

## **Contamination and ecological risk of antibiotics in Haihe River Catchment, China**

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### **Introduction**

China is one of the largest producers and consumers of antibiotics [1]. Antibiotic concentrations were predicted to be the highest in Haihe River Catchment across China previously, potentially resulting in high ecological risks in this region [1]. As a result of growing usage and regulation of antibiotic use in animals, the pattern of use may have altered temporally for different antibiotics. It is important to monitor the occurrence of antibiotics within different categories for understanding their mass loading to the catchment and the potential ecotoxicological risks involved. This study investigated the seasonal occurrence and spatial variation of 15 antibiotics in the Haihe River Catchment during 2016-2017. The investigated compounds included veterinary antibiotics, human-use antibiotics, and those intended for both human and animal use.

### **Results and discussion**

Total concentrations of 15 target antibiotics ranged from 414 to 1951 ng L<sup>-1</sup>, with an average of 821 ng L<sup>-1</sup>. The average concentration of individual antibiotics was in the range of 5.53-99.5 ng L<sup>-1</sup>, which were generally at a slightly higher level compared to previous studies throughout China and the world. Discharges from wastewater treatment plants were the main sources of antibiotics. The mass loading of antibiotics to the rivers was significantly higher during wet season than during dry season. Mass fluxes of the antibiotics continuously increased towards the lower reaches of the rivers. Total annual input of the antibiotics into Bohai Bay was 5008 kg. Ofloxacin, trimethoprim, leucomycin, erythromycin and florfenicol were the predominant antibiotics, whilst amoxicillin, erythromycin, ofloxacin, norfloxacin and enrofloxacin may pose high ecological risks to the aquatic ecosystem. The use of veterinary antibiotics is increasing around the catchment by comparing with historical data. Several antibiotics selected in this study were reported for the first time in this catchment. This study provides important information for chemical management and indicates that further monitoring is needed on the more harmful and veterinary antibiotics in the catchment.

[1] Zhang et al. (2015) ES&T 49, 6772-6782.