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BOOK REVIEWS

Coastal Dunes, Carter, R.W.G.; Curtis, T.G.F., and Sheehy-Skeffington, M.J., 1992. Rotterdam: Balkema, 533p., $US 95. ISBN 90-5410-058-3.

Coastal Dunes is a collective title for the Proceedings of the Third European Dune Congress held in Ireland, in 1991, under the auspices of the European Union for Coastal Conservation.

The book is well edited and solidly bound with an attractive hard cover. It is also well printed although sometimes the editors have let pass figures that are too pale (*e.g.* p. 134, 135, 296). In addition to an exhaustive table of contents, a short preface, and an author index, the book contains 48 papers grouped into five parts. The absence of a list of figures and tables, of a thematic and geographical index and more importantly of an introduction presenting the context and the objectives of the congress and the proceedings must be deplored. By examining attentively the content, these elements can however be inferred in part.

The subject matter is European dunes and, in this sense, the title of the book is misleading. On the other hand, the subtitle "Geomorphology, Ecology and Management for Conservation" translates well the themes addressed, using mainly case studies which form the five parts of the book: (1) geomorphology: processes and history (15 papers), (2) ecological environments (11 papers), (3) ecological management (6 papers), (4) management for dune conservation (12 papers), and (5) prospects for future management (4 papers). Most of the research aspects of dunes are covered.

Papers are quite unequal but have an average of 10 pages (from 5 to 20) and 6 illustrations (from 0 to 12). They cover most of the coastal countries of Western Europe, except for the Scandinavian countries. The most extensively studied countries are the United Kingdom and Ireland (28%), the Netherlands (23%), Germany (13%), France (8%) and, to a lesser extent, Portugal, Denmark, and Spain. A paper deals with Hungary and, curiously, there are two on South Africa! These proportions correspond approximately to the number of authors although in addition six Americans and one Canadian can be found. The four papers of the last part do not make reference to any country in particular and present concepts and general actions.

Except in rare cases, the authors present their paper on their own country. Hence, they enrich the book with multilingual references (58% of cases) and foreign references surpass the number of references in English in 31% of the papers.

At first glance, the price of the book may appear rather high, but the density of the matter and the general knowledge that can be derived from the majority of papers, and that can be transposed to other areas, are worth the price. Since only part of the world is covered, there remains a doubt in the reader's mind as to this possible transposition, specially in relation with other ecological systems and other management and conservation conditions.

In conclusion, it is a good reference manual for scientists in the field of wind erosion, specially in Western Europe, but remains somewhat expensive for students.

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Cross-Shore Transport During Storm Surges, by H. J. Steetzel. Doctoral thesis for the Technical University of Delft, 1993. Printed and bound by Casparie Zwolle bv. Also published as Delft Hydraulics Communication No. 476 and Report No. CI-93.05 of the Technical Advisory Committee on Water Defense (TAW), 274 p. ISBN 90-9006345-5.

The 20 line abstract of the book gives in a nutshell its contents:

During storm surge conditions, viz. both high water levels and intensive wave attack, a dune coast is subjected to erosion. The dune face will be eroded due to a net seaward transport of sand. With respect to the safety of a low-lying polder behind the dune row, the amount of erosion during the 'design storm surge' has to be known.

The insight in the process of dune erosion was enlarged by simulating storm surge conditions and profile developments in scale models. During some of these tests detailed measurements of wave heights, velocities, sediment concentrations and profile changes were conducted.

From a thorough analysis of these data it was concluded that cross-shore transport during storm surge conditions could be computed from the product of time-averaged flow profiles and time-averaged sediment concentrations. Based on this description a mathematical model has been developed in which the velocities and concentrations are related to the local hydraulic conditions.

Starting with an initial pre-storm profile and a description of the storm surge (water level and wave heights), the model computes the development of the cross-shore profile during the storm. The outcomes of the model have been verified for a series of tests in which dune-erosion governing parameters were systematically varied, as well as for a number of other data.

The model will (on a long-term) be used by the authorities responsible for a coastal stretch to assess and check the safety of the dunes as a primary sea defence structure.

The book has nine chapters. An outline is given in section 1.3.

Chapter 2 deals with the phenomena which are responsible for beach and dune erosion in general, ultimately focusing on the energetic process of (beach and) dune erosion during storm surge conditions. The problems related to the effects of this process are summarized and both the strategy and approach of the present study are specified. It is concluded that in order to predict the amount of dune erosion due to a storm surge, a mathematical model for cross-shore transport during extreme hydraulic conditions is necessary.

Chapter 3 summarizes and evaluates the results of investigations carried out by other researchers in the field of cross-shore transport modeling. Various sorts of cross-shore process scales and cross-shore transport models are categorized and discussed briefly in a systematical manner. Detailed knowledge on the processes involved is not (yet) present.

The different basic phases of the model development, such as formulation, calibration, verification and application are elaborated in Chapters 4 through 8.

Chapter 4 explains the formulation of the model in detail. Firstly, the basic assumptions with respect to the theoretical formulation of cross-shore transport are supported by elaboration of relevant terms and analysis of measurements. During a storm with intensive wave breaking, suspended sediment transport is predominant and the net cross-shore transport rate can be related to the time-averaged sediment concentrations and the time-averaged cross-shore flow profiles. In sections 4.3 and 4.4, the time-averaged sediment concentration profile and secondary flow profile are investigated and described using the results of some large-scale model tests. The final transport computation, based on the depth-integrated product of time-averaged sediment concentration and the time-averaged (secondary) flow profiles, is described in Sections 4.5 and 4.6. The set-up of the mathematical model which computes the profile development due to the derived transport processes is described and the additional extension of this model to incorporate the effects of structures and along shore transport gradients on the profile development is outlined in Sections 4.7 and 4.8.

For calibration and verification purposes, two groups of process parameters have been identified, namely 'internal' and 'external' process parameters. The first group denotes the basic input data of the transport model as described earlier, whereas the second set is essentially related to process results such as the actual development of the cross-shore profile or the related dune erosion rate.

Chapter 5 summarizes the basic outcome of the calibration of the computational model which is predominately based on formulation and tuning of sediment suspension and mixing processes. Governing unknown parameters are related to the estimated local hydraulic conditions. Although a large amount of scatter is present, useful first-order relations have been defined.

The results of the verification of the model are described in Chapter 6. This verification is principally based on the 'external' parameters such as the profile development and the amount of dune erosion above the maximum surge level. The final verification is accomplished by comparing measured dune erosion quantities with the outcomes

of computed profile development for several model tests and a number of prototype data.

The results of a systematic sensitivity analysis for the three main governing parameters are presented in Chapter 7. The effect of the pre-storm profile, the sediment characteristics and the hydraulic conditions on the resulting storm surge profile are elaborated in detail. With regard to the uncertainty of the latter, the effects of the (maximum) surge level, the duration of the storm, the (detailed) wave conditions as well as the timing of the storm surge itself (relative to the regular astronomical variations) on the erosion rate are computed. The storm surge level is shown to be one of the major governing parameters.

Chapter 8 presents some additional applications in order to demonstrate the capability of the model. Results on the computed effects of beach nourishments and structures in the coastal profile as well as the effects of oblique wave attack are illustrated. Moreover, general assessment of the hydraulic conditions is discussed briefly.

It is concluded that the mathematical cross-shore transport model results in reliable outcomes, even for applications well beyond the standard ones as described in the former chapters. Although at the end of every chapter a brief outline of the main conclusions is presented, an overall summary is given in Chapter 9. Concluding remarks on the derived model as well as some recommendations for further improvement of the model are presented.

The book is very informative and well written with excellent figures and a comprehensive list of references. It serves the purpose of a scientific thesis as well as a handbook equally well.

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