Small urban reservoirs as archives of recent environmental change: San Francisco Bay Area, CA

LAURA K. RADEMACHER[1] AND KRISTINA L. FAUL[2]

[1]Department of Earth and Environmental Sciences, University of the Pacific, Stockton, CA 95211
lrademacher@pacific.edu

[2]Chemistry Department, Mills College, Oakland, CA 94613
kfaul@mills.edu

Urban lakes remain relatively understudied despite their important role in nutrient, carbon, and metal cycling. However, the management of these urban lakes, in particular small upstream reservoirs, has the potential to improve watershed water quality. We investigated sediment records from three urban reservoirs from the San Francisco Bay Area, CA to develop records of environmental change and the influence of various management strategies.

The three study reservoirs reflect very different watershed land uses and lake management strategies. Lake Aliso is intermittently full, primarily residential, with the additonal influence of acid mine drainage from an inactive sulfur mine. Lake Don Castro is continuously full and heavily influenced by the confluence of major freeways. Lake Anza is continually full and primarily urban parkland and provides a control.

We established water quality monitoring in all three of the study watersheds, which includes tributary and outlet sampling and in lake depth profile measurements of temperature, pH, conductivity, and dissolved oxygen. Additionally, samples are collected for laboratory general chemical and trace element analysis. We utilize the watershed monitoring as calibration points for the sediment cores collected from each reservoir.

Two vibracores were collected from each reservoir to reconstruct the historical changes in the watershed since the dam installations (~ 100 years ago). We analyzed sediment for Pb-210 to provide an age model for the sediment. In addition, we analyzed the sediment for C and N isotope ratios, as well as metal abundances using scanning x-ray flouresence.

C and N isotopes in combination with C/N ratios suggest mixing between lake-derived and terrestrially derived organic matter with a growing influence of lake derived (algal) carbon more recently. Lakes exhibit frequent oscillations in metal abundances, however, total abundances and the nature of variations vary between lakes. These geochemical variations are likely related to management practices, which control the prevailing hydrologic and redox conditions.