



The interaction between physical disturbance and organic enrichment: An important element in structuring benthic communities

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ABSTRACT: The interaction between physical disturbance and organic enrichment, with respect to its effect on the diversity and community structure of a macroinfaunal assemblage, has been examined in a benthic mesocosm experiment. The experiment was conducted at the Solbergstrand mesocosm (Norwegian Institute for Water Research) using subtidal sediment collected from Bjørnhordenbukta, a small sheltered bay in Oslofjord. Ninety-eight areas of homogenized sediment were subjected to one of seven levels of organic enrichment, combined with one of seven different frequencies of physical disturbance, each replicated once. This structured matrix of physical disturbance and organic enrichment treatments demonstrated the combined effects of these factors to be nonadditive. Diversity was lower than expected when low frequencies of physical disturbance acted in conjunction with high levels of organic enrichment or when high frequencies of physical disturbance were combined with low levels of organic enrichment. Diversity was higher than expected when both disturbance and enrichment were either high or low. The implications of this interaction between physical disturbance and organic enrichment for the application of the dynamic equilibrium model (Huston 1979) to sediment communities are discussed. Multivariate analysis also showed community structure to be significantly affected by physical disturbance, organic enrichment, and interactions between the two. It is concluded that strong interactions between physical disturbance and organic enrichment, coupled with both small- and large-scale variability in these factors, could promote heterogeneity and diversity in benthic infaunal assemblages. However, this remains to be tested in field conditions. Additionally, interactions between physical disturbance and organic enrichment may have important implications for matters of coastal zone management.

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