Calculation of species sensitivity values and their precision in marine benthic faunal quality indices

Kjell Leonardsson, Mats Blomqvist, Marina Magnusson, Andreas Wikström and Rutger Rosenberg

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English summary

One of the most challenging aspects of benthic quality indices used for assessing the marine environment has been to compile reliable measures of the species' sensitivity and tolerance to various magnitudes and different kinds of disturbances. Empirically derived sensitivity values can be assigned explicit uncertainties, but a problem to cope with in such analyses is that the origin of the samples, from disturbed or undisturbed environments, will affect the result.

Here we present a method to calculate sensitivity values based on samples from disturbed and undisturbed areas by creating an artificial disturbance gradient, from low to high proportion of samples from disturbed areas. Stratified random sampling was applied at different proportions among the samples from the disturbed and the undisturbed areas. Sensitivity values were calculated for each proportion of disturbed samples, and the sensitivity value with the lowest uncertainty among the values in a range from the lowest to one unit above the lowest was adopted as the final sensitivity value.

There were three different types of responses in the calculated sensitivity values along the “artificial” disturbance gradient. The three types were; decreasing, more or less constant, and increasing sensitivity values with increasing degree of disturbance. Therefore, analyzing all samples without stratification will not necessarily result in the lowest sensitivity values for all species.

The analyses of the uncertainties indicated that the accuracy rather than the precision in the sensitivity values might be a concern. The accuracy is difficult to measure, but we suggest a method to sort out species for which the uncertainty is outside predefined limits as a precaution to prevent bias in the status classification.