History and scope of report

The work described in this report was carried out by the author during 1967 when he was on study leave from the University of Queensland at Delft Hydraulics Laboratory’s *de Voorst Laboratory* in the Northeast Polder in the Netherlands.

The primary aim of this research project, which was funded by the Dutch Public Works organisation, Rijkswaterstaat, and overseen by Eco Bijker, then Deputy Director of Delft Hydraulics Laboratory, was to determine the influence of the height of a coastal sand dune upon the amount of recession of the shoreline during a period of increased ocean water level (storm surge).

Drafts of chapters 1 to 5 of the report were completed by me soon after I left *de Voorst Laboratory* in early January 1968. Ton van der Meulen edited these drafts and produced the text and figure volumes at the laboratory in May 1968. Subsequently, Riemer Reinalda produced the Conclusions volume (chapters 6 and 7) in June 1969, using a draft prepared by me after my return to Brisbane and additional analyses by Rijkswaterstaat engineer W. T. Bakker. For various reasons, including a lack of resources to prepare the figures in a form suitable for publication, the draft report was never formally published by Delft Hydraulics Laboratory.\(^1\)

In July 1968 project supervisor Eco Bijker wrote to me after his coastal engineering colleagues in the Netherlands (Werkgroep 5) had reviewed my draft of chapters 1 to 5 of the report as follows: “I like to tell you that everybody of our working group on coastal erosion appreciates your report very much. I myself am also very much impressed by the skillful way you have elaborated the tests and the way you have indicated in the report already the directions in which conclusions could be formed.”

In August 1968, following a question from one of the members of “Werkgroep 5” about the difference in recession between a dry and wet dune, I made a short investigation at the University of Queensland on the influence of moisture upon the strength of the model sand dunes considering both the influence of capillary moisture and rain and spray. A short unofficial report was sent to Ton van der Meulen at *de Voorst Laboratory* in September 1968.

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1. Delft Hydraulics Laboratory was the name under which the Dutch hydraulics laboratory operated internationally. In the Netherlands it was known as Waterloopkundig Laboratorium which simply means Hydraulic Laboratory.

2. Readers should be aware that there are many minor uncorrected typographical errors in the text, mostly the result of Dutch typists misreading my handwritten draft. Occasionally, a word has been misinterpreted and replaced by completely different word. In other places one or more words have been omitted. These cases are generally obvious to the reader, even if the correction may not be so. It is emphasised that the text is a draft and that readers should independently verify material before using it in professional practice.
Previous publications based on this research

Two papers concerning this research were presented to the 11th (International) Conference on Coastal Engineering in London in September 1968. Proceedings of this conference were published by ASCE in 1969.

1. Van der Meulen, T. and Gourlay, M. R, 1969. “Beach and Dune Erosion Tests” was written by Van der Meulen, using the results of Gourlay’s experiments as presented in this report, and describes the experiments and some of their results. This paper was later republished as Delft Hydraulics Laboratory Publication No. 61 in November 1969.

2. Edelman, T. 1969. “Dune erosion during storm conditions” applies concepts derived from the test results to the practical problem of predicting dune erosion. Edelman was Chief Coastal Engineer in the Rijkswaterstaat at that time.

Subsequently in mid1971 I requested permission from then Head of de Voorst Laboratory, Jo Vinje, to publish other material from this report. After consultation with the relevant engineer in the Rijkswaterstaat this permission was given but various other commitments prevented my preparing any new publications.\(^3\) Making the report available now (2015) on espace allows present researchers and practitioners the opportunity to study and make use of these experimental results.

Significant original work

1. The surf zone mobility parameter H/Tw and its significance are explained for the first time. H is wave height, usually deepwater wave height H\(_o\), but sometimes breaker height H\(_b\); T is wave period; and w is the fall velocity of the beach sediment particles. (Section 3.3, pp. 15-21; section 7.3(e), p. 9; section 7.5(b), p. 10)

2. Comparison of equilibrium beach profiles formed by wind-generated waves and those formed by equivalent regular waves. This project was one of the earliest to use random waves in beach profile experiments. (Section 4.2, pp. 26-34; section 5.4, pp. 72-80 and figures 59 to 77; sections 5.6.2 and 5.6.3, pp. 90-104))

3. Calculation of changes in net onshore/offshore sand transport rates, both with time at a given location in the surf zone and along a beach profile at a given time, as the dune and beach erode and the nearshore profile approaches equilibrium. (Section 5.14, pp. 55-58 and figures 41 to 46; other examples in subsequent sections of report)

4. Clarification of the influence of dune height and shape upon the erosion of a shoreline and nearshore profile development and the application of these results to the design of artificial sand dunes. (Section 5.1, pp. 41-59 and figures 12 to 26; Chapter 6, pp. 1 to 5 and figures 113 to 115; section 7.1, pp. 6-7; section 7.4, pp. 9-10)

Other relevant publications by author

Subsequent experimental research at the University of Queensland involving the development of equilibrium beach profiles formed under various wave conditions for several different beach sediments ranging in median size from 0.22 mm to 2.48 mm and

\(^3\) A few measurements from the report are used in Figure 7 of Gourlay 1980.
specific gravity of 2.65 and 1.34 has shown the significant influence of the sediment mobility parameter $H_o/Tw$ in relation to relatively impermeable beaches formed in fine sediments. Accreting beaches formed in coarser sediments are more influenced by the permeability of the beach material and its fluidising velocity. This research has been published in the following two reports/papers. The first one (Gourlay 1980) also gives a review of the use of $H_o/Tw$ by various researchers up until that date.
