Tide and circulation modelling is treated with a similarly broad range of numerical techniques: explicit finite difference, alternating direction implicit finite difference, and finite element. Additional numerical techniques used in the models are nested grids, moving boundaries and three dimensional grids. These techniques are applied to several different types of coastal regions and at different locations worldwide. Models are presented for the Arabian Gulf, the Singapore Strait, the Slovenian coastal sea, the southern North Sea, a bay in the Mediterranean, and several lagoons and estuaries.

The models presented in the book concerning sedimentation and pollution are of particular interest. These subjects present special problems for modellers because much of the critical physics and chemistry involved are poorly understood. The types of sediment subjects covered include sea bed changes in cohesive and non-cohesive sediments, shoreline changes and harbor siltation. Pollution models include water quality, thermal discharge, mixing of river effluent and effluent transport. Several different geographic settings are used as sites for application of the models, *i.e.* the North Sea, the Songkhla Port in Thailand, the Loire estuary, the Chukpyon Harbour in Korea, the Shingu River in Japan, the Tejo estuary in Portugal and the southern coast of England. Modelling specialists will find a number of empirical relationships that will be of interest, given the papers describing sediment erosion and transport, water diffusion, and mixing.

The book concludes with papers on computational techniques. Presented are papers on parallel computing, a general approach to modelling of three-dimensional surface flow problems and risk assessment models.

Authorship is decidedly international. Papers come from Europe, the Middle East, Asia, South America, Central and North America. Most of the authors are associated with academic institutions; the remainder are from government institutions. This provides a truly worldwide overview of activities in coastal modelling that is not easily obtained from other sources. The papers are all well referenced and this provides additional sources of information to the reader about coastal modelling.

In summary, for those desiring an up-to-date compendium of coastal process models, I think this book is ideal and is highly recommended. Both modelling specialists and generalists should find something to learn in the book about modelling of coastal physical processes.

Joseph N. Suhayda
Department of Civil Engineering
Louisiana State University
Baton Rouge, LA U.S.A.

Intertidal and Littoral Ecosystems, edited by A. C. Mathieson and P. H. Nienhuis, 1991. Elsevier, Amsterdam, 564p. ISBN 0-444-87409-7 (Vol. 24, Ecosystems of the World). Price: US $195; Dutch Fl 380.

The series *Ecosystems of the World* (in 29 volumes) was conceived by Bostwick H. Ketchum of Woods Hole Oceanographic Institution who died on July 14, 1982, but is being nobly carried on by David W. Goodall of the C.S.I.R.O. in Midland, Western Australia. The volumes do not appear in sequence. This one, Volume 24, edited by Mathieson (University of New Hampshire, Durham, NH) and Nienhuis (Delta Institute for Hydrobiological Research, Yerseke, The Netherlands) is an outstanding contribution and should be a required purchase for any coastal institute, though the high price may keep it, regrettably, off the shelves of specialists.

Although the content is intended mainly for biologists, there is much of value for physical geographers, geomorphologists and indeed any coastal scientist. The volume is multi-authored, divided into 18 chapters, and carries no less than five indexes, so that as a future research tool it will be invaluable; these are: lists of genera, authors, systematics, geography, and subject. The first four chapters treat with general-type reviews: (1) Introduction (by the editors); (2) Marine Plant Ecosystems (Lüning and Asmus); (3) Chemical Characteristics (Schramm); (4) Vertical Distribution, Zones (Russell). The rest of the volume is devoted to regional topics, which, although global in principle, leave vast gaps: (5) Iceland, esp. algae (Munda); (6) Baltic (Wallentinus); (7) Canadian Maritimes and Maine, Rocky Shores (Mathieson, Penniman and Harris); (8) U.S. Mid-Atlantic, Sandy Shores (Orth, Heck and Diaz); (9) Caribbean and Tropical W. Atlantic (Dawes, McCoy, and Heck); (10) N.E. Pacific: Aleutians to Baja California (Foster, de Vagelaere, Oliver, Pearse, and Harrold); (11) Southern California: Rocky

Coasts (Littler, Murray, and Seapy); (12) Tropical West Africa (John and Lawson); (13) Southern Africa (Field and Griffiths); (14) Chile (Santelices); (15) Indonesia and New Guinea: Seagrass Communities (Brouns and Heijs); (16) Red Sea and Gulf of Aden (Lipkin); (17) S.E. Australia (King, Hutchings, Larkum, and West); (18) Nearshore Benthic Environment: Remote Sensing (Kelly).

Impressive as this rich menu appears (the endpaper maps mark the areas), one cannot help but regret the absence of any consideration of the Arctic (Canadian Arctic, Greenland, Spitzbergen, Russian Arctic), western Europe, eastern South America, east Asia, oceanic islands in general, the entire Indian Ocean, and the Antarctic. It should be noted, however, that other volumes in this series treat coral reefs (Vol. 25), and estuaries and enclosed seas (Vol. 26); the latter which appeared in 1983 embraces the Baltic, Mediterranean, Black Sea, Persian Gulf, Bay of Bengal, South China Sea, Japan Sea, Bering Sea, the Gulf of California, and the Gulf of St. Lawrence. Thus, some of the "gaps" are partially covered already.

Coastal specialists of all categories might spare a few moments to consider the discussions on human impacts on the coastal ecology, notably in southern California (collecting, foraging, trampling, oil spills, sewage disposal, *etc.*), eutrophication in the Baltic, to name only two areas in what is really a global problem. The chemical survey in chapter 3 (Schramm) is particularly interesting in this context.

Leafing through the various chapters, it is particularly reassuring to learn the classic papers on shore ecology are still acknowledged and revolutionary rejections are not proposed. The standard zonation patterns recognized since the early 19th century still appear to stand up to global surveys, and their systemization by the Stephensons and Lewis in the present century is very much "alive".

In the light of the present anthropogenic rise in atmospheric CO_2 and the ongoing "global warming" debate it has been interesting to review the chapters for evidence of secular change. For the U.S. Mid-Atlantic sector, for instance, an illustration from Orth (1977) shows water temperatures for seven selected sites for the warmest and coldest months in series that go back to 1900; although there have been distinctive interannual fluctuations (largest in winter) there is no significant trend. There is some indication of the 18.6 yr lunar nodal period which causes tidal upwelling of cold water. This effect can be important near sensitive ecologic boundary zones as in the Gulf of St. Lawrence (see p. 114). Tides in general play a vital role in shoreline ecology and are discussed in almost every chapter. The Asiatic monsoon is also very significant, but the affected coasts are not included in this volume; however, the West African monsoon, although less powerful, is briefly discussed (p. 300). In the northeast Pacific, the role of El Niño gets little more than a mention.

Rhodes W. Fairbridge
G.I.S.S.
Columbia University
New York, NY 10025 U.S.A.