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Phosphorus Mobility in Lake Sediments

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For a long time that phosphorus release in sediments has been almost exclusively related with the absence of oxygen in the hypolimnium. This paradigm was firstly stated with the pioneer work of Einsele (in 1936) and Mortimer (in 1941), demonstrating the relation between the reduction of Fe (III) and phosphorus release, in anoxic sediments.

Although the theoretical statements matched the practical findings, these could not be generalized since several field observations and laboratory experiments lead to other conclusions. In fact, according to this paradigm, restoration measures were applied using hypolimnetic aeration, but with few or no results in eutrophication control. This acquired experience as lead to a need of deeper understanding of factors that influence the phosphorus mobility, leaving the old paradigm applicable only in special cases. Enumerating some of the factors, studies have shown that phosphorus release is largely influenced by the phosphorus retention capacity of the lake due to the sediments' geochemical characteristics. The presence of metallic oxides and hydroxides (specifically of aluminium and iron) in the sediment structure enhance retention, even in anoxic conditions. Phosphorus can also be released by microbial mediation in processes like organic matter mineralization, iron and sulphate reduction.

Bacteria can also impel a pH and redox variation that consequently leads to geochemical change liberating phosphorus. In the other hand, some bacteria have the capability of storing phosphorus. A review of these processes drives to a better understanding of factors that controls phosphorus mobility in natural waters.