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Watershed-based sources of polycyclic aromatic hydrocarbons in urban stormwater

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ABSTRACT

Previous studies have documented that polycyclic aromatic hydrocarbons (PAHs) from urban runoff accumulate in coastal estuarine and marine sediments. However, little is known about the sources and temporal patterns of PAH loading from stormwater. This study characterized the sources and temporal patterns of PAHs in urban stormwater by analyzing PAH concentrations and loads from a range of homogenous land use sites and in-river mass emission sites throughout the greater Los Angeles, California, USA region. Samples were collected at 30 to 60 min intervals over the course of a storm during multiple storm events over a four-year period. Polycyclic aromatic hydrocarbon storm fluxes ranged from 1.3 g/km² for the largely undeveloped Arroyo Sequit watershed to 223.7 g/km² for the highly urbanized Verdugo Wash watershed, with average storm fluxes being 46 times higher in developed versus undeveloped watersheds. The magnitude of PAH loading was affected more by the period of the storm season than by the size of the storm. Early season storms repeatedly produced substantially higher loads than comparably sized late-season storms, and loading was not correlated with storm size. Within individual storms, PAHs exhibited a moderate first flush with between 30 and 60% of the total PAH load being discharged in the first 20% of the storm volume. The relative distribution of individual PAHs demonstrated a consistent predominance of high molecular weight compounds indicative of pyrogenic sources. The results of this study indicate that aerial deposition of combustion by-products is likely the dominant source of PAHs in the watersheds that drain to the greater Los Angeles coastal region, and this source is consistent during all portions of stormwater runoff.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2005_06AnnualReport/AR0506_033-50.pdf