Deliverable 2.1: Framework to select indicators of multi-stressor effects for European river basin management

MARS
PROJECT

Managing Aquatic
ecosystems and
water Resources
under multiple Stress

BInd09: Chlorophyll-a to total phosphorus ratio (Chl:TP)

Quality element: Physico-chemistry & phytoplankton

Water category and water body types: Lakes, large rivers, transitional waters; all types

Selection rationale: Simple measure of production efficiency

Indicator type (DPSIR): State

Description: The correlation of total phosphorus and chlorophyll-a is one of the best-communicated relationships in aquatic ecology. However, several factors can confound the response of surface waters to reductions in total phosphorus: zooplankton grazing, internal P-loading, climate and nitrogen limitation. Variation in the Chl:TP ratio can be used to infer the likely response of phytoplankton following phosphorus reduction. If the Chl:TP ratio is low (i.e. low amount of chlorophyll-a per unit of TP), it is likely that factors other than phosphorus availability are limiting phytoplankton productivity. Water bodies with a low Chl:TP ratio are less likely to respond to reductions in TP concentrations compared to water bodies with a high Chl:TP ratio (i.e. high TP to Chlorophyll-a transfer efficiency).

Spatio-temporal scale:

Chlorophyll-a: Growing season mean, representative for water body

Phosphorus: Annual mean, representative for water body

Unit: none

Standardisation: none

Data requirements: Field data

Other: none

MARS spatial scale: Experimental, river-basin and European scale

Reference

Spears, B. M., Carvalho, L., Dudley, B., & May, L. (2013). Variation in chlorophyll a to total phosphorus ratio across 94 UK and Irish lakes: Implications for lake management. Journal of Environmental Management, 115, 287–294.