



THE CONTRIBUTION OF SEDIMENTS TO PHOSPHORUS CYCLING IN AN ESTUARINE SYSTEM, THE SCHELDT (BELGIUM AND THE NETHERLANDS)

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Eutrophication in the coastal zone is influenced by nutrient fluxes (N, P, Si) from continental systems. In estuarine environments, the sediment compartment might play a major role in the phosphorus cycle because it can act as source/sink of phosphorus. Burial of mineral phases in sediments represents a major P sink, while dissolution may act as a source. Reductive dissolution and microprobe analyses of intertidal sediments deposited in the upper freshwater part of the eutrophic Scheldt estuary (Belgium and the Netherlands) reveal the existence of a phosphorus/ferric iron rich discrete phase characterized by a Fe/P ratio of 0.7. This phase is found at all depths sampled (0–50 cm) and exhibits a remarkably uniform composition and chemical reactivity. On average it accounts for 87% of total sedimentary P. Persistence at depth of the phase reflects the absence of significant bacterial sulphate reduction in the freshwater sediments. In contrast, in intertidal sediments of the brackish middle estuary, phosphorus-rich iron oxides are reduced by sulphide and are absent below 20 cm depth. Thus sediments in the upper estuary may act as a sink for reactive phosphorus. This sink is limited further downstream because of increased availability of sulphate.