

Advanced Series on Ocean Engineering — Volume 34

# COASTAL DYNAMICS



**Willem T Bakker**

 **World Scientific**

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Willem T Bakker

Delft Hydraulics, Netherlands



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# **COASTAL DYNAMICS**

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*Dear reader,*

*Many of the original ideas in this book have been published in series of papers in the past decades. Seldom these papers were purely my work alone. Others have contributed either in the underlying research or where co-author of these papers. This book is therefore really the product of*

***Willem T. Bakker and friends***  
***THANK YOU, dear friends!***

Agema

van der Biezen

Bilse

van Bochove

Dijkman

Grieve

Heemink

Hulsbergen

Jallah

Joustra

van der Kerk

Kersting

Klein Breteler

Knaapen

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# Preface

When Lord created Man, he created two species:

- A. the kind which listens to you;
- B. the kind which does not listen to you.

Maybe your feeling is the same as mine, that species A is rather rare compared to B and your joy when you meet the A-kind can be compared with the one of an ornithologist, finding a rare species. Still, reviewing a human life time, I think I may be grateful for the number of findings.

Mostly, when they met, they said: “Listen, Wim, explaining something to someone is like showing your house to some people. You should take your guest by his hand, showing him the entrance first, and then. . .”.

After that, muttering they moved to their desk and started to write; they wrote about what they thought I thought, or about what they thought I should think on things, if I had the time to think about those things. And, because they were intelligent people (by definition) what they wrote was always better than I could have thought. In this way species A and I wrote many papers together.

Given the opportunity<sup>a</sup> to organize a meeting for the A-species (mostly new findings; young people) and to tell them about the thoughts their predecessors and I had together, I decided to staple a number of former papers. I edited those in this way, that I tried to filter out duplications and that I made links.

In fact, all my friends together built a house for me, in which I felt myself very much at home. The aim of the present book is to show this house rather than their individual performances. Whether correct or not, whether outdated or not, it has one definite characteristic, in plain European: “Es ist aus einem Guss”.

---

<sup>a</sup>May 29, June 3 and 5 1998.



I remember a frowning remark on the title of these notes: "Coastal Dynamics? Can't you be more specific?" The answer is: "This is Coastal Dynamics by Willem T. Bakker and friends". In the Introduction I shall try to show the limitations more verbalistic.

I should give the builders the credit they owe. At the end of this preface I made an alphabetic list of first-authors or co-authors of the stapled papers.

However, not everything is co-production and these notes contain as well information not published before.

Still, acknowledgment to the authors is not enough. Part of the A-species is A-species by appointment or by profession.

Writing on Coastal Engineering as an engineer of Rijkswaterstaat means interference with many people and your work could not be carried out without the support of many, mostly unnamed people. The same is the case at Universities. There is the direct support of the people, who make drawings for you or mark your lips.

I should name the whole staff of the former Department of Coastal Research of the former Directorate for Water Management and Hydraulic Research of the Rijkswaterstaat.

Many of the drawings in this booklet, Mr. Dofferhoff, originate from their work. I still remember the precious writing of my many formulas in my former reports by Ellen Brans; those reports are at the basis of the present lectures.

Part of this book consists of class notes made during my stay as Visiting Professor at the University of Hawaii. Thank you, Warren Bucher; thank you Gary Mocke, thank you Edith Katada and your staff for the work you did.

And how could I have delivered this work without the help of Edwin Elias (doing the Word processing) and Linda van Veen (translating some parts in English) and of Mark Voorendt, a super wizard spelling all the Word Wizards. Those Word Wizards put things on my laserprinter I never wanted to.

I wish to thank Christel Somers, who reviewed "Coastal Dynamics".

But I should like to honor as well the numerous skippers and observers on the measuring vessels and behind the water leveling apparatus. Names like Glim, Vonk, Blokland, Scheers, Goedgebuure<sup>b</sup> cross my mind.

---

<sup>b</sup>Apologies to the many people, which were in my mind when I wrote "Unnamed People" and which will be still remain unnamed after the publishing of this book.



Fig. 0.1 This figure is to honor people like them: generally the brand of, what I would call “Rijkswaterstaat people”: sturdy, reliable, no fuss (a drawing from Elsevier (by Bantzing) from many years ago).

Chapter 2 is derived from three papers (references [37], [57] and [61]). Chapter 3 (translated by Gary Mocke) originates from the Dutch text of the course “De Dynamica van Kusten” on Delft Univ. of Technology, given by me, apart from Section 3.4 (refer to reference [42] in Chapter 3). Chapter 4 has been published in [37] of Chapter 4; (cf. references [20] and [36] of Chapter 4 as well). Section 5.1 is a report of Delft Hydraulics (special thanks to Kees Hulsbergen (reference [53] of Chapter 5). Refer to (reference [10] in Chapter 2) with respect to Section 5.2.2 and to (reference [35] in Chapter 5) concerning Subsections 5.2.3 and 5.2.4. Subsections 5.2.5 originates from ICCE’90 paper (reference [25] in Chapter 4) and 5.2.6 from the NOURTEC study (reference [54] in Chapter 5). The evaluation of the line theories (Chapter 6) is new. Chapter 7 deals on interaction between outer deltas and tidal basins.

Putting the co-authors of the various papers quoted above in alphabetic order, the result is: Agema; V.d.Biezen; Bilse; V Bochove; Dijkman; Grieve; Heemink; ten Hoopen; Hulsbergen; Jallah; Joustra; V.d.Kerk; Kersting; Klein Breteler; Knaapen; Niemeyer; v.Overeem; Pylarczyk; Roos; Smit; Speekenbrink; v.Vechgel; de Vroeg.; de Vriend, (last but not least).

Still, this list does injustice to a number of people, who had either an essential part in underlying reports, or by papers, not directly cited here. I would like to mention specially Edelman (references [7], [31] and [48] in Chapter 2, references [6] and [9] in Chapter 3); Svasek (reference [9] in Chapter 2), (reference [8] in Chapter 4); V.d.Meulen [M918 model research), Casteleyn (reference [16] in Chapter 4), Swart (reference [9] in Chapter 4); Opdam (reference [34] in Chapter 2); Bult (reference [24] in Chapter 10); Dijkstra (reference [27] in Chapter 10); Andringa (reference [6] in Chapter 4) (Zeebrugge); the collaborators on the Thorsminde investigation (reference [55] in Chapter 5): Groenewoud, v.d. Graaff, Spanhoff, Laustrup.

I am grateful to Edelman and Bijker — my former bosses — for creating a biotope in which I could flourish; this product is one of the results. Bijker decided, we decided, that “Coastal Dynamics” should be finished in 1973. Sorry Eco, you had to do with a civil servant and at that time<sup>c</sup> work of civil servants sometimes, somehow, for some reason could have some delay. Here it is at last.

I want to thank Prof. Dette. Only mentioning the M. Sc. Thesis of Uwe Patzold (reference [15] in Chapter 5) (performed under Prof. Dette’s guidance) does not express the years of close cooperation and friendship, which lead to the Sylt-study (Subsection 5.2.3).

May I mention my pin-ups? In a way, they were driving forces behind my work as well, eventually.

Prof. De Josselin de Jong (enflaming the greediness for understanding the essence of things and triggering the appreciation of “an elegant theory”); Prof. Thijsse (his audience got hilarious when he quoted his name and affiliation: so what should I say? He kept Lorentz from his work (relativity theory) by bothering him with the enclosure of the Zuyderzee; he made science an engineering tool); Tjebbe Visser (the Master of the Word-the Word which becomes steel and concrete; as a student he could silence thousand drunken students and after that he could evidently make a storm surge barrier).

---

<sup>c</sup>Not now, of course. Civil servants are always very quick and efficient.

I thank the Forum (Chapter 8) for their critical comments on the contents of this book. I did not want to leave all my biases to my audience, they succeeded to give the audience a more-dimensional view on the coast.

I thank the publishers (ASCE: Elsevier, the American Shore and Beach Preservation; SOGREAH; Delft Hydraulics; the Royal Institute of Engineers; Centre of Civil Engineering, Research, Codes and Specifications; Prof. Moutzouris; Mrs. Bantzinger) for giving permission to edit this book in the way it is and giving me a waiver for the copyright.

Finally, I would like to stress, that this report and this lecture series would not have been possible without the logistic and financial support of the Rijkswaterstaat (Prof. Dr. Ir. J. Dronkers) and Delft University of Technology (Prof. Ir. K. d'Angremond).



## Note From the Publisher

Some of the figures in this book are of poor quality. However, the author has requested to publish the book as it is because the original figures are not available anymore. According to the author, the reader will be able to understand the meaning of the figures, because they are explained in the book.

We believe this book will still be of great value for anyone interested in Coastal Dynamics as it is. We hope you will agree!



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