# Using Citizen Based Science to Provide Insights on Toxic Cyanobacteria Blooms in a New York Lake

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Cayuga Lake (NY, USA) has seen highly toxic blooms of cyanobacteria (HABS) each summer since 2017, following a year of record drought (2016). Blooms were rare and not notably toxic before then. Could these blooms be related to climate-driven changes in nutrient loading? To address this, we examined long-term trends in N and P loads. Both nutrients may be important for toxic blooms in Cayuga Lake: the lake is strongly P-limited, but N may increase toxin production and reduce zooplankton grazing, leading to larger and longer blooms. We examined nutrient inputs from two rivers with watersheds varying in agricultural intensity, using monitoring data from a program initiated in 2002 by the Community Science Institute (CSI) that relies on citizen volunteers for sampling and runs an EPA-certified lab for chemical analyses. Total P inputs from both rivers were similar and have decreased over time, while inorganic N inputs were far higher from the watershed with more agriculture. Annual average inputs of inorganic N showed little change over time, but summer-time fluxes were much greater in 2017 than in 2016 and other prior dry years. We see strong evidence of this “whiplash effect” for both inorganic N and P, with storage in the watershed in dry years leading to high exports in subsequent wet years. This analysis would not be possible without the long-term data of the CSI program. Citizen science-based organizations like CSI can provide valuable data at relatively low cost.