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The occurrence and fate of chemicals of emerging concern (CECs) in coastal urban rivers receiving discharge of treated municipal wastewater effluent

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ABSTRACT

To characterize the occurrence and fate of chemicals of emerging concern (CECs) in two effluent-dominated rivers in Southern California, USA, water samples were collected during low-flow conditions above and below discharges of water reclamation plants (WRPs), and screened for more than 60 pharmaceuticals and personal care products (PPCPs), commercial/household chemicals, current use pesticides and hormones. Approximately 50% of targeted CECs were detectable at stations downstream from WRPs, compared to <31 and <10% for stations above the WRPs for the Los Angeles River (LAR) and the San Gabriel River (SGR), respectively. Chlorinated phosphate flame-retardants were detected at the highest concentrations, with a mean total aggregate concentration of TCEP, TCPP, and TDCPP of 3400 and 2400 ng/L for the two rivers examined. Maximum instream concentrations of bifenthrin, diclofenac, galaxolide, and permethrin exceeded risk-based thresholds established by an expert panel to identify CECs for monitoring in receiving waters. In contrast, concentrations of PPCPs commonly detected in treated wastewater (e.g., acetaminophen, DEET, and gemfibrozil) were less than 10% of established thresholds. Attenuation of CECs was not observed downstream of WRP discharge, due in part to the short hydraulic residence times in these highly channelized systems (<3 days). These results will inform the selection of CECs for future WRP effluent and instream monitoring in semi-arid, effluent-dominated systems, as well as assessment of mass loading for terminal water bodies at the bottom of these watersheds.

Full Text

http://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2013AnnualReport/ar13_013_025.pdf