Book review

Coastal management: changing coast, changing climate, changing minds

A. Baptiste (ed.). ICE Publishing, London, UK, 2015, ISBN 978-0-7277-6114-9, £250, 880 pp.

This book contains the proceedings of a conference, held in Amsterdam, the Netherlands in September 2015, which was the eighth in the Institution of Civil Engineers coastal management series; it was attended by 220 delegates who were able to choose from more than 60 speakers from 30 countries. The book is therefore a weighty tome containing in excess of 70 peer-reviewed papers, running to 748 pages of technical material.

If there is to be any criticism of how the proceedings are presented, it is that they are not arranged in sections or by themes. That said, the proceedings bring together a wealth of information from researchers and coastal professionals from across the world, which would be difficult to assemble otherwise. Notwithstanding the lack of themes, the papers may be broadly categorised under

- breakwaters, dykes and defences
- risks and uncertainties
- coastal management and realignment
- climate change
- beach, coastline and dune nourishment
- case studies
- flood forecasting
- lessons learned.

From these categories the reviewer has selected a few papers for a further brief review. The first of these is 'Engineering of an island style breakwater system for the Ft. Pierce marina' (Cox and Cziapinski). Following the destruction of the marina in 2004 by Hurricane Frances it was clear to the city of Fort Pierce that replacing the marina with another of the same type was not the long-term answer to the problem of future hurricanes. This study investigated a range of options and concluded that an archipelago of artificial islands operating with local processes would offer the best protection against waves and tidal currents. Numerical modelling was used to whittle down the number of options from 17 to the preferred scheme reported in the paper.

The area of risk and uncertainty is one that plays an ever-increasing role in the analysis and design of coastal structures and beach management. The paper 'Dealing with uncertainties in long-term predictions of a coastal nourishment' (Kroon, van Leeuwen, Walstra and Loman) presents an approach to identifying and quantifying the individual sources of uncertainty for a design, build and maintenance contract, and combines these into a single probability density function. Dutch law requires sea defences to be designed to protect against a flood event having a return period of 1:10 000 years, with mandatory evaluations every 5 years. Using two-dimensional models to predict wave heights, tidal currents and

sediment transport, Kroon *et al.* identified the principal sources of uncertainty that enabled them to derive probability density functions for the main factors leading to sediment loss. These factors included, for example, wave-driven sand loss, uncertainties in the data used for calibration and validation, or uncertainties in the modelled sediment drift arising from variations in the cross-shore profile. By combining the individual probability density functions in a Monte Carlo simulation, joint probability and cumulative density functions were obtained, from which the study was able to determine the multiplication factors that should be applied when predicting the sand loss over a 20-year project time frame.

Case studies included coastal monitoring, shore protection, dealing with cliff instabilities, adaptive coastal management and building with nature. Of the case studies presented, 'The sand motor: building with nature in progress' (van Gelder-Maas, de Wilde, Marx and de Schipper) is well worth a read. This is a pilot scheme implemented by the Dutch Department of Works (Rijkswaterstaat) to use sand nourishment to feed the beaches in a more natural way, as well as for creating and improving opportunities for leisure activities. The 'motor' in question is an artificial peninsula formed of ~21.5 million m³ of sand. It is a scheme that has resulted in close collaboration between government authorities, academia and the private sector. The pilot scheme started with three objectives

- long-term enhancement of coastal protection
- development of knowledge and innovation in the field of coastal management and protection
- the creation of an appealing leisure and nature area along the Delft coast.

Although the first interim assessment has been undertaken, it is still too soon to draw firm conclusions. Nevertheless, the initial findings are showing positive signs that this new concept is performing as expected.

The printing of the text, the diagrams, photographs and graphs is of the usual high standard that has come to be expected from ICE Publishing. It goes a long way to aid in the reading and understanding of the subject matter, which exposes the reader to current thinking, innovation and practice. The subject matter encompasses coastal planning, management and monitoring, design and construction of coastal defences, strategy and policy, scheme funding, forecasting, shoreline management, engaging with coastal communities, dealing with the social impacts arising from climate change, tsunamis, and flooding and flood risk; the latter being particularly relevant given the events of the past winter. Scientists, coastal engineers, researchers and environmentalists, as well as strategy and policy advisors, will all find something to pique their interest.

For anyone who spends their professional life in coastal work, these proceedings are an indispensable resource that provides practical solutions to managing coastal issues in a changing environment.

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