Special Management Actions Needed for Naturally Eutrophic Lakes

New research assessed current water quality in lakes with a naturally high nutrient status in Finland and estimated their change over time due to human activity. The results suggest that this particular type of lakes may require special management actions to fulfill the new requirements of the EU Water Framework Directive.

The deterioration of the water quality in lakes and rivers has been one of the most concerning environmental problems since industrialization. The implementation of the recent EU Water Framework Directive (WFD) will lead to several changes in water management and monitoring strategies as it aims at achieving a good chemical and ecological status for all lakes and rivers in Europe by the year 2015. To that end, lakes must be identified and typified by each member state, and the reference conditions (lake’s status before human activities’ influence) for each lake type must be defined. Management decisions will be based on these reference conditions. Naturally eutrophic lakes are those considered to have a naturally high nutrient status (high concentrations of nitrogen and/or phosphorus). These type of lakes represent a special challenge because not much is known about the typical biological communities or nutrient levels in these lakes in their near-pristine conditions. For water management, conservation, and restoration under the WFD, how can we define the reference conditions for lakes that have been naturally eutrophic? How much have they changed due to anthropogenic activities? How can we set the targets to fulfill the new requirements for them? Methods need to be tested in order to achieve reliable assessment of lake background conditions and water quality.

A team of Finnish scientists has recently examined 10 lakes in Finland presumed to be naturally eutrophic in order to assess their reference conditions and to estimate their change over time resulting from human activity. The scientists used sediment-based methods to assess the current and natural status of the lakes. Specifically, they analysed diatom (microscopic algae) samples from the surface sediment to estimate the current water quality and diatom samples from the deeper sediments to assess the past water quality. They reconstructed past total phosphorus concentration and assessed the grade of eutrophication.

The results of the current study suggest that all the lakes studied had been nutrient-rich before the influence of modern agriculture. However, the diatom analysis showed that total phosphorus concentrations have generally increased over time due to human disturbances, except for two lakes that were close to their natural status. The authors also found that other factors in addition to nutrients affect the diatom populations, such as lake depth and morphology, and so they should be considered when assessing water quality in lakes. There is a group of diatoms that clearly belongs to lake ecosystems that suffer from anthropogenic eutrophication (D. tenuis and S. parvus), but no species indicate the pure reference conditions.

The authors concluded that most of the naturally eutrophic lakes may require some management actions in order to fulfill the WFD requirements by 2015. However, they argued that when defining the reference conditions for naturally eutrophic lakes, it would be necessary to examine the particular characteristics of each lake because of the heterogeneity of this lake group even in its natural state. The results of the study also confirm that sediment-based techniques are powerful tools to assess the reference conditions and ecological quality status in surface waters.


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