

shaft, or rim generator), its diameter (7 or 9 m), and the size of concrete caisson required for housing them (1, 2 or 3 units/caisson). For the most part the relative merits of various construction techniques and designs are presented fairly, but one should not look to this volume for an entirely objective account of those merits. It is apparent from the discussion of several papers that many of the participants in the symposium represented vested interests — turbine manufacturers, construction engineers, or proponents of specific electrical generation systems — who were anxious to promote their own cause. The formal papers, however, generally conformed with the Committee Report in favouring the inner barrage between Brean Down and Lavernock Point, which would accommodate 160, 9.0 m diameter turbines. Substitution of rim generators appear to depend upon success of the prototype 7 m Straflo™ turbine currently being tested at Annapolis Royal (Nova Scotia).

Projections of the power generated (and hence its economic potential) and the environmental consequences of building the barrage rest heavily upon numerical models of tidal movements. Initial conflicts between the 2-dimensional model of tidal amplitudes developed by Heaps at the Institute of Oceanographic Sciences (Bidston) and a smaller scale 2-d model constructed by Miles at the Hydraulics Research Station appear to have been resolved, and both models produce results near the $\pm 6\%$ variation in amplitudes and $\pm 15\%$ cm variation in mean sea level commonly found.

They are not so easily validated, however. An obvious and serious uncertainty remains in interfacing these model predictions of tidal movements with sedimentation and erosion processes, particularly in the upper estuary and Bridgewater Bay where cohesive sediments predominate. Since suspended sediment load is an important biological parameter, much further work obviously needs to be done in making satisfactory predictions of environmental effects.

One weakness in the volume is its apparent lack of editorial judgement. The papers were obviously written independently, and no attempt has apparently been made to avoid redundancy. There are, for example, no less than 21 figures showing the general layout of a turbine inside a caisson, some of them with no labelling whatsoever. Many of these are clearly redundant, and much space would have been saved by omitting them and substituting appropriate cross-references. A half-page sketch of a lock layout (p. 175) serves no real purpose what-

soever. Most papers are relatively free of typographical errors, although there are several obvious ones in Odd's paper on sediment transport, and some serious inconsistencies in the output energy for different generation tests in Table 1 of the paper by Ackers. The most irritating and unnecessary editorial lapse, however, is the fact that questions and answers in the discussions are separated — all the questions are reported first, and then the reader must hunt for the answers provided by each speaker which are combined together at the end of the discussion.

Despite these cavils, this volume is a very valuable summary of engineering aspects of the Severn Barrage proposal. It will undoubtedly become dated very quickly if the proposed Acceptability and Preliminary Design Study is undertaken, because of the extensive effort that study will initiate. For the time being, however, anyone interested in tidal power, particularly in its environmental aspects, will find this a useful and informative reference.

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The United States Without the Law of the Sea Treaty, edited by Lawrence Juda, 1983. Times Press, 82 High Street, Wakefield, Rhode Island. US\$ 30.00.

Decisions by the US Government to withdraw from discussions of, and not to participate in, the Law of the Sea (LOS) Treaty, provides the impetus for this heart-searching (I hesitate to write soul-searching) volume. The verbatim text is based on a conference held at the University of Rhode Island in June 1983.

The book ranges across the interface between international law/politics and ocean management. The former tend to receive more attention, indeed, to judge by discussion comments, many of the managers present seemed bemused by the legal subtleties and nuances. It would appear that in this case many Governments want a strong legal framework before exploitation of resources begins, yet the haggling and the compromises seem unrealistic to many observers. It is largely lack of flexibility in the LOS proposals that worries the US Government.

America's withdrawal from the LOS policy process leaves a number of unanswered questions,

particularly over the ratification and implementation by allied Nations. There is a fear that the US will be left out should the Treaty be widely accepted, and late entry may bring unwanted and severe penalties. Meanwhile many US companies, in whom, ironically, much of the technology and expertise needed for the development of ocean resources is vested, are likely to operate through 'offshore' subsidiaries. The real losers could be the US Government, particularly if the Treaty moves against unimpeded navigational access. This could lead to security problems. Many of the book's chapters discuss these points directly, covering ocean mining, navigation, fishing, and scientific research.

A fascinating undercurrent in the book concerns the more general attitude of the right-wing Reagan Administration to world affairs. Oddly enough, many of the opinionated passages in the book remind me of the strident socialist writings of George Orwell. Reluctance of some contributors (and by implication the current Administration) to accept ideas of shared heritage, presumably because of its 'communist taint,' is distressing. It is hard to see how a realistic LOS structure can be established without accepting such a principle. Concern, expressed by the anti-treaty lobby, that the LOS might hasten "the new economic order" seems far-fetched.

However, the book is well-balanced, at least on the central LOS Treaty issue, and should be widely recommended to, and read by, students of ocean management for the wider issues it discusses. For all that the text is hard to read for those not trained in law. (The direct transcription from verbal presentation does not help.)

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Quaternary Period in Saudi Arabia, Volume 2, by A.R. Jado and J.G. Zötl, 1984. Springer-Verlag, Wien-New York, 361p. DM 158, ISBN 3-211-81749-2 (Wien), ISBN 0-387-81749-2 (New York).

The first volume of this work was published in 1978 (ed. S.S. Al-Sayari and J.G. Zötl), dealing with eastern Saudi-Arabia and the Persian (or Arabian) Gulf coastline. This work deals with its western coastal belt from the Gulf of Aqaba to the Red Sea shore as far as Yemen and the Farasan Islands. Treating mainly the hydrogeology, a great deal of attention is paid to coastal geomorphology and the late Quaternary history of sea-level changes.

This is the first in-depth and well-illustrated work on this almost unexplored coast. The Gulf of Aqaba sector is almost a mirror image (but with strike-slip) of the Sinai coast where the Israeli work disclosed three important uplifted coastal terraces, dated by Th-230 as 110,000, 200-250,000 and over 250,000 yr. One Holocene coral terrace at about 2 m was dated by Friedman as 4770 BP, which appears to be without neotectonic disturbance. Along the Red Sea shore, as far south as Jeddah, there is an alteration of sandy coastal plains, up to 50 km wide, with some sectors of cliffed Precambrian. Uplifted Pleistocene coral-reef terraces, as in Sinai, have been tested by radiocarbon-dating, but all those dated in the 16,000 to 30,000 BP range are quite properly rejected as spurious (p. 72), resulting from a small contamination by recent carbon. K/Ar dates of youthful basalts are in the range 0.4 to 1.4 million years, the younger flows resting on the middle of the uplifted coastal terraces (20 m) and the older basalts on the uppermost terrace (up to 40 m). Mid-Holocene terraces are dated at 4400-7000 BP. Samples of shell and coral from the south of Jeddah taken from the 4 m raised reef also gave spurious (17,000-39,000 yr) dates, but shells from a raised beach 5 m above the erosion notch on the Farasan Islands (p. 219) gave the date of 4700 BP (p. 155). An interesting feature is the coastal uplift caused by the Jizan salt diapir. In this area extensive sabkhas formed during the eustatic high-level stage, 4000-6000 BP, and subsequently were partly covered by dunes. The hinterland was characterized, as in North Africa, by generally heavy monsoonal rains in the period 12,000 to 6000 BP, but with arid fluctuations. General aridity returned after 6000 BP. It is interesting that the maximum of sea level in the mid-Holocene is 6000 years later than the appearance of the heavy rains, but that the subsequent fluctuating fall of sea level is more or less coincident with increasing desiccation.

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The Pleistocene Geology and Life in the Quaternary Ice Age, by Tage Nilsson, 1983. F. Enke Verlag, Stuttgart and D. Reidel, Dordrecht, 651p. DM 240.00, US\$ 115.00, ISBN 90-277-1466-5.

This is a wonderful book! Something I've waited for a very long time. It is a comprehensive treatment