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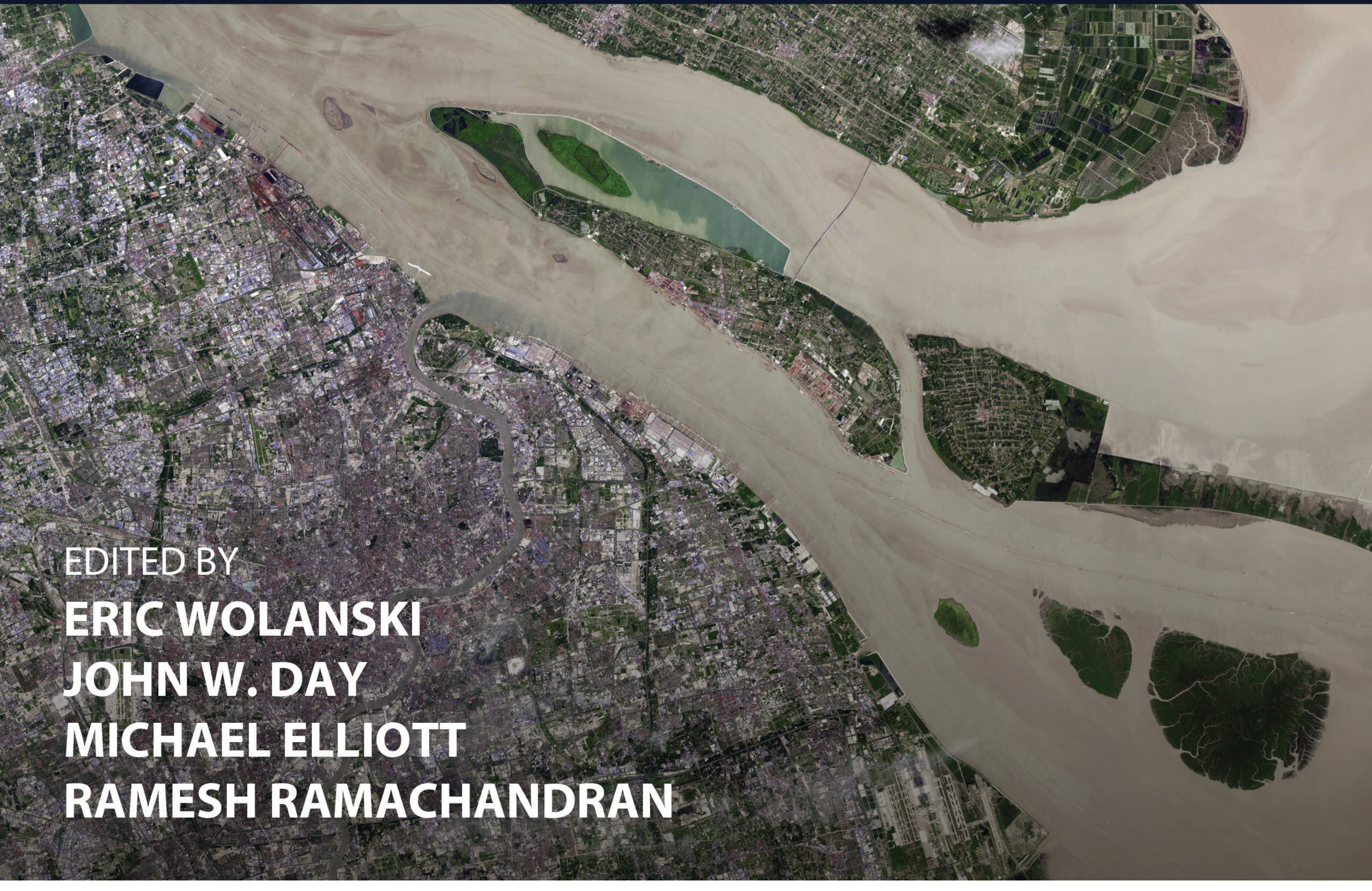
THE FUTURE



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Dedication

We dedicate this book to our grandchildren: Oliver, Grace, and Harry Wolanski; Olly, Dylan, and Mycah Elliott; and Daisy and Sunny Day; and to Ramachandran's children Gowtham and Niveda Ramesh; we hope that they will enjoy healthy estuaries and coastal waters by 2050 and beyond and we hope that these will remain healthy to entrust to their children.

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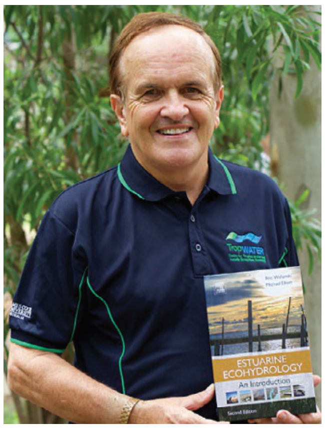

Professor Eric Wolanski

Eric Wolanski is an estuarine oceanographer and ecohydrologist at James Cook University and the Australian Institute of Marine Science. His research interests range from the oceanography of coral reefs, mangroves, and muddy estuaries to the interaction between physical and biological processes determining ecosystem health in tropical waters. He has over 400 scientific publications, including 12 books, and technical reports. Eric is a fellow of the Australian Academy of Technological Sciences and Engineering, the Institution of Engineers Australia (ret.), and l'Académie Royale des Sciences d'Outre-Mer. He was awarded a Doctorate Honoris Causa by the catholic University of Louvain, another Doctorate Honoris Causa by the University of Hull, a Queensland Information Technology and Telecommunications Award for Excellence, and a Lifetime Achievement Award by the Estuarine & Coastal Sciences Association. Eric is an Editor-in-Chief of *Wetlands Ecology and Management*, *Treatise on Estuarine and Coastal Science*, the Honorary Editor of *Estuarine, Coastal and Shelf Science*, and a member of the editorial board of four other journals. He is also a member of the Scientific and Policy Committee of Japan's EMECS (focusing on the Seto Inland Sea) and the European Union DANUBIUS-PP Scientific and Technical Advisory Board, which is a pan-European distributed research infrastructure dedicated to interdisciplinary studies of large river–sea systems throughout Europe.

Professor John Day

John Day is distinguished professor emeritus in the Department of Oceanography and Coastal Sciences at Louisiana State University. He has over 400 publications focusing on the ecology and management of coastal and wetland ecosystems, with emphasis on the Mississippi delta, as well as, among many, coastal ecosystems in Mexico and the impacts of climate change on wetlands in Venice Lagoon and in the Po, Rhone, and Ebro deltas in the Mediterranean. John is the coeditor of 14 books including *Estuarine Ecology, Ecological Modeling in Theory and Practice, The Ecology of the Barataria Basin, An Estuarine Profile*, *Ecology of Coastal Ecosystems in the Southern Mexico: The Terminos Lagoon Region, Ecosystem Based Management of the Gulf of Mexico, America's Most Sustainable Cities and Regions—Surviving the 21st Century Megatrends*. John served as chair of the Science and Engineering Special Team on restoration of the Mississippi delta, on the Scientific Steering Committee of the Future Earth Coasts program, and a National Research Council panel on urban sustainability.

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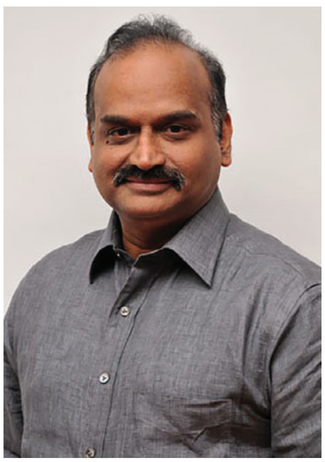

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Preface: Why This Book?

Coastal ecosystems are at the nexus of the Anthropocene, with enormous environmental issues, and inhabited by nearly half of the human population. These coastal systems and the surrounding human societies form coastal social-ecological systems that increasingly face enormous environmental issues from multiple pressures, which threaten their ecological and economical sustainability. The pressures are derived from hazards which then become risks where they impact the society and where, in some cases, human responses exacerbate the risks. There is only one big idea in managing these systems—how to maintain and protect the natural ecological structure and functioning and yet at the same time allow them to deliver ecosystem services which produce societal goods and benefits. The pressures include basically all human activities within the river catchments such as changes to land use and hydrology in the river catchment, and directly on coastal ecosystems from land claim, coastal sand mining, harbor dredging, pollution and eutrophication, overexploitation such as overfishing and extraction of groundwater, gas and petroleum extraction. In addition, coastal zones are impacted by climate change—this is not just the 'usual' culprits of sea level rise, ocean acidification, and increased temperature but also, just as important, changes in the rainfall-runoff of the river catchments, stronger coastal storms, and the changes to species distributions, including the influx of invasive species.

The problems faced by half of the humanity worldwide living near coasts are truly a worldwide challenge as well as an opportunity for science to study commonality and differences and provide solutions. During the five decades of monitoring the degradation of estuaries and coastal waters in the 20th century, coastal scientists studied the problems and issues arising along the coasts worldwide. Now, in the 21st century, the scientists need to use their science to help find solutions to these problems through science-informed management and innovation. The issues to solve are complex because they involve large areas, many users, and sociopolitical-environmental mosaics.

This book provides a typology of the human interaction with estuaries and coastal waters worldwide as a comprehensive description of what works and what does not work for estuaries and coastal waters worldwide and what remediation measures are possible and likely to succeed within limits. This is the first time that such a worldwide approach to estuarine and coastal sustainability has been initiated.

Thus the book addresses these real-life issues in order to learn from each other, by having a series of chapters written by the leading local experts detailing case studies from estuaries and coastal waters worldwide in the full range of natural variability and human pressures. The study sites are located in all the continents, except for the Antarctic, and several oceanic islands. This is followed by a series of chapters written by scientific leaders worldwide synthesizing the problems and offering solutions for specific issues graded within the framework of the socioeconomic-environmental mosaic. These include coastal fisheries, climate change, biophysical limits and energy costs, coastal megacities, evolving human-nature interactions, remediation measures for a number of worldwide issues such as mud and metal legacy as well as plastic pollution, integrated coastal management, and international water conflicts affecting estuaries, deltas, and coastal waters.

We wish to thank Jaclyn Truesdell and Lindsay Lawrence at Elsevier for their help in producing this book.

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