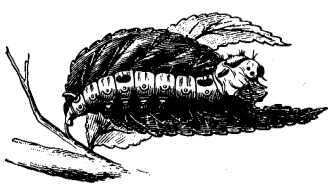
A SALTMARSH ELEGY

Saltmarshes: Morphodynamics, Conservation and Engineering Significance. J. R. L. Allen and K. Pye, eds. Cambridge University Press, New York, 1992. 184 pp., illus. $49.95 (ISBN 0-521-41841-0 cloth).

While I was reading this book, the August 1992 issue of *Trends in Ecology and Evolution* arrived in my mailbox. In the latter, Alan Berryman and his colleagues present a lucid discussion of "ecological engineering." Berryman et al. (1992) note the discordant key that this term strikes in the ears of most ecologists. However, they point out that there are few alternatives to active intervention in the maintenance, conservation, and preservation of ecosystems if *Homo sapiens* is to remain a viable species, along with the rest of the biota, on this small planet. Realizations of this perspective can be found in the proliferation of recent books and new journals that provide for the union of ethereal ecological theory with more mundane, anthropocentric concepts of engineering and economics. However, it appears that there are still many bars to be played before the melody will be resolved from within the cacophonous notes of this fin de siécle symphony. Hints of this melody are apparent in J. R. L. Allen and K. Pye's edited book on salt marshes, but in the end, the dissonance overwhelms.

Saltmarshes is a collection of eight formal contributions to a one-day workshop on the "morphodynamics, conservation and engineering significance of saltmarshes" (p. viii) held in April 1991 at the Postgraduate Research Institute for Sedimentology, University of Reading, UK. The publication of this generally high-quality book within a year of the conference emphasizes the importance of applying theory to the management of coastal ecosystems. The foci of the articles are simultaneously expansive and parochial. With the exception of the chapter by A. J. Gray on saltmarsh plant ecology, the authors' primary concern is for processes operating at large spatial and temporal scales.



The editors, who also contributed three of the eight chapters, are sedimentary geologists. According to them, as well as authors M. J. Tooley and J. S. Pethick, the "location, character and dynamic behaviour of saltmarshes is governed essentially by four physical factors: sediment supply, tidal regime, wind-wave climate, and the movement of relative sea level" (Allen and Pye, p. 3). The saltmarsh biota (i.e., plants) act only in a secondary role as a source and trapper of sediment, but only when physical conditions are such as to permit initial plant colonization. This point of view demands an appreciation and exploration of processes that have occurred over entire coastlines since the end of the Pleistocene glaciation, a vista difficult to see from within the one-square-meter quadrat favored by population and community ecologists.

Unfortunately, this vista is observed from sea level, and the horizon is but 5 km distant. Despite the title of the book, all the chapters deal exclusively with saltmarshes of the British Isles. Such a narrow geographic concentration would have been expected in discussions at a regional workshop on conservation and management of local saltmarshes, but not in the invited papers that framed the workshop.

The authors were "invited to summarise the current status of knowledge in their specialist subject areas" (p. viii), but they in fact summarized the current status of British knowledge. Redfield's pioneering work on the relationship among sea-level rise (Redfield and Rubin 1962), saltmarsh geomorphology (Redfield 1965), and succession (Redfield 1972) is ignored in the chapters on sea-level changes (Tooley), marsh geomorphology (Pethick), and marsh plant succession (A. J. Gray). Gray's chapter, a revisitation of saltmarsh zonation and succession, neglects 30 years of research in these areas conducted at Woods Hole, Massachusetts, Sapelo Island, Georgia, Rumstick Cove, Rhode Island, and the California coast. The last would be particularly relevant, because California saltmarsh dynamics have changed with the invasion of *Spartina alterniflora*, in much the same way that British saltmarshes have changed since the invasion of Spartina anglica (*Spartina maritima* x *S. alterniflora*). Methods and practices relating to saltmarsh conservation (J. P. Doody) in the British Isles similarly would benefit from a more cosmopolitan review of the literature.

A. H. Brampton's short chapter on the engineering significance of British saltmarshes contrasts sharply with the other articles in this book. The rest of the authors can point to large amounts of local data and information in their areas of expertise. However, Brampton points out that "standard coastal engineering textbooks have little or nothing dealing with the management or repair of saltmarshes" (p. 115), despite their occurrence on at least 20% of the British coastline and the designation by the US government of 80% of these sites as "sites of special scientific interest." Brampton identifies sea-level rise and consequent saltmarsh erosion as destabilizing processes in need of engineering solutions. There is a clear statement of research requirements that must be met before any engineering solutions can be attempted. It is noteworthy that Brampton stresses the possible contradictions between engineering schemes that may prevent coastal erosion and flooding, and with the preservation of biotic integrity of the saltmarshes.

There is no attempt at a synthetic chapter to close the book, which is unfortunate given the disparate approaches presented and the lack of clear directions in the nascent fields of ecological engineering and restoration ecology. What is clear is that coherent management of so-called natural ecosystems requires insights from biology, geology, and engineering as well as a consideration of the economics, ethics, and politics involved. *Saltmarshes* provides a modicum of information on which students

and researchers can draw in their efforts to develop management techniques for coastal ecosystems, but much more is needed before we truly can manage a marsh.

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ECOPHYSIOLOGICAL PERSPECTIVE ON PLANT STRESS

Responses of Plants to Multiple Stresses. Harold A. Mooney, William E. Winner, and Eva J. Pell, eds. Academic Press, San Diego, CA, 1991. 422 pp., illus. $69.95 (ISBN 0-12-505355-X cloth).

This useful and well-prepared book is a collection of interrelated discussions of the responses of higher plants to stress. It grew out of a meeting on the subject in Asilomar, California, that focussed almost exclusively on ecological and physiological approaches to plant stress interactions. The contributors are important figures in their respective fields and have written clear and persuasive introductions to their subject areas. The book will be of use to specialists and students alike in stress physiology.

With the exception of 4 of the 18 contributions, which take a broader approach in terms of disciplines, the book is purely ecophysiological in emphasis. From my perspective, because our information concerning underlying stress-related mechanisms comes in many different disciplinary stripes, more integration of metabolic and molecular data and considerations of the ecophysiological material would have enriched the already impressive whole. One can only hope for a sequel event and resultant second book in which the same topics are revisited with a broader perspective.

The editors have explicitly organized the contributions into treatments of short-term responses of plants to multiple stresses, the relationship of these responses to biotic interactions, and long-term evolutionary coping strategies of whole plants to particular environments. But one of the strengths of the book is the blurring of this distinction in many cases, especially with regard to the chapters that discuss the modeling of stress responses.

R. E. Dickson and J. G. Isebrands, the authors of the opening chapter, have worked with good results for many years on structure-function relationships for cottonwood and have developed a whole-plant physiological growth-process model for a one-year-old poplar tree using morphological and environmental data collected by the group over the years as major driving variables. The strength of their approach lies in its specificity, focused as it is on quantification of ontogeny and morphological indices in one species. They have used their model to obtain new information about the interaction of light and temperature on growth in poplar and point out the potential for obtaining useful information for other environmental variables, such as air pollutants, were quantitative information available.

Insights into the effects of multiple stresses on nutrient availability are provided by F. S. Chapin III, who first considers the effects of stresses on the apportionment of assimilate between secondary metabolites and growth processes and then the consequence of that apportionment for nutrient availability/requirements.

The chapter by D. R. Geiger and J. C. Servaites summarizes the important and original physiological and biochemical work of their group on allocation of assimilate. They have achieved an admirable and unique balance between foci on regulatory metabolic mechanisms and on relationships between source and sink. This is an interdisciplinary approach that really works. The authors also