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Whole Lake Experiments to Control Harmful Algal Blooms in Multi-Use Watersheds

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Abstract Text:

This study involves experimental manipulation of impoundments that were built originally for hydroelectric power generation along the Huron River of southeastern Michigan. Through partnerships with citizen advisory committees and municipal governing boards, we have been able to conduct whole lake experiments within an urbanized environment that are aimed at reducing or eliminating dense summer aggregations of nuisance and toxic cyanobacteria, primarily Aphanizomenon and Microcystis. During summer 2006, we altered discharge characteristics at an outlet dam, triggering an August diatom bloom rather than the usual cyanobacteria. During summer 2007, we used new technology to deliver supersaturated oxygen to the hypolimnion. X-ray fluorescence spectroscopy of the surface sediments and experiments with sediment cores reveal that phosphorus release is principally under control of ferric hydroxide and redox chemistry. A simple box model has been developed that adequately mimics oxygen dynamics in the hypolimnion and which can be used with real-time data from in situ instruments to make adaptive management decisions.

Impact Statement:

Whole-lake experiments conformed to numerical model predictions that hypolimnetic discharge of about 300,000 cubic meters per day is needed to prevent anoxia. Using this approach we were able to destabilize the water column and trigger a bloom of the diatom Aulacoseira rather than the usual cyanobacteria, until the lake was virtually depleted of soluble silica.