

Evidence

Assessment of sediment phosphorus capping to control nutrient concentrations in English lakes

Project summary SC120064/R9

This project investigated the effectiveness of a technique for stopping the release of phosphorus from lake sediments. If successful, this could accelerate the ecological recovery of lakes with excessive nutrients and help to restore fish and wildlife populations.

Lake treatment

Eutrophication in lakes, caused by high nutrient inputs (particularly phosphorus), is a harmful imbalance in the ecology which can include, for example, excessive growth of algae. This may harm fish and other wildlife, and degrade clean water supplies for drinking or industrial use. Controlling phosphorus flowing into lakes should allow ecological recovery, but there is often a substantial time lag before improvements are observed, due to the release of “legacy” phosphorus from lake sediments. Reducing this internal sediment load should promote a more rapid recovery.

Two lakes in Cheshire, Hatchmere and Mere Mere, were treated to assess the effectiveness of controlling internal phosphorus load by applying the product Phoslock®. This is a material which is spread over the lake and binds phosphorus in the sediment, preventing its release into the water. Phoslock® is otherwise inert. Before and after the treatment the Environment Agency and the Centre for Ecology and Hydrology (CEH) carried out detailed monitoring to evaluate the chemical and ecological responses in the two lakes, including ecological indicators which are reported for the Water Framework Directive.

Results

The results showed that total water column concentrations of phosphorus were reduced for up to 2 years following application. Reductions in bottom water phosphate concentrations and shifts in sediment phosphorus pools also indicated a reduction in internal phosphorus loading. However, the applications of Phoslock® were not sufficient to fully control sediment phosphorus release and the external phosphorus load from the lake catchments remained unexpectedly high. As a result the desired responses in water quality and ecology were not observed.

Conclusions

The project has delivered detailed evidence on a method to control internal lake phosphorus loading to reverse eutrophication and has furthered our understanding of the factors likely to affect the success of sediment capping techniques. The limited benefits in this trial indicate that the complex nature of lake ecosystems and the multiple pressures acting on them may make it unlikely that any single measure will be sufficient to restore the ecology of many lakes. Site-specific studies of any lakes proposed for this type of treatment are essential.

The results of the study will be useful to staff in the Environment Agency and other bodies concerned with lake restoration projects across the UK.

This summary relates to information from project SC120064, reported in detail in the following output:

Report: SC120064/R9

Title: Assessment of sediment phosphorus capping to control nutrient concentrations in English lakes.

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