

island coastline fronting the Netherlands, West Germany and Denmark. The book is divided into 6 basic sections examining the physiographic background of the coast, barrier island development, recent geomorphic processes, morphodynamic features, historical development, and finally detailed site characteristics. The book is lavishly illustrated with diagrams, more than 200 photographs and 40 colour plates. The quality of all are commendable with hardly a single figure being irrelevant. Overall the calibre of the presentation, and the degree of research and referencing is of the highest standard.

There are several aspects about the book that stand out. First is the degree of historical detail presented on the development of this coastline since the Middle Ages. One cannot help but get the impression that this coastline was much more dynamic in past centuries than it is at present. Second is the use of detailed morphological studies of bedforms, using mainly aerial photography, to derive information on the direction of sediment movement on intertidal morphology. Third is the attention to detail in weaving a complete picture of the development of the present landscape. One could so easily ignore small aeolian ripples or ice-derived morphology in a book of this type; but Ehlers not only describes these features well, but also incorporates them into the overall presentation. Last is the degree of interaction shown between humans and geomorphic process. Early peat cutters, settlers on the Halligen islands, coastal engineers with their protection works, and modern tourists trampling across the dunes have all left their imprint on the modern morphology of this coastline.

I have only 2 criticisms of the textbook. Firstly, being unfamiliar with the Wadden Sea coastline, I sometimes became lost trying to locate place names in the text that never appeared on any map. Secondly, while the book is strong on morphology, it is completely lacking in stratigraphy. The cost of the text may seem prohibitive; however this may be reasonable considering the quality of the book, and the fact that it is written for a specialist audience. If anyone has any interest in barrier island morphology, or the historical interplay of people and landscapes, then this book is certainly worth reading.

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**Climatic Change, Rising Sea Level and the British Coast.** by Boorman, L.A.; Goss-Custard and McGrorty, S. 1989. NERC: Institute of Terrestrial Ecology Publication No. 1 Her Majesty's Stationary office, London £5.50 24p. ISBN 0-11-701429X.

For the past 15 years, three international organisations, the International Union for Quaternary Research (INQUA), the International Geographical Union (IGU) and the International Geological Correlation Programme (IGCP) have sponsored research through their commissions and projects on sea-level and coastal changes and climatic change throughout the world, and the results of their sea-level activities have been summarized regularly (for example, DEVOY 1987, PIRAZZOLI 1988, and TOOLEY 1987). In addition, many scientists have drawn attention to the impact of sea-level and coastal changes on the sedimentary record and prehistoric occupation of the coastal lowlands of the Earth.

It is to the credit of the Environmental Protection Agency in Washington, D.C., U.S.A. (BARTH and TITUS, 1984) that attention has been drawn to the changing composition of the atmosphere, particularly the concentration of radiatively-active gases such as CO<sub>2</sub> and CH<sub>4</sub>, the effects on climate, particularly temperature, and the effects on sea level, through steric changes and the melting high altitude glaciers and land-based high latitude ice caps. The impacts that this will have on the occupation by man of the Earth have been addressed during regional and international conferences during the past 5 years, and intergovernmental protocols have been issued to reduce the emissions of these radiatively-active gases. The effectiveness of these protocols and the accuracy of the predictions of CO<sub>2</sub>, temperature and sea-level rise to AD2100 are all in doubt and open to the scrutiny and measured debate. But, there is no doubt that all the world's coastal lowlands are at risk now from storm surges, the present altitude of the local sea surface and the range of

tidal altitudes. Investigations of past and contemporary land/sea-level relationships of all coastal lowlands, and calculated rates of changes are an essential prerequisite for any cautious and tentative predictions that may follow. This is best achieved on a regional and national basis to permit planning of land use and land use changes.

It is within this context that the slight volume on *Climatic change, Rising Sea Level and the British Coast* must be considered. The booklet is divided into 14 sections of which Section 1 is an executive summary and section 2 an Introduction. Section 3 is devoted to sea-level change and sea defence options; Section 4 elaborates on these options; Sections 5, 6 and 7 consider changes that might occur to mudflats, salt marshes, invertebrates and bird populations if sea-level rose and different defence options were adopted. Section 9 deals with changes to sea cliffs formed in unconsolidated sediments, Section 10 with changes in the zone adjacent to and landward of the coast, Section 11 with the pattern of changes in the United Kingdom and Section 12 with the socio-economic consequences of sea-level rise. In Section 13 research requirements are outlined and Section 14 contains the references.

As it stands, the booklet is a partial, at times erroneous and misleading statement of the problem as it might affect the British coast. The map of mainland Britain showing areas vulnerable to a rising sea-level ignores many coastal lowlands in south-west Britain (lowlying areas adjacent to Barnstaple Bay, and including impacts on Saunton Sands and Braunton Burrows), most of Wales (*e.g.* Ynyslas/Borth Bog, Morpha Dyffryn, Morpha Harlech, Newborough Warren and Abergele), the ecologically important Fenham Flats and Budle Bay in Northumberland, and many sites in eastern and western Scotland, all of which may be directly or indirectly affected.

The sea-level rise scenarios for Britain employed in the report are 0.8 m to 1.65 m in 100 years, and the main thrust of the report is the biological implications. At the present, tidal variations around mainland Britain range from 1 to 12 m, mean high water mark intersects the coast at different altitudes from + 6.7 m O.D. at Avonmouth to + 3.9 m O.D. at Boston High, astronomical tide altitudes range from +

8.0 m O.D. at Avonmouth to + 1.0 m at Lowestoft and waves and storm surges add 2 to 3 metres and more to still water surfaces. This great variability of water levels and the processes associated with them, act on a coastline of solid rocks and unconsolidated sediments, indented by bays, inlets and estuaries, so that responses are difficult to predict and are site specific. General statements are misleading without qualification, and quantifying changes that might occur with a 80 to 165 cm rise are not possible. The liberation of sediments from cliffs formed of unconsolidated sediments, and from sand dunes may lead to localized coastal accretion and an apparent fall of sea level. Similarly, the consequence of climatic change on drainage basins may result in a release of sediments further adding to the sediment budget of coastal compartments.

Many of the references employed are obscure, sometimes unpublished, and at times idiosyncratic. One must enquire why SHENNAN (1987a) was not quoted, when many of the ideas in this booklet originate from this source, and two of the authors attended the conference at which Shennan presented his ideas in April 1987, 14 months before the booklet was written (L.A. Boorman *pers. comm.* July 1989). Dr. Shennan's data are misunderstood and misrepresented: he has not predicted a rise of sea level of up to 4.5 m in less than 50 years for The Wash, but figure 1 in SHENNAN (1987) shows BARTH and TITUS (1984) sea-level rise scenarios starting at + 4.6 m Ordnance Datum, which is the altitude today of the High Astronomical Tide in the area.

It is disappointing that no reference is made either to FLEMMING's (1982) work on land uplift and subsidence in Britain, or to SHENNAN's (1987b) work. Recognition should have been given to the work of DEVOY (1987) and to CARTER's (1987) seminal review paper that provides the proper context for the content and conclusions of this booklet.

Clearly, this booklet should not have been published without a prior wide review, and should have included the results of published scientific investigations: properly evaluated for the subject matter of the booklet. It is barely redeemed by the quality of some of the colour photographs.

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**A Workbook of Practical Exercises in Coastal Zone Management for Tropical Islands**, by P.R. Bacon; C.A. Deane and A.D. Putney, 1988. Commonwealth Science Council, London. 300p. stg. £14.00. ISBN 0-85092-33-6. May be purchased from Commonwealth Science Council, Marlborough House, Pall Mall, London SW1Y 5HX, England.

In these days of providing coastal zone management training, there is an obvious need for books of a practical nature. This workbook offers a series of exercises which illustrate a range of environmental, ecological and institutional aspects of the coastal zone management process in tropical islands. The exercises are intended for use during advanced training courses and are designed to give practising and prospective coastal managers 'hands-on' experience in a range of essential techniques. While

not all will agree on the selection of the exercises, this workbook fulfils an immediate need.

The workbook reflects the authors' varied background—zoology, coastal engineering and resources management—and relevant experience on the subject matter. As the authors are from the Caribbean area, the area focus is on this region but the general principles and suggested methodologies can be applied to other tropical islands. Many of the ideas have already been tested in training courses.

The workbook has a short introduction including a section on 'how to use the workbook.' It is essential for both the tutor and the trainee to read this section. For training purposes, the workbook demands a knowledgeable tutor in guiding the trainees. The 23 exercises are meant to be covered over a period of six weeks. The tutor should also consult Appendix 1 which serves as a guide in using the book for shorter training courses. Some advice is also provided for the trainee in using the workbook.

The workbook is organized around five topics in separate chapters, each having two to eight exercises. Chapter 1, which is on programme definition and baseline data acquisition, has three exercises on defining the scope of a coastal zone management programme, mapping coastal features, and interpreting aerial photographs. Chapter 2 deals with coastal development and impact assessment and has six exercises on assessing beaches, sitting coastal infrastructures, disposing wastes, monitoring water quality, preparing an Environmental Impact Assessment, and economic analysis. There are eight exercises in Chapter 3 on coastal area management planning; the topics range from preparing a data atlas, drafting a system plan, defining potential areas and selecting a management strategy for a protected area, drafting legal protection for a multiple-use area, zoning a natural area, and designing development and operation programmes for protected areas. Four exercises in Chapter 4, which is on coastal ecosystem management, deal with more specific aspects including assessing coastal ecosystems, habitat evaluation, calculating optimum sustainable yields for coastal resources, and planning recovery of damaged coastal ecosystem resources. Chapter 5 is on risk assessment and contingency planning and has two exercises on predicting coastal flood hazard and oil spill contingency planning. These chapters are supple-