

Molecular Fingerprints

Distinguishing "legacy" versus newly contaminated sediments in New York/New Jersey waterways

By Dr. Michael Kruge

As a result of decades of heavy industrial activity, major waterways in the New York/New Jersey area bear a legacy of contaminated sediments. Although many industries in the region ceased operation years ago, contaminants that they discharged remain. In addition, urban runoff, atmospheric deposition of soot and sewage system overflows during storms provide ongoing sources of pollutants.

These pollutants constitute a cause for concern if, for example, people consume contaminated fish or shellfish caught in these waters. The chronically hazardous conditions distress local residents and impede economic development in the vicinity. Proposed remedial measures remain controversial, elusive and extraordinarily expensive.



Dr. Michael Kruge (pictured above) and a group of faculty and students have been studying two of the most severely impacted local waterways: the Gowanus Canal in Brooklyn, N.Y. and the lower Passaic River in northeastern New Jersey. The extremely high levels of pollution in the Gowanus Canal provoked the U. S. Environmental Protection Agency (EPA) to declare it a Superfund site in 2010, a designation reserved for the worst cases of pollution in the country. Similarly, a portion of the Passaic River near Newark's Ironbound district was also placed on the Superfund list.

Montclair State University students, along with faculty and staff members, have been conducting chemical analyses of sediments collected in both waterways, characterizing the principal organic pollutants in the sediments on the molecular level. These include petroleum, polycyclic aromatic hydrocarbons (PAHs) and compounds indicative of sewage input.

This environmental forensic approach is, in effect, molecular "fingerprinting" of the mixtures of contaminants found at various sites in the waterways. This permits distinguishing between the "legacy" contaminants emplaced decades ago and chemically-distinctive continuing inputs such as sewage discharges. Kruge's team has concluded that even if all presently contaminated sediments were removed by dredging, recontamination would continue to plague these waterways.



Top: the lower Passaic River in northeastern New Jersey and, bottom, the Gowanus Canal in Brooklyn, N.Y. In March 2010, the EPA added the Gowanus Canal to the Superfund National Priorities List, and a portion of the Passaic River near Newark's Ironbound District was also placed on the Superfund list.

PARTICIPANTS

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