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Landscape scale risk assessment of cyanobacteria blooms in California lakes

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Abstract

Habitat and water quality restoration projects are commonly used to enhance coastal resources or mitigate negative impacts of water quality stressors. Significant financial resources have been contributed for restoration projects, yet much less attention has focused on evaluating the outcomes beyond site-specific assessments. Collaboration among researchers to synthesize restoration and water quality data across different spatiotemporal scales is also challenging using conventional methods that lack efficiency, transparency, and reproducibility. This study used open science tools to evaluate multiple datasets in the Tampa Bay area to identify 1) types of restoration projects that produce the greatest improvements in water quality, and 2) which time frames and synergistic effects of projects are most relevant for having the largest perceived benefits. Changes in chlorophyll concentrations as a proxy of eutrophication were used to assign a probabilistic expectation of water quality changes from investments in restoration activities. Water infrastructure projects to control point sources of nutrient loading into the bay were associated with the highest likelihood of chlorophyll reduction, particularly for projects occurring prior to 1994. Habitat restoration projects were also associated with reductions in chlorophyll, although the likelihood of reductions from the cumulative effects of these projects were less than those from infrastructure improvements. We will also demonstrate how open science tools facilitated collaboration between the authors, and more importantly, how the open science workflow will enable application of our analysis to other scenarios.