



Coincident patterns of waste water suspended solids reduction, water transparency increase and chlorophyll decline in Narragansett Bay

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Highlights

- A 75% reduction in WWTP solids loading to Narragansett Bay was documented.
- Reduced TSS loading resulted in clearer water and increased *in situ* light.
- A phytoplankton growth model was applied to estimate changes in chlorophyll.

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Highlights

Abstract

Keywords

1. Introduction

2. Methods

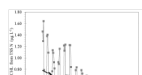
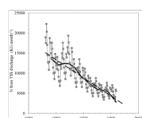
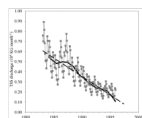
3. Results

4. Discussion

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References

Figures and tables

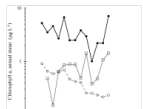
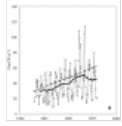
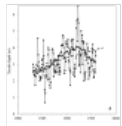
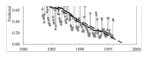


Abstract

Dramatic changes occurred in Narragansett Bay during the 1980s: water clarity increased, while phytoplankton abundance and chlorophyll concentration decreased. We examine how changes in total suspended solids (TSS) loading from wastewater treatment plants may have influenced this decline in phytoplankton chlorophyll. TSS loading, light and phytoplankton observations were compiled and a light- and temperature-dependent *Skeletonema*-based phytoplankton growth model was applied to evaluate chlorophyll supported by TSS nitrogen during 1983–1995. TSS loading declined 75% from $\sim 0.60 \times 10^6 \text{ kg month}^{-1}$ to $\sim 0.15 \times 10^6 \text{ kg month}^{-1}$ during 1983–1995. Model results indicate that nitrogen reduction related to TSS reduction was minor and explained a small fraction ($\sim 15\%$) of the long-term chlorophyll decline. The decline in NBay TSS loading appears to have increased water clarity and *in situ* irradiance and contributed to the long-term chlorophyll decline by inducing a physiological response of a $\sim 20\%$ reduction in chlorophyll per cell.

Keywords

Chlorophyll; Water clarity; Oligotrophication; *Skeletonema*; Narragansett Bay; Nutrient loading; Suspended solids



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