

DERIVING SEDIMENT QUALITY STANDARDS FROM FIELD-BASED SPECIES SENSITIVITY DISTRIBUTIONS

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The determination of predicted no effect concentrations (PNECs) of toxic chemicals in marine water and sediment (= water or sediment quality standards), is extremely important in ecological risk assessments (ERAs). The current method in deriving PNECs is primarily based on laboratory eco-toxicity bioassays which have several shortcomings: 1) chemicals are usually tested singly, whereas in the environment, chemicals may interact, so that estimates of effects of complex mixtures under field conditions are arguably only partially predictable; 2) test species are often not ecologically relevant; and 3) most current data are derived from freshwater systems, with few data available for saltwater and marine sediment. Consequently, marine PNECs have been derived from freshwater data by applying unrealistically large safety factors and this leads to 'overprotection'. This study, for the first time, has explored the possibility of utilising field data of benthic communities and pollutant loadings in sediment samples collected from Norwegian waters (North Sea). This unique dataset contains abundance data for ca. 2900 species in over 2300 stations, along with co-occurring concentration data for > 25 substances. In this paper, we will describe a novel approach that makes use of these data for constructing field-based species sensitivity distributions (FSSDs) for target chemicals, from which field-based PNECs are derived based on the HC5 values (hazardous concentration for 5% of species or the 95% protection level). Our results indicate that this new approach is more environmentally realistic. The merits and problems of this new approach will be discussed with special reference to marine ERAs.