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DAME, R. 1996. **Ecology of marine bivalves: An ecosystem approach.** CRC Marine Science Series. 272 p. $95.00 ISBN 0-8493-8045-6.

While reading *Ecology of marine bivalves,* I found myself wondering whether the current researchers of this field, of which Professor Dame is a leading expert, have actually achieved the level of holism aspired to in his book. My opinion is that an ecosystem-level approach to bivalve ecology still remains an elusive future goal. My reasoning for this view is that the spatial scale employed by most contemporary bivalve ecologists is closer to population or community, rather than ecosystem, levels. Ecosystem research should ideally include a multidisciplinary team consisting of a physical oceanographer, surficial geologist, and biologist. For each study, the ecosystem spatial scale should be determined by the details of the physical oceanography. Sadly, such an approach will not be found in the majority of references reviewed in this book.

It is stated on page 35 of *Ecology of marine bivalves* that one can scale up from organismic to ecological processes, i.e., in estimating population-level grazing rates of suspension-feeding bivalves. As it turns out, bivalve population grazing rates are probably another example of "a group attribute common only to the population" (p. 75). This means that physiological feeding rate bioassays will not yield meaningful population-level grazing rates by simple scaling up. The reason for this is because of the differences in hierarchical level involved and that it has been recognized that bivalve reef grazing rates are an emergent property of the reef (Wildish and Kristmanson 1993). The underlying causes of this are

- that physiological feeding rate bioassays are incapable of considering the "seston depletion effect" and consequences seston depletion may have in sharing out available food to more individuals along the downstream path of the reef, and
- that the addition of bivalves to the reef by recruitment and immigration or losses, by death and emigration, are not considered in this approach.

Since the pioneering work of Rowe (1971), marine biologists have looked for the linkages between planktonic primary producers and benthic secondary producers. In fact, this process of pelagic–benthic coupling has become a popular contemporary theme and leads to the question posed in the book as to whether top-down or bottom-up control is operating. According to Heip et al. (1995), suspension-feeding bivalves are constrained on a local scale by hydrodynamics, whereas at the ecosystem scale, the amount of primary production limits bivalve production. My own view of pelagic–benthic coupling where bivalve reefs are present is that the key limiting factor is hydrodynamic, both at local and ecosystem levels. It is the flux of phytoplankton that reaches the reef that is of critical importance. Thus, if the estuarine ecosystem has a stratified water column, phytoplankton may not be able to reach bivalves directly, whereas if downwelling or fully mixed water masses are present, it creates conditions where bivalve reefs can form. Besides hydrodynamics, other limits for bivalve reefs are suitable substrates and predation. For phytoplankton, additional limiting factors are absence of light or plant nutrients and zooplankton grazing. In natural coastal ecosystems, it will rarely be that the amount of primary production is limiting for bivalve reefs, but rather how much of it can be transported to the reef.

One chapter deals with bivalves as components of ecosystem health and, for me, highlights a contradiction in the book's title: bivalve autecology versus coastal/estuarine ecosystems. I also wonder whether the anthropocentric nature of the chapter is the best way to deal with ecosystem-level change? Or should one also include natural catastrophes, such as storms, earthquakes, and asteroid impacts? Because ultimately any diagnostic method will have to be able to distinguish between anthropogenic and natural ecosystem stresses. All of the methods presented in this chapter are physiological or behavioral and not integrative ecosystem-level ones. This point is made and discussed by the author and a future goal considered to be to devise measures of ecosystem resilience, equilibrium, diversity and photosynthetic versus macrobenthic respiration energy rates. Some of these measures have already been attempted, e.g., by conventional benthic field sampling in relation to a wide range of human wastes reaching marine receiving waters. I was, therefore, surprised that these studies were not discussed.

In the preface of *Ecology of marine bivalves,* it is stated that the book is intended as a reference source for bivalve researchers, coastal and fisheries resource managers, and students. Although the book will be considerable value to the first group, I believe that for the other two it may be less so. My reasoning is that many of the questions considered in the book have not been answered or remain controversial. Some examples of what I mean are the precise mechanism of bivalve filtration, the utility of the scope for growth measure in ecosystem studies, the difficulty in deriving population grazing rates from physiological bioassays, and the general lack of methods available in ecosystem analysis. It is difficult to see how practical resource managers can make much use of this. The up side of this situation is that such questions are all scientifically tractable and, therefore, provide a rich field for future research.

This is a well-produced book and Richard Dame has adequately reviewed marine bivalve ecology research up to 1995. I recommend the book as essential reading to anyone with a keen research interest in the ecology of marine bivalves.

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