COASTAL STABILIZATION: INNOVATIVE CONCEPTS

*By **Richard Silvester and John R. C. Hsu**, ISBN 0-13-140310-9; Prentice Hall, 1993; 539 pgs*

Review by **Christopher G. Kendall**

The stated purpose of this extremely readable and well written book is to bring together under one title a current understanding of longshore drift and fluid motion. While this text doesn't pretend to be the complete treatise on fluid motion and beaches, it does bring together both mathematical sophistication and rules of thumb in a well-written, descriptive narrative.
If you're looking over this book at your local bookstore, you should read through the introduction and the conclusions. These two sections provide a summarization of this text which, like the rest of the book, are extremely clear to a point. The book is aimed at a combination of university students and practicing engineers and geologists who need a working background on how to stabilize eroding beaches coupled with an insight into engineering applications for coastal protection.
The book consists of ten chapters. Each chapter is divided up into sections and subsections. There is usually a small, descriptive preamble with a short discussion of the topic coupled with illustrations, which may be purely descriptive or may be mathematical. These illustrations include coastal map charts, photographs, and graphical representations of numerical relationships. All of these illustrations are clear.
The book begins with an introduction, which covers a discussion on the coastal environment, defining what beach erosion is and the various methods for contending with it. Following this is a chapter on waves. Here, the authors explain how waves are characterized and how they can be forecast. They also discuss wave kinematics and transformations.
Next is a chapter on beach processes. It discusses the origin of beaches and dunes, the climate of waves, sediment movement beyond the breaker line, lateral movement in the surf zone, longshore drift, the effect of tides and ocean currents in estaurine conditions, cohesive soils, shingle beaches and marine cliffs.
There's also a chapter on the engineering aspects of coastal morphology and a discussion of geomorphology of coasts. It follows the classical terminology of the kind initiated at the turn of the century and this is woven into the author's current understanding of what produced the morphologies that we see on the coast today.
Next is a chapter on coastal defenses, which focuses on the causes of erosion and how it can be stabilized in dunes, various descriptions of previous solutions to coastal stabilization including sea walls, rivetements, groins, offshore breakwaters, perched beaches, and beach renourishment.
There's also a description on the use of headland control, a topic of particular interest to the authors, who are major proponents of this approach. This scheme proposes that one can stabilize the coast by the insertion of fixed structures spaced along the coast, which act not unlike the headlands of some coasts, stabilizing sediment movement between these headlands, just as long as there's sufficient sediment being added to the coastal system by longshore drift. Further, within this chapter there is a discussion of shingle beaches, cohesive soils, cliff recession and the effects of sealevel rise.
This is followed by a combination of chapters discussing the behavior of the ocean and it's impact on beaches. Chapter subtopics include headland control, design of headlands behind single, offshore breakwaters, straight shorelines, eroding embankments, barrier islands, beach renourishment, artificial recreational beaches and manmade islands. There's a chapter on maritime structures and their effects, scour due to normal waves and scour due to short-crested waves, and breakwater, etc. There's a chapter on alternatives to normal breakwaters, including berm breakwaters, barrier beach breakwaters, geotextile construction, and

submerged platform breakwaters. For the final chapter before the conclusions, there is a section on bypassing mechanisms, including dredging, land dredging plants, trucking, effects of jetties, jet location, jet pumping, and sand fluidization.
The concluding chapter, which is entitled "What Direction: Coastal Engineering", lists many of the topics discussed in the text including such things as destabilization of coasts, previous defense solutions, systems for handling and controling erosion, cohesive soils, shingle beaches, effects of maritime structures, alternatives to break waters, bypassing mechanisms, etc.
Since the authors write so clearly, reading this book was easy and interesting to me. Problems were discussed in a very straightforward manner and the authors are obviously practiced in the application of schemes for protecting coasts. Of particular interest is their chapter on application to Headland Control for which they presented a variety of case studies, and in the chapter on Coastal Defenses illustrated this approach with photographs and maps for Singapore.
This is a nice book which may end up on many of your shelves, particularly if you're moving from the field of hydrocarbons to environmental geology, with an emphasis on coastal protection and stabilization.
The authors don't pretend that any particular system will save your coast from erosion, but attempt to offer some solutions. They report that many solutions that have been applied in the past have not worked and have been magnificent failures. Though their particular interest in headland protection may be one more dead end, they have certainly provided some convincing evidence that their approach may be partially successful. Both authors have experience with the science of coastal stabilization and John Hsu is particularly well known for his experiments with wave tanks in Western Australia.
The book is well referenced with each chapter ending with a list of topical and current references. This book is a classic, which states the problem at the beginning, describes the problem in the text, and then has a final summary of the problem at the end. I highly recommend this text to you.