

Antibiotics in the surface water and sediment from the tributaries of the Xiaoqing River, China: occurrence, distribution and risk assessment

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ABSTRACT

Antibiotic residues are being highlighted around the world as emerging concerns in aquatic environments. Here, the occurrence of antibiotics in tributaries of the Xiaoqing River, China, as well as the spatial and temporal distributions, were reported. The total concentrations of 19 antibiotics in surface water and sediments ranged from 8.20–809.07 ng L⁻¹ and from 39.57–2,151.64 µg kg⁻¹ dry weight (dw), respectively. Among all detected antibiotics, ofloxacin showed the highest concentration and detection frequency in both surface water (283.83 ng L⁻¹, 100%) and sediment (1,827.18 µg kg⁻¹ dw, 100%). The pollution levels of antibiotics in different seasons were in the following order: dry season > normal season > wet season, except for clarithromycin, sulfadiazine, sulfamerazine and sulfaquinolaxine. Domestic, aquaculture and livestock wastewater might be the main pollution sources of antibiotics in the tributaries of the Xiaoqing River. Moreover, the Pearson correlation coefficient showed significantly positive correlations between antibiotics and heavy metals (such as Cu, Zn and Pb), indicating that there may be a combination of contaminants. The environmental risk assessment indicated a high environmental risk of ofloxacin, clarithromycin, roxithromycin and sulfamethoxazole.

Keywords: Antibiotics; Xiaoqing River; Surface water; Sediment; Risk assessment

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