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# Lecture Notes in Earth Sciences

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Contaminated Sediments



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## 1. INTRODUCTION

Sediments are increasingly recognized as both a **carrier** and a possible **source of contaminants** in aquatic systems, and these materials may also affect groundwater quality and agricultural products when disposed on land. Contaminants are not necessarily fixed permanently by the sediment, but may be recycled via biological and chemical agents both within the sedimentary compartment and the water column. Bioaccumulation and food chain transfer may be strongly affected by sediment-associated proportions of pollutants. Benthic organisms, in particular, have direct contact with sediment, and the contaminant level in the sediment may have greater impact on their survival than do aqueous concentrations. Following the findings of positive correlations between liver lesions in English Sole and concentrations of certain aromatic hydrocarbons in Puget Sound (Washington) sediment, it can be suspected that such substrates may also be responsible for a host of other serious and presently unrecognized changes at both the organismal and ecosystem levels (Malins *et al.*, 1984).

Modern research on particle-bound contaminants probably originated with the idea that sediments reflect the biological, chemical and physical conditions in a water body (Züllig, 1956). Based on this concept the **historical evolution** of limnological parameters could be traced back from the study of vertical sediment profiles. In fact, already early in this century Nipkow (1920) suggested that the alternative sequence of layers in a sediment core from Lake Zürich might be related to variations in the trophic status of the lake system. During the following decades of limnological research on **eutrophication problems** sediment aspects were playing only a marginal role, until it was recognized that recycling from bottom deposits can be a significant factor in the nutrient budget of an aquatic system. Similarly, in the next global environmental issue, the **acidification** of inland waters sediment-related research only became gradually involved. Here too, it is now accepted that particle-interactions can affect aquatic ecosystems, e.g. by enhancing the mobility of toxic metals.