and Beach Management-Certification Schemes; Part II, Ocean Governance, Fisheries and

Aquaculture: Advances in the Production of Marine Resources; Part III, Exploration and Management of Coastal Karst; Part IV, Coastal Marine Environmental Conflicts: Advances in Conflict Resolution; and Part V, Examples of Advances in Environmental Management: Analyses and Applications that collectively contain 17 chapters. These subdivisions are, of course, artificial and meant only to help organize the material into convenient study groups. Chapters in each part are briefly described in what follows.

Part I contains three chapters that deal with coastal hazards and beach management. In Chap. 1 (“Geological Recognition of Onshore Tsunami Deposits”), Costa, Andrade, and Dawson discuss enhancements of our abilities to recognize (paleo) tsunami specific signatures in coastal sediments through the application of diverse sedimentological techniques. They show in this chapter how it is possible, through the use of diverse sedimentological proxies, to obtain information about the presence or absence of tsunami indicators, establish their likely source, and collect valuable information about tsunami run-up, backwash or wave penetration inland. Botero, Williams, and Cabrera, in Chap. 2 (“Advances in Beach Management in Latin America: Overview from Certification Schemes”), analyze beach certification schemes as part of beach management in Latin America. These authors highlight advances in beach management in Latin America by pointing out main conceptual, methodological, and practical challenges to be achieved for scientific and decision makers of the continent. Chapter 3 (“New Methods to Assess Fecal Contamination in Beach Water Quality”) by Sarva Mangala Praveena, Kwan Soo Chen, and Sharifah Norkhadajah Syed Ismail deals with an emerging paradigm for assessment of recreational water quality impacted by microbial contamination. Advances in this topic are important because recreational water is susceptible to fecal contamination, which may increase health risk associated with swimming in polluted water.

Part II also contains two chapters, but these efforts focus on broader issues of advances in ocean governance that involve new developments in coastal marine management and fisheries and aquaculture production. Chapter 4 (“New Approaches in Coastal and Marine Management: Developing Frameworks of Ocean Services in Governance”) by Paramio, Alves, and Vieira delves into aspects of “Modern” and “post-Modern” views of ocean uses as a source of resources and space; for example, how economic development is now supplemented by functions the marine environment provides, such as human life and well-being. Ocean governance remains a current focus of discussion for policymakers aiming to address sustainability principles and perspectives in a more effective way. Chapter 5 (“Interaction of Fisheries and Aquaculture in the Production of Marine Resources: Advances and Perspectives in Mexico”), by the Pérez-Castañeda team (Roberto Pérez-Castañeda, Jesús Genaro Sánchez-Martínez, Gabriel Aguirre-Guzmán, Jaime Luis Rábago-Castro, and Maria de la Luz Vázquez-Sauceda) indicates advances that are indicative of the potential value of aquaculture as a complementary productive activity that will meet the growing human demand for food from the sea. This advanced understanding is critical because, in terms of global fisheries production, the maximum fisheries catch potential from the oceans around the world has apparently been reached.

Part III contains Chap. 6 (“Advances in the Exploration and Management of Coastal Karst in the Caribbean”) by Michael J. Lace. This chapter is important because it explains that significant karst areas remain to be explored while illustrating associated landform vulnerabilities, anthropogenic effects, and range of coastal resource management and preservation initiatives that should be applied. These advances highlight unreported field research in selected island settings that support an emerging view of complex karst development.

Four chapters that deal with advances in coastal resources conflict resolution comprise Part IV. Chapter 7 (“Mud Crab Culture as an Adaptive Measure for the Climatically Stressed Coastal Fisher-Folks of Bangladesh”) by Khandaker Anisul Huq, S. M. Bazlur Rahaman, and A. F. M. Hasanuzzaman is an example of new adaptive measures for ensuring the security of food and livelihood of coastal poor people. Highlighted here is on-farm adaptive research on crab fattening/culture as a livelihood option for the fisher folks. This chapter shows how to recommend and carry out comprehensive crab culture extension programs for building capacity and improving economic conditions in climatically stressed coastal communities. Chapter 8 (“The Guadalquivir Estuary: A Hot Spot for Environmental and Human Conflicts”) by the Ruiz team (Javier Ruiz, M<sup>a</sup> José Polo, Manuel Díez-Minguito, Gabriel Navarro, Edward P. Morris, Emma Huertas, Isabel Caballero, Eva Contreras, and Miguel A. Losada) demonstrates how the application of robust and cost-efficient technology to estuarine monitoring can generate the scientific foundations necessary to meet societal and legal demands while providing a suitable tool by which the cost-effectiveness of remedial solutions can quickly be evaluated. A holistic approach to understanding the estuarine ecosystem, including its physical and biogeochemical dynamics and how these control biodiversity, is identified as the first step towards making knowledge-based decisions for sustainable use. Chapter 9 (“Shrimp Farming as a Coastal Zone Challenge in Sergipe State, Brazil: Balancing Goals of Conservation and Social Justice”) by Juliana Schober Gonçalves Lima and Conner Bailey discusses marine shrimp farming in Brazil from the perspective of both social justice and environmental conservation. Conflicts arose here because the rearing of marine shrimp became an important local economic activity that increasingly occupied large areas on the coast. Shrimp farming is practiced mainly through extensive family-based production systems in mangrove areas that were subsequently declared Permanent Preservation Areas by Brazilian law. As a result, these family shrimp farms are considered illegal, but the farms themselves long predate promulgation of the law and represent an important source of livelihood for hundreds of families. Chapter 10 (“Regional Environmental Assessment of Marine Aggregate Dredging Effects: The UK Approach”) by Dafydd Lloyd Jones, Joni Backstrom, and Ian Reach describes the MAREA (Aggregate Regional Environmental Assessment) methodology, and shows how similar regional assessment exercises could contextualize the effects and impacts of multiple marine dredging activities in other parts of the world. Each MAREA assesses the cumulative impacts of marine dredging activities using regional-scale hydrodynamic and sediment transport models linked to regional-scale mapping of sensitive receptors.

Part V contains seven chapters that consider various aspects of advances in environmental management based on examples of analyses and applications. Chapter 11 (“Advances in Large-Scale Mudflat Surveying: The Roebuck Bay and Eighty Mile Beach, Western Australia”) by Robert J. Hickey, Grant B. Pearson, and Theunis Piersma deals with advances in mudflat surveying using the example of shores along Roebuck Bay and Eighty Mile Beach in northwestern Australia, the richest known intertidal mudflats in the world. Chapter 12 (“Sea-Level Indicators”) by Niki Evelpidou and Paolo A. Pirazzoli illustrates how the study of relative sea-level changes is an essential element of ocean observation and technological advances that are necessary to improve the determination of levels (elevation or depth), chronological estimations, and the identification of appropriate sea-level indicators. Although levels are determined with satellites, oceanographic vessels, geophysical equipments, leveling techniques, tide-gauge devices, or even direct measurement by an observer, chronological estimations may result from radiometric analysis of samples, comparison with stratigraphic sequences, archaeological or historical data, assumptions on erosion or deposition processes, or even from glacio-isostatic or climate modeling. Indicators of fossil or present-day sea-level positions are nevertheless the most important elements for a sea-level reconstruction, because they provide information not only on the former level but also on the accuracy of the reconstruction. In Chap. 13 (“Advancement of Technology for Detecting Shoreline Changes in East Coast of India and Comparison with Prototype Behavior”) by R. Manivanan, various aspects of intake/outfall of nuclear power plant on the coast, especially the dispersion of warm water discharges under different environmental conditions, is simulated using mathematical modeling techniques and suitable locations of intake and outfall with the minimum recirculation. This chapters discusses advances for optimizing the efficiency of power plants by locating the intake/outfall so there is minimum recirculation of warm water in the intake under the prevailing coastal environmental conditions. Chapter 14 (“Coastal Dunes: Changes of Their Perception and Environmental Management”) by Tomasz A. Łabuz outlines coastal dune types and conditions for their development, while considering functions and practical use of coastal dunes. Of special interest here are advancing and changing attitudes to environmental management of coastal dunes that include various new approaches to use and perception of dunes that result from cultural and societal development. Chapter 15 (“Advances in Brine Disposal and Dispersion in the Coastal Ecosystem from Desalination Plants”) by R. Manivanan observes brine water plume behavior in the vicinity of coastal areas with different outfall locations. This study indicates that higher velocity and larger port diameter enhances dispersion rates and minimizes adverse effects on the marine ecosystem. Chapter 16 (“Estuaries Ecosystems Health Status – Profiling the Advancements in Metal Analysis”) by Ahmad Zaharin Aris and Looi Ley Juen demonstrates advanced analytical methods and detection techniques available for metals analyses. Environmental forensic approaches and application of various metal pollution indicators, indices, modeling, and statistical analysis are used to assess estuarine ecosystem health status. Chapter 17 (“Floating Offshore Wind Farms and Their

Application in Galicia (NW Spain)”) by Laura Castro-Santos and Vicente Diaz-Casas provides a methodology for calculating the life-cycle costs of developing a floating offshore wind farm. This example was developed for a semisubmersible floating offshore wind platform and a general offshore wind turbine of 5 MW. The farm will be composed of 21 offshore wind turbines, with a total power of 107 MW.

While it is understood this volume does not include all advancements in the management and governance of environmental systems, a thorough selection of topics have been addressed. From coastal hazards, to ocean services, to aquaculture, this book presents a diverse cross-section of studies that provide innovative environmental stewardship on an international scale. However, these studies are only the beginning. From these new ideas spring forth new ways of thinking to effectively protect, manage, and govern fragile coastal ecosystems found around the world. By delving into original, pioneering methods and practices, as illustrated throughout this volume, true advancements are then achieved.

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