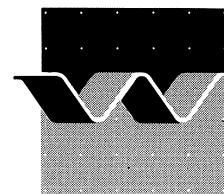


# PRINCIPLES OF COASTAL MORPHOLOGY



University of Utrecht  
Department of Physical Geography



Delft Hydraulics

**Previous publications:**

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*Principles of Sediment transport in Rivers, Estuaries and Coastal Seas  
by Leo C. van Rijn, 1993*

# **PRINCIPLES OF COASTAL MORPHOLOGY**

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**For those who like beaches**

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## **PREFACE**

One of the most beautiful views in the world is the sunset from a wide, open beach over a flat sea. Many of us enjoy even more the spectacular sound and view of foamy breaking waves rolling onto the beach or impacting at a rocky cliff under fountains of water. The confrontation with the sea always is a shocking experience: the wide space, the bright illuminating light and the endless horizon, separating the earth from the everlasting universe. This experience has been the driving force to complete this book about the behaviour of muddy, sandy and rocky beaches under the forces of the sea.

The author has tried to understand and describe the hydrodynamic and morphodynamic coastal processes from analysis of field data (being the fingerprints of nature) rather than from theoretical concepts. Although these latter concepts are indispensable to put our knowledge into a unified framework, the data collected by field workers all over the world form the solid foundation of our understanding of coastal behaviour. The book focuses on modern processes like hydrodynamics, sediment dynamics and morphodynamics on a time scale from hours to decades; information of geologic and stratigraphic data is largely excluded. Furthermore, there is a focus on straight coasts and barrier island coasts; estuarine coasts are not considered and delta coasts are only discussed briefly. If all is well, these latter subjects will be covered in another book: Principles of rivers, estuaries and deltas.

The book contains reviews of: coastal classification (types of coasts); coastal evolution; hydrodynamic processes in the coastal zone; transport processes of mud, sand and gravel; morphology of straight beaches/barriers, spits, tombolos, forelands and barrier islands; and morphology (erosion/accretion) near hard and soft coastal structures. Mathematical modelling and predictability of coastal behaviour is also discussed. A diskette containing a process-based cross-shore profile model is attached to this book. This model can be used to compute the wave heights, longshore velocities and transport rates of uniform sediment (sand) and non-uniform sediment (mixture of sand and gravel) along a cross-shore profile.

Roughly about 2,000 papers/reports/books of the overwhelming amount of available literature have been reviewed in the process of writing this book; about 800 of these documents (reference list of 32 pages is included) are quoted. Any errors or misinterpretations of the work of others are entirely the responsibility of the author.

The book is aimed at coastal scientists, engineers, consultants and planners, who all need to understand coastal behaviour in order to describe the past and present coastal systems and/or to speculate about future developments (predictions).

The author hopes that this book will stimulate field workers to continue their efforts to unravel the secrets of coastal behaviour, modellers to squeeze the coastal processes into a framework of computer statements and consultants to do a good engineering job.

Leo C. van Rijn, July 1998

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