

helpful. While many of the conclusions that the author arrives at regarding particular schools of thought or contributions are unexceptional (for example in the case of the neo-classical economics approach), a concluding chapter could have strengthened the link with the earlier discussion of forms of explanation.

Finally, since the author states that his "personal interest and competence are higher" (p.92) in the area of Marxist theories of technical change than in the other areas, it is worth making two rather important observations about Marx's views. The first is that although Elster suggests to the contrary, Marx was aware of the importance of capital-saving technological change and indeed as Rosenberg shows in his book, Marx elaborated on the

importance of this form of change in the machine producing sector. Secondly, it is surprising, in view of Elster's predilection for intentional explanations, that he does not discuss Marx's oft-repeated statement about social forces operating "behind the backs of individual capitalists and independently of their will". Clearly, this is of central importance in Marx's discussion of technological change and although there are connections here with Elster's discussion of functional explanations, he does not consider this issue at all.

It is a very stimulating book however, which will, I am sure, be of interest beyond a specialized readership. □

*Martin Fransman is a Lecturer in Economics, University of Edinburgh.*

## Brackish communities

J.D. Burton and M. Sheader

### Estuaries and Enclosed Seas.

Edited by Bostwick H. Ketchum.  
Elsevier: 1983. Pp.500. Dfl.400.00,  
\$170.25.

ALTHOUGH numerous accounts of individual estuarine systems and coastal sea areas have been published in recent years there have been fewer attempts to synthesize the available information into accounts of how these environments function as ecosystems. The present volume, Number 26 in the series *Ecosystems of the World*, consists of two sections of about equal length. The first, which deals with estuaries, is structured around treatments of particular groups of organisms, drawing upon information on various localities to exemplify the processes discussed. This structure provides a better framework for integration than that adopted in Section II, which is organized on a regional basis, with accounts of ten enclosed seas. Although enclosed seas often possess estuarine characteristics on a large scale, this theme is not consistently followed and the combination of these sections in a single volume is justified in practice on grounds that are more geographical than ecological.

There is, however, a more integrated overview of the characteristics of these inland seas, provided by Bostwick H. Ketchum, the editor of the volume. Sadly, Dr. Ketchum, whose thoughtful contributions here are typical of his publications on estuaries, died before the book appeared.

The greatest single feature that distinguishes estuarine ecology from that in other aquatic environments is the intense variability of conditions. Although influenced by topography, most strikingly apparent are the marked changes in salinity distri-

butions during the tidal cycle and with season. Some background knowledge of physical processes is essential to an understanding of estuarine biology and it is provided here by chapters on estuarine characteristics and the physics of circulation. The latter, by C.B. Officer, provides a remarkably clear picture without demanding much mathematical insight by the reader, and deserves to be widely read. In contrast with the care taken to provide this background, there are no general accounts of estuarine sedimentology and chemistry. These are surprising omissions, especially since it is characteristic of estuaries that there is usually a close coupling of processes in the bottom sediments with those in the water column, with important consequences for the cycling of organic material and nutrients.

The temporal variability in conditions encountered in estuaries means that organism populations need to be adapted to stress, and a chapter is devoted to this topic. The assessment of stress in dynamic systems which are also subject to pollutant inputs is a complex question, central to evaluating the capacity of a system to receive waste without incurring unacceptable effects. The presentation here deals with the background clearly. A feature throughout the book, however, is that the literature after 1977 is thinly represented. A consequence in this particular chapter is that ideas concerning biochemical and cytological indices of stress are neglected.

The estuarine organisms are considered in separate chapters; phytoplankton, zooplankton, benthos, and fishes. The authors have adopted different approaches, each of which is successful within the limits imposed by this structure. For example the distributions of zooplankton are considered by reference to several specific regions and their general biology by reference to the copepods. The chapter on benthos is more general, with an emphasis on European estuaries. One consequence of the variability of estuaries is that they have considerable individuality, making

generalizations difficult, especially as at present we know much more about the estuaries, often small, in developed, mostly temperate regions, than those elsewhere.

A more avoidable limitation in this section arises because it tends to treat the estuarine biota in compartments. One result is that the meroplankton receive less prominence than seems appropriate. The authors do provide some information on interrelationships between the groups but there is no overall discussion, taking a holistic view and drawing on experience with estuarine ecosystem models. This would have highlighted important topics which are inadequately represented as it stands, including the function of heterotrophic micro-organisms in the cycling of organic material, and the roles of the microplankton and the meiofauna in food-chain dynamics. At the other end of the size distribution the macroalgae and higher plants receive little attention.

The chapters on enclosed seas vary in emphasis. They cover the Mediterranean, Black, Red, Baltic, Bering, Okhotsk, Japan and China Seas, and the Gulfs of St. Lawrence and California. The account of the Black Sea, by Yu. I. Sorokin, discusses succinctly the relationships between microbial activity and chemical conditions, which in turn are related to topography and water circulation. The other accounts give far more attention to environmental characteristics than to the biology. That on the Red Sea is at the extreme, with only six sentences on the organism populations.

It is useful to have these accounts brought together in one place and those for regions which have not been extensively reviewed elsewhere are particularly welcome, but generally there is surprisingly little about the inter-relationships between the organisms and their environment. Indeed for the Mediterranean Sea the biological and physical aspects are segregated into two chapters.

To make a conceptual synthesis of material concerning environments of such great diversity represents a major challenge. This volume succeeds in bringing together a large amount of well-indexed factual information but the lack of a consistently process-orientated ecological theme running through all the contributions is apparent. □

*J.D. Burton and M. Sheader are in the Department of Oceanography at the University of Southampton.*

### Charting the Oceans

*The Times Atlas of the Oceans*, published by Times Books/Van Nostrand Reinhold (£30, \$80.50) is now available. Detailed maps cover the oceans of the world but a large part of the book is devoted to the marine environment. Extensive illustrated descriptions of the distribution and exploitation of marine resources are included.