

INTEGRATED APPROACH FOR FAST CHARACTERIZATION OF EUTROPHIC LAKE QUALITY (WATER AND SEDIMENTS)

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Currently, more and more lakes are experiencing an accelerated degradation of water quality due to the impact of anthropic factors. This evolution of the lakes towards an eutrophication state is more and more linked to algae bloom (presence of cyanobacteria). Cyanobacteria or blue-green algae are microscopic organisms which are likely to produce toxins called cyanotoxins. The main trigger is the phosphate content of water, but sediments quality has also a great influence on water quality. Indeed, they can trap and store organic or inorganic substances, among which some nutrients like phosphorus. These substances and their by products can be released in water thanks to organic matter transformation processes.

Water quality monitoring of lakes is thus important but difficult to carry out. The available tools based primarily on sampling and laboratory analysis are not adapted to the needs, particularly because of the time needed for getting results and of the cost of analysis limiting the number of parameters measured. Therefore, the objective of this study is to develop alternative (simple and cost effective) procedures and monitoring systems of water and sediments quality of eutrophic lakes. These developments allow the quick detection and/or the identification of contamination of these lakes with an integrated approach.

The following methods has been developed and applied for the diagnosis of the lakes status by the characterization of water and sediments quality:

- UV-visible spectrophotometry for qualitative and quantitative characterization of organic matter of sediments after extractions. The spectra acquisition is carried out between 200 and 350 nm for aqueous extracts (soluble compounds), and between 200 and 700 nm for sodium hydroxide extracts (humic substances) and acetonitrile extracts (anthropic organic matter and specific compounds).
- ELISA tests (Enzyme Linked ImmunoSorbent Assay) for the identification and the quantification of cyanotoxines, (equivalent to Microcystins LR). This type of test is sensitive and allows a faster response compared to the use of the standardized methods.

The procedure has been applied for several lakes of Southern Quebec (Canada). Among which a hyper-eutrophic one with a proliferation of cyanobacteria and an important accumulation of sediments. This study shows the interest in using fast systems and environmental control procedures particular to aquatic environment, and especially in this context of urgency for cyanobacteria monitoring in eutrophic lakes.

KEYWORDS

Eutrophic lake, water and sediment quality monitoring, UV-visible spectrophotometry, Microcystins LR quantification, ELISA tests