

Sources of pollution in waterways

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Polycyclic aromatic hydrocarbons (PAHs) are components of petroleum products such as gasoline, coal, and oil. They are also produced as by-products of the combustion of fuels including petroleum and fire wood. PAHs can cause cancer and other health effects. Because they are produced during combustion, they are ubiquitous, and their levels are high enough to be a concern in all urban waterways. However, because there are so many potential sources of PAHs in the environment, it is not clear which of these sources are most responsible for the contamination in the water. Knowing what the major sources are would help states formulate more effective strategies to control them.

A group of scientist funded by the New York Academy of Sciences undertook an extensive review of the possible sources of PAHs to the New York/New Jersey Harbor. They estimated the input magnitude of 10 individual PAH compounds to the harbor from tributaries, atmospheric deposition, [wastewater treatment plant](#) discharges, combined sewer overflows, and storm [water runoff](#). They also estimated the amount of these PAHs removed from the harbor by tidal exchange between the harbor and the coastal ocean and Long Island Sound, volatilization into the atmosphere, and accumulation or burial of sediment-bound PAHs at the bottom of the harbor. Results from the study were published in the March-April 2010 issue of the [Journal of Environmental Quality](#).

The authors primarily relied on data on PAH concentrations in wastewater treatment plant discharges, combined sewer overflows, storm water runoff , and the water column of the New York/New Jersey

Harbor collected by the Contaminant Assessment and Reduction Project (funded by the Port Authority of New York/New Jersey). They also used data from the USEPA's Regional Environmental Monitoring and Assessment Program (REMAP), and from the New Jersey Atmospheric Deposition Network, which is run by one of the authors (Lisa Rodenburg) and was funded by the NJ Department of Environmental Protection. These data sets were collected during 1998 to 2002, so the study represents a snapshot of the harbor at that time.

The results showed that storm water runoff was the main pathway for inputs of all PAHs into the harbor, contributing about half the total load. Deposition from the atmosphere directly to the harbor surface was found to be important for the smaller PAH compounds. By estimating both the loads and losses, the scientists determined that PAH levels in the harbor are remaining steady; that is, the loads are roughly balanced by the losses, so no accumulation is occurring over time. The study also identified some gaps in the data that made it difficult to construct accurate estimates of loads and losses. These data gaps primarily concerned storm water runoff and combined sewer overflows. For both of these sources, more information is needed on both PAH concentrations and the magnitude of the flows themselves.

"This is the first time that we have been able to demonstrate just how important storm water runoff is in terms of contributing pollution to the New York/New Jersey Harbor. And since the harbor is pretty typical of urban waterways, our conclusions probably apply to most other cities in the United States and across the globe," says Lisa Rodenburg, who coauthored the study. The results of the study suggest that municipalities that want to reduce PAH levels in their waterways will have to develop storm water management plans to control the amount of storm water runoff entering their waters and to remove sediment from the runoff that carries PAHs.

More information: View the abstract at
jeq.scijournals.org/cgi/content/abstract/39/2/642

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