



BOOK REVIEWS

Muddy Coasts of the World: Processes, Deposits and Function. Healy, T.; Wang, Y., and Healy, J.-A., (eds.), 2002. Amsterdam: Elsevier, Proceedings in Marine Science #4, 542p. ISBN: 0-444-510192. USD 195, EUR 195.

This landmark publication is the result of seven years work by the members of Working Group 106 of the Scientific Committee on Ocean Research. The fourteen distinguished members and associate members of this group are drawn from around the world, with representatives from all the populated continents and sub-continents. Their impressive credentials for the task of preparing this definitive work are witnessed by the biographical details of them and their fellow authors summarised in the introduction to the book. Their approach to the topic is largely descriptive and interdisciplinary, rather than physico-mathematical, reflecting the backgrounds of most of the authors in physical geography, marine geology and coastal geomorphology.

The Terms of Reference of the Working Group included:

- Review of the oceanographic geomorphic and sedimentary dynamics of muddy coasts
- To assess the impact of sea level rise on the sedimentary evolution of muddy coasts
- To assess the impact of sea level rise on the mangrove forest and salt marshes of muddy coasts
- To recommend necessary research, data collection, and monitoring for the future management of muddy coastal zones

Their remit thus addresses not only the distribution and science of muddy coasts, but also their sustainable management. Their working definition of Muddy Coast is taken as: "A sedimentary-morphodynamic type characterised primarily by fine-grained sedimentary deposits—predominantly silts and clays—within a coastal sedimentary environment. Such deposits tend to form rather flat surfaces, and are often, but not exclusively, associated with broad tidal flats". They stick to this remit relatively closely, and do not stray too far into the properties of mud *per se*, or estuarine dynamics, or dredging of mud, all of which are addressed already in a number of existing books.

The first two chapters are authored by the whole Working Group, and cover firstly the research issues, and secondly definitions, properties and classification. They are thus essential reading, not only as an introduction to the more detailed chapters in the book, but also for anyone with an involvement in the science and management of muddy coasts, estuaries, inlets and embayments. The first chapter presents comprehensive consensus views on the fundamental processes, exploitation and management, knowledge gaps (useful for those wishing to choose a PhD topic in this area), human impacts, environmental health and sustainable utilisation of muddy coasts. The importance, and yet current poor under-

standing, of the role of biological processes is emphasised throughout. Sustainability, one of the key issues of present times, takes centre stage in the discussion of impacts and management.

The ensuing nineteen chapters are each written by one or a few authors on specific aspects of the topic. The subjects have evidently been chosen to give a balanced overview of the subject area, in contrast to books comprising conference proceedings. Chapters three to twelve cover generic aspects of muddy coasts, while chapters thirteen to twenty-one deal with aspects illustrated by specific regional examples.

The essentials of mudshore dynamics and controls are expounded by A. J. Mehta. In this (the most mathematical) chapter are included wave damping by visco-elastic muddy sediments, sediment budgets and the shapes of cross-shore profiles. A case study relating to the effects of sea-level rise on inundation of a wildlife area shows how natural deposition processes serve to ameliorate the shoreline retreat.

An account of the main features related to accretion and erosion of muddy coasts is presented by R. Kirby. He contrasts the high convex profile observed in accretionary mudshores with the low concave profile of erosional mudshores. A possible management approach to combat erosion by placing dredge spoil as a wave absorber is suggested. Mehta and Kirby both present their jointly-developed criterion for mudshore stability, but from different perspectives.

The important issue for low-lying coastlines of sea level change is dealt with by Jelgersma, Healy and Marone. They give an informative and readable summary of the current state of knowledge of past sea level changes, future projections, and impacts on muddy coasts. Despite the accelerated rise, however, they conclude that in most cases depositional processes will reduce the net effect to a level that will be no greater than those due to direct human impacts. In a later chapter, Chenglan Bao and Terry Healy catalogue the devastating effects of storm surges on those dwelling on low-lying coasts, which can raise sea level briefly by over 6m. They tabulate 13 severe storm surges over the past three centuries, which between them have killed more than one million people.

Chapter 6, by B. W. Flemming, is a considerable tour-de-force covering the geographical distribution of muddy coasts. This occupies 103 pages, and covers every corner of the world that has a muddy coast to offer, with information gleaned from around 500 references. The world's coasts are divided into 26 regions, which are treated individually with maps and descriptions of the areas with muddy coasts, including their tidal ranges and other regional processes.

A brief summary of the main physical properties of mud is given by P. Augustinus, followed by an overview of the important ways in which these properties are modified by biochemical factors. For example, the traditional view that co-

hesion of clay particles is primarily an electro-chemical phenomenon is challenged by a growing body of research over the past 20 years showing that the dominant factors are organic. The flora, fauna, plankton and bacteria associated with muddy coasts are described by M. D. Fortes, together with the way in which they interact with each other, and with their muddy environment. Two further chapters are devoted to the importance of mangroves as a dominant species of tropical muddy coasts. Their use as sensitive indicators of sea level change, and their considerable influence over the dynamics of fine sediments, are described.

Chapter 12 deals with that most fundamental of interactions, that of the human influence on muddy coasts. The author cites examples of both direct influences, due to coastal defence works, pollution, erosion or loss of habitat, and indirect influences such as subsidence due to water/oil/gas extractions, or sediment starvation.

Chapters 13 to 21 each deal with muddy coasts in geographically distinct regions: China, New Zealand, India, Korea, England, Canada, North and South America, and Australia. The authors illustrate the distinctive factors, features and issues influencing their different regions: tidal flats, tectonic activity, saltmarshes, tidal dynamics, ice-cover, and coral reefs.

Part of a reviewer's task is to look for deficiencies, but I found very few and those only minor. One possible improvement would have been if the title or authors of chapters had been printed at the tops of pages, to aid navigation within the book. The chapter on "Geographic distribution of muddy coasts" might have sat more comfortably as Chapter 12, leading into the chapters devoted to specific parts of the world. An index would have been a desirable addition, but they are difficult to compile in multi-authored books so its absence is understandable. The authors must have put considerable effort into proof-reading, since the typographic errors are very few.

The authors and editors have produced a masterly, authoritative and usable work. They amply cover the subject matter of the title, both with a balanced coverage of the world, and with a comprehensive overview of processes, deposits and functions—plus much more besides. The book is attractively printed by Elsevier, and lies easily on the eye with large black print on opaque white paper, with a binding that looks as though it will withstand repeated reading. I heartily recommend this book to all those who deal with muddy coasts, whether as researchers, managers, or members of conservation bodies and interest groups.

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Mediterranean Archaeology and Archaeometry: International Journal. Liritzis, Ioannis (ed.), 2002. Rhodes, Greece: University of the Aegean, vol. 1, no. 1, 77p. Initially free (later 20 euros).

A journal in the same general field as JCR might seem redundant, but here is one that focuses on a particular region and its appropriate sciences that should be warmly welcomed. This reviewer recently compiled a chronology of the last 10,750yr (the Holocene Epoch) which contained some 50 tentative names for the climatic and sea-level oscillations, of which I found that 33 came from source areas in the eastern Mediterranean and Middle East. My point is that this is a very special region of great significance in sciences relating to the environment and cultural evolution of the Human Race.

This first number is beautifully produced and laid out (by the Rhodian Graphic Arts company in Rhodes itself) and its sponsors should be immensely proud of this initial effort. The scientific papers begin with the flint tools and blade technology of the Palaeolithic, which reminded me of my first encounter with these cultures in North Africa while working with the UNESCO "Save the Monuments" program in the middle Nile and eastern Sahara. How did those people travel to the Aegean islands? Certainly not by eustatic or tectonic adjustments (land bridges).

Next comes an article on the Bronze Age on Rhodes which provides valuable chronological data relating to the cultural levels before and after the celebrated eruption of Santorini (Thera) in the Second Millennium B.C. The precise date of this event is still under investigation. The "high" date is given at 1628 B.C. and the "low" at 1550 B.C., the latter relating to traditional time-tables of Egyptian and Mesopotamian history. An interesting sequence of events shows that the widespread damage caused by a pre-eruption earthquake was already partially repaired before the main tephra fall. Quite soon after the latter the sites were reoccupied, so it was not "the end of the world". Abundant charcoal makes it possible to obtain high precision radiocarbon dates in great numbers, which are calibrated according to latest tables. Wood samples always present problems, however, because the tree can be any age, and twigs are preferable because of their natural limitations.

Next comes a discussion of Jordan in the 7th to 6th millennia B.C., i.e. around 8500 BP (uncalibrated). Most sites in southern Jordan were abandoned around 8000 BP, apparently a result of climatic changes. It would be interesting to review the geological evidence for the large-scale evacuation.

A fourth paper treats with Cyprus and islands in the eastern Aegean during the early Holocene. Apparently, these were formerly not regarded as being regularly occupied, or merely as "way stations" for migrant peoples. This earlier view is now rejected and many colonial settlements (mostly coastal) have been clearly established. Cyprus is 400km from Rhodes and 600km from Crete. Around 7000 BC (calibrated) sea level was around -35m, so that coastal plains were wider and camp sites are more difficult to identify. Early visitors were evidently fishermen, but hunting was also involved, resulting in the extermination of the pygmy hippopotamus and pygmy elephant. Archaeological indications suggest that the early Holocene visitors came from the Levant.

The final item treats with a topic of particular interest to geologists and is provided with a historical chronology. This