

Water Quality Assessments

A guide to the use of biota, sediments and water in environmental monitoring

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THE USE OF PARTICULATE MATERIAL

4.1 Introduction

The first edition of this guidebook *Water Quality Surveys. A Guide for the Collection and Interpretation of Water Quality Data* (UNESCO/WHO, 1978) did not include a chapter on the assessment of sediments. Brief mention of sediment was made in the two chapters on rivers and lakes, but these remarks were confined to simple statements on physical transport, sorting and deposition. However, since 1978 much new information has been published on the role of particulates in the uptake, release and transport of pollutants, as well as sediment-bound nutrient and contaminant interactions with water and biota, in the aquatic environment. Assessment of the literature on sediments clearly reveals the prominent role that they play in elemental cycling and this has been utilised to great effect in both environmental monitoring and assessment. For this reason, a separate chapter on this topic is essential to provide the basic background and understanding needed to interpret accurately data derived from sediment sampling programmes. More detailed information is available in Golterman *et al.* (1983), Håkanson and Jansson (1983) and Salomons and Förstner (1984).

It is common practice to accept, as an operational definition, that particulate matter (PM) refers to particles greater than $0.45 \mu\text{m}$. By this definition dissolved matter includes particles finer than $0.45 \mu\text{m}$, including colloids. Particulate matter is derived primarily from rock weathering processes, both physical and chemical, and may be further modified by soil-forming processes. Erosion subsequently transfers the sediments or soil particles from their point of origin into freshwater systems. During transport, the sediment is sorted into different size ranges and associated mineral fractions until it is deposited on the bottom of the receiving water body. Sediment may then be resuspended, and transported further afield, by intermittent storm activity until it comes to its ultimate resting point or *sink*, where active sediment accumulation occurs. Modification of the composition of sediments may occur as a result of the input of autochthonous organic, and inorganic, particles (e.g., calcite, iron hydroxides) generated in the water column and by chemical alterations, especially during periods of deposition.

Particle size and mineralogy are directly related because individual minerals tend to form within characteristic size ranges. Sediments may

**This chapter was prepared by R. Thomas and M. Meybeck*