



BOOK REVIEWS

Managing Coastal Erosion, National Research Council, 1990. Washington, D.C.: National Academy Press, 182p. ISBN 0-309-04143-0.

Forty-five percent of the U.S. population now lives in counties bordering the coast. This population is projected to increase by 13% within the next 20 years. Over 60% of the U.S. shoreline is presently eroding to some extent. There is therefore a growing public concern over coastal erosion, mitigation measures, appropriate land use policies, and preservation of remaining wetlands.

This book presents a summary of the conclusions and recommendations by the Committee on Coastal Erosion Zone Management, under the auspices of the Water Science and Technology Board and Marine Board of the National Research Council (NRC), in response to a request for guidelines by the Federal Energy Management Agency/Federal Insurance Administration (FEMA/FIA). Causes of coastal erosion, both natural and anthropogenic, are briefly reviewed, as well as current federal and state coastal management programs. Coastlines vary greatly in their physical characteristics, which affect their relative susceptibility to natural erosion. Shoreline engineering structures, such as jetties, groins, seawalls, *etc.*, designed to counter beach erosion, have often accelerated erosion downdrift. Fragmentation of political jurisdiction among federal, state and local districts has further complicated the search for solutions.

The National Flood Insurance Program (NFIP), established in 1968, and administered by FEMA, is the main avenue of Federal involvement in coastal flood hazards. NFIP designates flood-prone areas, based on the statistical 100 year flood event. The Upton-Jones amendment (1987) provides compensation for owners of structures in imminent danger of collapse to relocate prior to the actual loss, and thus is a modest step toward a retreat option. Specifically, to qualify for designation as "imminent collapse" a building must lie seaward of a line 100 feet plus five times the local

average annual shoreline recession rate (E-10). There are further E-30 and E-60 setback designations, for insurance purposes (based on 30- and 60-year erosion rates, respectively). While the dynamic nature of the E-zones is recognized, no specific provisions are made for future sea level rise, nor local subsidence effects.

The NRC subcommittee calls for establishment of a national computerized data base; also the use of historical trends to estimate shoreline retreat, as the most practical method in the near future, although they recommend statistical Monte Carlo simulations as a preferred method, in the long run. While not specifically discussed, models of future sea level rise can be introduced, to provide projections of longer-term trends. A certain flexibility should be incorporated into the legislation to permit periodic reassessment of the E-zones, as more accurate data become available.

Managing Coastal Erosion provides useful information on policy responses to shoreline recession and its adverse effects on private property. It also addresses issues such as the role of the Federal government toward development in erosion-prone coastal areas. As such, the book will be of great interest to coastal managers, engineers, property owners, and the growing segment of the population which lives or works near the shore.

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The Rising Tide—Global Warming and World Sea Levels, L. Edgerton, 1991. Washington, D.C.: Island Press, 137p. ISBN 1-55963-068-X. ISBN 1-55963-067-1.

One of the most direct consequences of global warming could be accelerated rates of sea level rise, which would potentially threaten coastal cities, ports and wetlands. Even under present rates

of global mean sea level rise (estimated to range between 1–2 mm/yr, during the last 100 years), over 70% of the world's sandy coasts and 90% of U.S. beaches are eroding.

Lynn Edgerton, a lawyer for the Natural Resources Defense Council (NRDC), an environmental organization, briefly covers the scientific background of the predicted greenhouse-gas induced climate warming, its implications for future sea level change and its anticipated effects on coastal environments. The main thrust of the book, however, is a review of U.S. federal and state policies with respect to the coastal environment. The difficulty of formulating a consistent coastal policy is magnified by the division of management responsibilities among five federal agencies (the Environmental Protection Agency, the Department of Commerce, the U.S. Army Corps of Engineers, the Department of the Interior, and the Federal Emergency Management Agency, FEMA). The further dispersion of jurisdiction among federal, state and local agencies only underscores the conflict of roles and lack of coordination. Edgerton provides a good summary of relevant state and local regulations, including several site studies for San Francisco Bay, Delaware Bay, Hawaii and Massachusetts. Recommendations are offered to mitigate adverse impacts. Various policy options are examined, including reductions in CO₂ emissions, to incorporation of future sea level changes into land use planning and flood insurance programs. A need exists to factor sea level rise into the shoreline erosion rates and flood frequency statistics of FEMA, but also to allow flexibility in adjusting to new and more accurate sea level rise scenarios, as better data become available.

However, several important considerations are downplayed. The wide range of geographic responses of the shoreline to sea level rise, due to the great variety of physical, oceanographic and meteorological characteristics is not mentioned. No clear distinction is made between episodic storm events, and permanent inundation. The book, furthermore, devotes little space to the engineering responses (*e.g.* hard or soft stabilization, beach nourishment), and the extent to which these measures may have often been counterproductive in the past, by exacerbating erosion problems downdrift (an odd omission from an environmental perspective).

International activities are briefly mentioned (*e.g.* the United Nations Environmental Program,

IPCC Coastal Zone Management subgroup). Case studies are presented for the Nile delta, Bangladesh, and the Netherlands. However the particular concerns of island states are not addressed, for example as presented at the Small States Conference on Sea Level Rise, organized by the Republic of Maldives, in 1989.

The book's main strengths are the overview it provides on the maze of federal, state and local regulations, and the set of recommendations for impact mitigation. Although the science background is discussed in greater depth elsewhere, the book is clearly and simply written for coastal managers, policymakers, and anyone else with an interest in the future of our shorelines.

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Paleoshorelines and Prehistory: An Investigation of Method, L. L. Johnson (ed.), assisted by M. Stright, 1992. Boca Raton: CRC Press, 243p. ISBN 0-8493-8855-4.

Prehistoric settlement and land use patterns were closely linked to natural resource availability. In coastal regions, this involved convenient access to shellfish and other marine or intertidal food sources. Inasmuch as the littoral coastal environment responds dynamically to variations in sea level and sediment supply, coastal archeology requires a clear understanding of the evolution of the shoreline over time.

In *Paleoshorelines and Prehistory: An Investigation of Method*, archeological and geological methods are employed to investigate the relation between ancient occupation sites and paleoshoreline positions, and their modification over time by sea level changes. Techniques discussed range from granulometric analysis, to radiocarbon dating of shells from beach ridges and shell middens, to underwater geomorphological mapping, using sidescan sonar and scuba diving, and finally, satellite imagery. Localities described in the book are selected from diverse tectonic settings on islands and the mainland. Examples from tectonically stable areas include the Bahamas and Barbuda Island in the Caribbean; Kotzebue; Alaska; Brazil; and the eastern Gulf of Mexico. Unstable regions encompass areas of tectonic uplift (south-