15.1 Introduction

We have seen in Chapter 14 that multivariate methods of analysis are very sensitive for detecting differences in community structure between samples in space, or changes over time. Generally, however, these methods are used to detect *differences* between communities, and not in themselves as measures of *community stress* in the same sense that species-independent methods (e.g. diversity, ABC curves) are employed. Even using the relatively less-sensitive species-independent methods there may be problems of interpretation in this context. Diversity does not behave consistently or predictably in response to environmental stress. Both theory (Connell (1978) ; Huston (1979)) and empirical observation (e.g. Dauvin (1984) ; Widdicombe & Austen (1998)) suggest that increasing levels of disturbance may either decrease or increase diversity, or it may even remain the same. A monotonic response would be easier to interpret. False indications of disturbance using the ABC method may also arise when, as sometimes happens, the species responsible for elevated abundance curves are pollution sensitive rather than pollution tolerant species (e.g. small amphipods, *Hydrobia etc*). Knowledge of the actual identities of the species involved will therefore aid the interpretation of ABC curves, and the resulting conclusions will be derived from an informal hybrid of species-independent and species-dependent information (Warwick & Clarke (1994)). In this chapter we describe three possible approaches to the measurement of community stress using the fully species-dependent *multivariate* methods.

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