

Effects on community structure of a pollutant gradient – introduction

R. M. Warwick

Plymouth Marine Laboratory (West Hoe), Prospect Place, The Hoe, Plymouth PL1 3DH, United Kingdom

For determining effects of pollution at the community level, study of assemblages of benthic organisms has obvious advantages over study of the pelagos. Because of the movement of water masses, in spatial surveys one can rarely be certain how long a particular pelagic community has been in the vicinity of the pollution source, and in temporal studies the same assemblage cannot be sampled repeatedly at a particular place. Changes in benthic community structure have therefore been the mainstay in monitoring biological effects of pollutants. Traditionally, these have largely involved studies of species abundance distributions for the macrofauna (defined in practical terms as the large species which are retained on a 0.5 or 1 mm meshed sieve when the sediment is passed through it). Species vary in their degree of tolerance to pollution so that some will decrease in abundance, some remain unaffected, and some which benefit from the changed conditions will increase (the so-called 'pollution indicator' species). A large literature has developed describing how these patterns of species abundance respond to pollution.

Recently, McIntyre (1984) has commented on 'the failure of the popular benthic community monitoring approach to deliver the goods in some cases'. There are several probable reasons for this. Firstly, many natural environmental variables also modify community structure and it has not always been easy to separate these from anthropogenic effects. Secondly, studies of this kind are highly labour intensive and cannot readily be translated to regions of the world where the fauna is poorly known and a high level of taxonomic expertise is lacking. Thirdly, not enough effort has been made to identify predictable responses to pollution in other components of the benthic system such as the meiofauna (metazoans retained on a 63 μm sieve) or the

microbial community (passing through the 63 μm sieve), or even to examine attributes of macrobenthic community structure other than species abundance.

The aim of the GEEP Workshop was to examine, compare and evaluate as wide a range as possible of both traditional and newly developed techniques for determining pollution effects on all components of the benthos, in an attempt to develop suitable protocols. The robustness of these techniques to levels of taxonomic discrimination lower than that of species has also been investigated, in order to increase their cost-effectiveness and their utility for worldwide application.

The community studies, as with those of individual organisms, had 2 major elements. Field samples were taken from a series of sublittoral soft-sediment stations in Frierfjord and Langesundfjord, Norway, along a putative pollution gradient. The biological components were mainly analysed before the workshop; macrofauna in Oslo (Norway), meiofauna in Gent (Belgium) and microbes in Dartmouth (Canada). Activity during the workshop and subsequent to it was mainly concerned with data analysis. A mesocosm study involved the transplantation of large boxes of undisturbed sediment from a sublittoral site at Bjørnødet Bay, and these were subjected to 3 levels of pollutant contamination. Again, the biological components were analysed prior to the workshop, in the same laboratories for the macrofauna and microbes, but in Plymouth (England) for the meiofauna.

LITERATURE CITED

- McIntyre, A. D. (1984). What happened to biological effects monitoring? *Mar. Pollut. Bull.* 15: 391–392