DRIVERS OF HARMFUL ALGAL BLOOMS

The contribution of volunteer-based monitoring data to the assessment of harmful phytoplankton blooms in Brazilian urban streams

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In this study, data collected by volunteers (n=117) were combined with laboratory analysis by scientists at the University of Sao Paulo to identify the causes of the harmful phytoplankton blooms in 64 Brazilian urban streams. Results reinforced the need for a more focused nutrient management and ecological restoration of local streams. The study highlights the benefits of citizen science to support monitoring and decision-making. *Cunha et al. (2017) Sci Total Environ. 584-585:586-594*

Aims

The study compared qualitative and quantitative data gathered by volunteers in 64 urban streams in Brazil with information about the phytoplankton communities present in the same streams,

- to help identify potential drivers of harmful algal blooms
- to estimate the thresholds at which the density of harmful algal species of cyanobacteria reached elevated levels.

Approach

The research took place in three highly urbanized Brazilian cities: Curitiba, São Paulo and Rio de Janeiro between 2013 and 2016.

Citizen scientists, after having received training by local scientists and learning experts made measurements of water quality (nitrate, phosphate, turbidity) and environmental conditions (land use, pollution sources) and took water samples for phytoplankton density and community. Scientists at the BIOTACE Laboratory analysed these samples to determine species and community density.

Statistical tests were used to identify correlations between nutrients, turbidity and phytoplankton.

Impacts

The results of this study provide an information basis for the management of urban streams in Brazil to reduce the risk of harmful algal blooms. In addition to the impact of nutrients, in particular phosphate, key drivers related to the absence of riparian vegetation and the presence of small local pollution sources was shown to be highly important.
The association of citizen science monitoring with regular professional activities showed clear benefits to environmental management.

Key results

- Data from Brazilian urban streams were successfully collected by trained volunteers.
- High nutrient and turbidity levels were observed in many streams.
- Phytoplankton densities were associated to streams with high phosphate (not nitrate) concentrations.
- Nutrient thresholds for Cyanobacteria blooms were established based on volunteers' data.
- Volunteer observational data, especially pollution sources and riparian vegetation showed relationships to phytoplankton abundance and water turbidity.
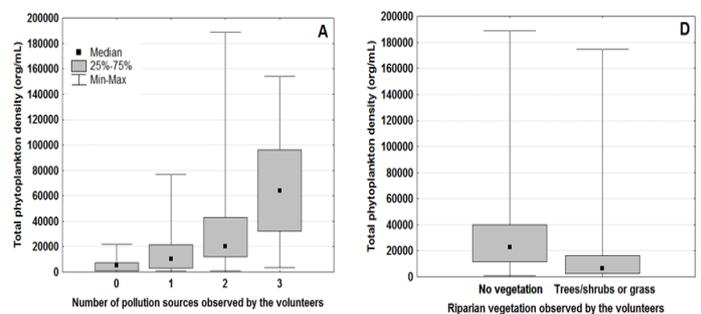
Boxplots of A) number of pollution sources and total phytoplankton density (cells/mL); D) presence or absence of riparian vegetation and total phytoplankton density (cells/mL).