

C. Reid Nichols · Lynn Donelson Wright ·  
Gary Zarillo

# Integrated Coastal Resilience

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# **Synthesis Lectures on Ocean Systems Engineering**

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 Springer

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## Foreword

Integrated Coastal Resilience is an introductory geoscience book focusing on natural hazards, their impacts, and strategies for effective adaptations. Science issues addressed include relative sea level rise, storm damage, flooding, shoreline change, and ecological degradation. Compound effects such as flooding by combined storm surge, torrential rains, and river floods, as well as critical “tipping points” beyond which recovery is difficult, are also discussed. Not addressed in this book are specific emergency response measures or mitigation efforts that can be applied by decision-makers. However, this general reference provides insights into the data that can be accessed and evidence that can be applied to create the enabling capacity undergirding effective decision-making.

Coastal resilience is approached as a positive outcome achieved through collaboration by teams of diverse professionals (e.g., engineers, environmental scientists, health scientists, and social scientists). Natural hazards and data used to characterize extreme events are described. This book highlights information derived from federal observing networks and uses the Gulf of Mexico Coastal Ocean Observing System (GCOOS) as an example. The importance of citizen scientists who describe how recurring floods damage local structures is emphasized in this short textbook as well as how this information might influence policy makers. The way rising sea levels contribute to coastal change is discussed with numerous current references. For this reason, this general reference is particularly useful in helping engineering students to understand connections between the geosciences and environmental impacts on engineering projects.

This book provides information on data resources such as historical archives, in situ data, remotely sensed imagery, and numerical model output, which can be fused together as dashboards to benefit people living in coastal areas. Recent literature cited provides insights on environmental impacts ranging from recurring floods to shoreline protection. Data resources provided in this reference book and examples are useful in helping teachers to develop case studies that can help students translate basic knowledge into practice through real-world scenarios. The reader is apprised of the importance of big data, which

includes examples from GCOOS and federal agencies including NOAA, NASA, and the US Army Corps of Engineers.

Integrated Coastal Resilience emphasizes the importance of collaboration and data fusion across temporal and spatial scales associated with varying environmental phenomena. This book puts engineering, geoscience, and social science concepts into a business context to improve preparation, resistance, adaptation, and recovery from natural hazards. State-of-the-art platforms and important monitoring networks that are used to collect meteorological and oceanographic data are introduced, along with the need to adopt data standards that provide actionable information. The complementary glossary that describes physical and social science terms related to coastal resilience is especially useful for all levels of environmental scientists, engineers, social scientists, and emergency managers.

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