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# Coastal Watershed Management

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El-Kadi dedicates this book to his wife Faten and children Shereen, Aladdin and Enjy.

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# Preface

Coastal watersheds differ from others by their unique features, including proximity to the ocean, weather and rainfall patterns, subsurface features, and land covers. Land use changes and competing needs for valuable water and land resources are especially more distinctive to such watersheds. Surface water is a valued resource of significant economic, ecologic, cultural, and aesthetic importance. Streams supply irrigation water and can be the main source of drinking water in some places. Streams also provide important habitats for many unique native species. Water quality of receiving waters, such as estuaries, bays, and nearshore waters, are negatively impacted by stream chemical, biological, and sediment pollutants. Coastal groundwater aquifers are negatively affected by land use changes, with associated reduction in recharge and increase in chemical use, and are subjected to the threat of saltwater intrusion. Limited water resources and concerns regarding water quality necessitate the need for best management practices. Watershed problems and pertinent management practices are site specific with conditions that drastically change based on the watershed nature. Hence, there is need for a better understanding of the various physical, chemical, and biological processes involved.

This book covers recent research relevant to coastal watersheds. It addresses the impact of stream chemical, biological, and sediment pollutants on the quality of receiving waters, such as estuaries, bays, and near-shore waters. The contents of the book can be divided into three sections; a) overview of hydrological modeling, b) water quality assessment, and c) watershed management. Chapter 1 presents a general overview of hydrological modeling with emphasis on tropical watershed hydrology. Water quality of coastal watersheds is discussed in chapters 2 through 5. Nutrient bioavailability via runoff from agricultural soils in a watershed in Australia is presented in chapter 2. Chapter 3 explores sediment tracing techniques including artificial and cosmogenic radionuclides, exotic particles, fingerprinting, and rare earth elements. Chapter 4 discusses the importance of and threats to coastal wetlands. Chapter 5 reviews four components of fine particle dynamics: sources and supply mechanisms; in-stream transport and deposition; biological impacts; and spatial and temporal scales of study and variability. Watershed management issues include effect of nitrogen best management practices on water quality (Chapter 6); effects of changing land use on nutrient loads and water quality (Chapter 7), effects of land use changes and groundwater pumping on salt water intrusion

(Chapter 8); a restoration and protection plan for a coastal watershed (Chapter 9); estimation of benefits from restoring coastal ecosystems (Chapter 10), economic value of watershed conservation (Chapter 11); and impact of best management practices in coastal watershed (Chapter 12). Two case studies are also presented in this book. Chapter 13 explores the link between watershed development, hydrologic response and increased risk of waterborne disease as a result of flooding and presence of commensal rodents chronically infected with leptospirosis in a Hawaii watershed. Chapter 14 presents a protection and restoration plan for a watershed in Hawaii which can serve as a model for many similar areas.

This book differs from other hydrology books by dealing with coastal watersheds which are characterized by their unique features concerning weather and rainfall patterns, subsurface characteristics, and land use and cover. In addition to academia, the book should be of interest to organizations concerned with watershed management, such as local and federal governments and environmental groups. Although the book covers coastal regions, it should be of importance to wide range of readers working in other environments. Most contents in the book require minimum background in hydrology, but some chapters require familiarity with hydrological processes, modeling, and watershed management. Overall, the book is expected to satisfy a great need toward understanding and managing critical areas in many parts of the world.

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