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Ecological risk assessment of fifty pharmaceuticals and personal care products (PPCPs) in Chinese surface waters: A proposed multiple-level system

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A R T I C L E I N F O

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A B S T R A C T

Interest in the risks posed by trace concentrations of pharmaceuticals and personal care products (PPCPs) in surface waters is increasing, particularly with regard to potential effects of long-term, low-dose exposures of aquatic organisms. In most cases, the actual studies on PPCPs were risk assessments at screening-level, and accurate estimates were scarce. In this study, exposure and ecotoxicity data of 50 PPCPs were collected based on our previous studies, and a multiple-level environmental risk assessment was performed. The 50 selected PPCPs are likely to be frequently detected in surface waters of China, with concentrations ranging from the ng L^{-1} to the low-g L^{-1}, and the risk quotients based on median concentrations ranged from 2046 for nonylphenol to 0 for phantolide. A semi-probabilistic approach screened 33 PPCPs that posed potential risks to aquatic organisms, among which 15 chemicals (nonylphenol, sulfamethoxazole, di (2-ethylhexyl) phthalate, 17β-ethynyl estradiol, caffeine, tetracycline, 17β-estradiol, estrone, dibutyl phthalate, ibuprofen, carbamazepine, tonalide, galaxolide, triclosan, and bisphenol A) were categorized as priority compounds according to an optimized risk assessment, and then the refined probabilistic risk assessment indicated 12 of them posed low to high risk to aquatic ecosystem, with the maximum risk products ranged from 1.54% to 17.38%. Based on these results, we propose that the optimized risk assessment was appropriate for screening priority contaminants at national scale, and when a more accurate estimation is required, the refined probability risk assessment is useful. The methodology and process might provide reference for other research of chemical evaluation and management for rivers, lakes, and sea waters.

1. Introduction

As one of the most important groups of contaminants of emerging concern, the occurrence of pharmaceuticals and personal care products (PPCPs) in the aquatic environments and their potential detrimental effects on aquatic organisms have given rise to major global concern in recent years. Pharmaceuticals are human and veterinary medicines, including antibiotics, β-blocking drugs, blood lipid regulators, anticonvulsant drugs, X-ray contrast media, and others. Personal care products (PCPs) are chemicals used in soaps, shampoos, conditioners, toothpastes, skin care products, sunscreens, insect repellents, lotions, and fragrances (Yu, 2011). It has been reported that more than 50,000 PPCPs are produced and around thirty million tons are consumed worldwide (Yu, 2011). China exports more than 60% of the total active pharmaceutical ingredients to the global pharmaceutical industry (Rehman et al., 2015) and consumed more than 162,000 tons of antibiotics in 2013 (Zhang et al., 2015). Proportions of the global total of PCPs consumed in China is approximately 6.5%, which is only exceeded by the United States of America (19.1%) and Japan (9.4%) (CIRN, 2012).

While most PPCPs are not persistent, due to their mass production and are used daily for various purposes, they are continually released

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into the aquatic environments via wastewater treatment plants (WWTPs), agricultural runoff, aquaculture, and PPCP manufacturing sites (Barbara et al., 2008; Larsson et al., 2007; Sim et al., 2011), and are typically considered as “pseudo-persistent” (Santos et al., 2010). The contamination of PPCPs in surface waters has been extensively studied in China and worldwide, with concentration ranging from ng L^{-1} to μg L^{-1} (Ebele et al., 2017; Sun et al., 2015; Bu et al., 2013; Liu et al., 2013; Balakrishna et al., 2017; Kuzmanović et al., 2015; Thomaidi et al., 2015; Carmona et al., 2014; Tewari et al., 2013; Scheurer et al., 2009). Although PPCPs are detected in surface waters at relatively low concentrations, many of them and their metabolites are biologically active and may impact non-target aquatic organisms at a long-term exposure, including endocrine disruption, genotoxicity, carcinogenicity, fetal development (Jin et al., 2014). A major concern raised by the presence of PPCPs in the aquatic environment is their ability to interfere with the endocrine system to produce undesired effects/ disruption of homeostasis (Ebele et al., 2017). It has been reported that more than 20% of PPCPs detected in surface waters were estrogenic chemicals (Kolpin et al., 2002).

Historically, studies on the aquatic risk of PPCPs were most frequently conducted using the simple, deterministic quotient method, which was expressed as the exposure concentration divided by the effect concentration (Donnachie et al., 2016; Wang et al., 2017; Zhang et al., 2017a; Zhang et al., 2017b; Vazquez-Roig et al., 2012). It is inevitable that there may be outliers within both effect and exposure datasets that may lead to bias or misinterpretation of risks. These might include unrepeatable ecotoxicity results, perhaps with ambiguous endpoints or high environmental concentrations reported from one-off measurements at localized, often more contaminated sites (Donnachie et al., 2016). Moreover, these studies were mainly based on acute toxicity data, and cannot adequately reflect the potential for chronic effects of long-term exposure to sub-acute levels (Godoy et al., 2015; Carlsson et al., 2006), particularly with regard to reproductive fitness, which most accurately represents variations between populations and species diversity for modulation of endocrine function in aquatic organisms (Jin et al., 2014; Liu et al., 2016a). Thus, a more accurate evaluation of PPCPs based on chronic effects is urgently needed.

According to the guidelines for ecological risk assessment developed by the US EPA (1998), quantitative risk estimates can be developed on the basis of measured data using one or more of the following techniques: (1) single-point exposure and effects comparisons, (2) comparing an exposure distribution with a point estimate of effects, and (3) comparisons incorporating variability of exposure and effects. Considering the complex effects and the low frequency of detection, risk characterization for PPCPs carried out by one method may be insufficient for the protection of the aquatic environment in China. The objectives of this study were to conduct a comprehensive evaluation of PPCPs in Chinese surface waters using all the three techniques based on chronic effects and concentrations reported during the 12-year period from 2006 to 2017, and to evaluate the protective capacity of this tiered approach, which could provide a more rigorous scientific basis and technical support for risk management options for PPCPs.

2. Materials and methods

2.1. PPCPs selected for this study

The 50 PPCPs (Table 1), on which this China-wide investigation focused, were selected for study based on the results of previous pilot studies (Liu, 2016), in which the risks of 144 PPCPs were assessed based on maximum concentrations in waters and thresholds for the most sensitive endpoints. If based on focused, regional studies, particular PPCPs were deemed to be more likely to cause adverse effects on aquatic environments of China, and most likely to cause more widespread issues. Among the 50 PPCPs, 44 were the prioritization of compounds on the first European Watch List (European Commission, 2015).

Table 1
Relevant information and properties of the selected PPCPs.

Category	Chemical	CAS NO.	Water Solubility at 25 °C(mg L^{-1}) [a]	log Kow [a]
antibiotic	clarithromycin	81103–11-9	0.342	3.16
antibiotic	erythromycin	114–07-8	1.44	3.06
antibiotic	roxithromycin	80214–83-1	0.0189	2.75
antibiotic	tylosin	1401–69-0	5	1.63
antibiotic	trimethoprim	738–70-5	400	0.91
antibiotic	sulfamethazine	57–68-1	1500	0.89
antibiotic	sulfamethoxazole	723–46-6	6.1	0.89
antibiotic	enrofloxacin	93106–60-6	3400	0.7
antibiotic	cephalexin	15686–71-2	1790	0.65
antibiotic	sulfapyridine	144–83-2	268	0.35
antibiotic	sulfamethoxypyridazine	80–32-0	7000	0.31
antibiotic	ciprofloxacin	85721–33-1	30,000	0.28
antibiotic	sulfadiazine	68–35-9	77	−0.09
antibiotic	ofloxacin	82419–36-1	28,300	−0.39
antibiotic	chlorotetracycline	57–62-5	630	−0.62
antibiotic	oxytetracycline	79–57-2	313	−0.9
antibiotic	norfloxacin	70458–96-7	178,000	−1.03
antibiotic	tetracycline	60–54-8	231	−1.3
hormone	diethylstilbestrol	56–53-1	12	5.07
hormone	17β-estradiol	50–28-2	3.6	4.01
hormone	17β-ethynyl estradiol	57–63-6	11.3	3.67
hormone	testosterone	58–22-0	23.4	3.32
hormone	bisphenol A	80–05-7	120	3.32
hormone	estrone	53–16-7	30	3.13
hormone	androstenedione	63–05-8	57.8	2.75
hormone	estriol	50–27-1	441	2.45
others	gemfibrozil	25812–30-0	11	4.77
others	indomethacin	53–86-1	0.937	4.23
others	diclofenac	19367–86-5	2.37	4.02
others	ibuprofen	15687–27-1	21	3.97
others	propranolol	525–66-6	61.7	3.48
others	naproxen	22204–53-1	15.9	3.18
others	clofibric acid	882–09-7	583	2.84
others	salicylic acid	69–72-7	2240	2.26
others	carbamazepine	298–46-4	17.7	2.25
others	caffeine	58–08-2	21,600	−0.07
others	iopromide	73334–07-3	23.8	−2.05
PCP	di-n-octyl phthalate	117–84-0	0.02	8.1
PCP	di(2-ethylhexyl) phthalate	117–81-7	0.27	7.6
PCP	nonylphenol	25154–52-3	6.35	5.99
PCP	galaxolide	1222–05-5	1.75	5.9
PCP	tonalide	1506–02-1	1.25	5.7
PCP	triclocarban	101–20-2	0.00237	4.9
PCP	triclosan	3380–34-5	10	4.76
PCP	dibutyl phthalate	84–74-2	11.2	4.5
PCP	musk ketone	81–14-1	0.387	4.3
PCP	diethyl phthalate	84–66-2	1080	2.42
PCP	dimethyl phthalate	131–11-3	4000	1.6
PCP	traseolide	68140–48-7	NR[b]	NR[b]
PCP	phantolide	15323–35-0	NR[b]	NR[b]

Note: a. Water Solubility and log Kow (octanol–water coefficient) from ChemIDPlus Advanced (http://chem.sis.nlm.nih.gov/chemidplus/) and PubChem (https://pubchem.ncbi.nlm.nih. gov/), U.S. National Library of Medicine. b. NR refers to not reported.

2.2. Evaluation and selection of data

2.2.1. Measured environment concentrations

The concentration data of 50 PPCPs in surface waters were obtained from peer-reviewed publications and government reports published between 2006 and 2017 by performing searches in National Knowledge Infrastructure, Web of Sciences, Scopus and Google Scholar using the keywords “pharmaceutical”, “drug”, “PCP”, “occurrence”, “pollutant” or “concentration”. The data mainly came from chemical analysis of samples collected in rivers and streams, followed by lakes, reservoirs, and estuaries. In order to reflect the worst and the best case scenario in freshwater ecosystems, concentrations in receiving waters and drinking water sources were included. Given the number of studies in the literature, the mean concentration for a location was calculated using measured values if greater than the method detection limits (MDL), the 1/2 MDL if < MDL or 0 if not detected. Once the datasets for environmental concentrations at the national scale were considered sufficient, the information was plotted to be evaluated and the 95th, 75th, 50th and 25th centile concentrations were calculated. The purpose of these measures is to describe the upper end of the exposure distribution, allowing researchers to evaluate whether certain locations indicate disproportionate large risks (US EPA, 1996).

2.2.2. Environmental toxicity information

Toxic potencies for the effects of 50 PPCPs on non-target organisms were retrieved from the ECOTOX Knowledgebase (https://cfpub.epa.gov/ecotox/search. cfm) developed by the US EPA, following the principles of accuracy, relevance and reliability according to Klimisch et al. (1997), Durda et al. (2000), Hobbs et al. (2005), US EPA (2011), Moermond et al. (2016). In these five methods or guidelines, there are five evaluate criteria for the quality of ecotoxicity data as follow: (1) test design, including guideline method, experimental process, the validity of the test results and quality controls; (2) the purity of the test substances and other ingredients in formulation; (3) general information and source of test organisms; (4) exposure conditions, including the experimental system appropriate for the test substance, the experimental system appropriate for the test organisms, the reliability of nominal concentration, the spacing between test concentrations, exposure duration, verify concentration and biomass loading; (5) data analysis, including replicate, statistical method, concentration-response curve and raw data (Liu et al., 2016b). Toxicity data were selected using a hierarchical method and chronic toxicity data of no observed effect concentrations (NOECs) or EC_{10} for the most sensitive effect measurements were preferred (EC, 2003). In the absence of NOEC or EC_{10}, the lowest observed effect concentration (LOEC) or the median effect concentration (EC_{50}) was used with assessment factor (AF) of 2 or 10 (EC, 2003; Bu et al., 2013).

2.3. Assessment of risks

The multiple-level ecological risk assessment (MLERA) of PPCPs was conducted according to the Framework for ecotoxicological risk assessment (US EPA, 1998, US EPA, 1992), the Technical Guidance Document on risk assessment (EC, 2003), NORMAN prioritisation framework for emerging substances (NORMAN Association, 2013), and previous studies (Zhou et al., 2019; Desbiolles et al., 2018; Ohe et al., 2011). A brief summary of the method is described in the following sections.

2.3.1. Tier-1 risk quotient (RQ): A screening-level risk assessment.

The ecological risks caused by 50 PPCPs in surface waters of China were assessed by use of deterministic quotient approach. Chronic and sublethal deterministic risk quotients (RQs) were calculated as quotients of the median concentration of individual chemicals in waters divided by the predicted no effect concentration (PNEC) (Eq. (1)). The preliminary risk assessment ranks of PPCPs were classified as insignificant if $RQ < 0.1$; low risk if $0.1 \le RQ < 1$; moderate risk if $1 \le RQ < 10$, and high risk if $RQ \ge 10$ (Bu et al., 2013; Ågerstrand, 2010).

$$RQ = \frac{C_m}{PNEC} \quad (1)$$

Where C_m is the median concentration calculated from the collection of values for a single chemical measured at an individual location; *PNEC* is the predicted no effect concentration derived by the most sensitive toxicity data with AFs of 10, 20, or 100 depending on test endpoints of NOEC or EC_{10}, LOEC, EC_{50} (Bu et al., 2013; Tarazona et al., 2010).

2.3.2. Tier-2 frequency of PNEC exceedance: A semi-probabilistic approach.

Using median concentrations as a comparator provides a robust method to compare relative risks from chemicals. However, this relative risk index does not reveal to what degree any of the chemicals might actually be harming aquatic organisms at a national scale. So, a semi-probabilistic risk assessment approach was conducted according to the Framework for ecotoxicological risk assessment (US EPA, 1998, US EPA, 1992). In brief, concentrations of a chemical lower than PNEC are considered as safe, while concentrations exceeding PNEC might pose a risk to aquatic organisms. Measured concentrations of target chemicals at individual sampling sites were compared to PNEC values to determine the frequency of PNEC exceedance. PPCPs were then prioritized by the proportion of concentrations that exceeded the PNEC (Johnson et al., 2018).

$$F = \frac{n}{N} \times 100\% \quad (2)$$

where *F* is the frequency of PNEC exceedance, n is the number of sites with concentrations above PNEC and, *N* is the total number of sampling sites for a chemical. The resulting value indicates the share of sites where potential effects are expected (Ohe et al., 2011).

2.3.3. Tier-3 prioritization indexes: An optimized risk assessment.

Since the current RQ approach based on median concentrations in water could be skewed by the frequency of detection. It is a tendency to consider both concentration and frequency during the high-risk compound screening. Thus, an optimized risk assessment was carried out according to a methodology developed within the NORMAN Network (NORMAN Association, 2013; Zhou et al., 2019; Desbiolles et al., 2018; Tousova et al., 2017). Prioritization index (PI) was calculated, as the result of the RQ value multiplied by the frequency of PNEC exceedance, to highlight the PPCPs of greatest concern in surface waters of China, which are close to the natural scenario and favors the selection of priority pollutants.

$$PI = RQ \times F \quad (3)$$

where *PI* is prioritization index, *RQ* is risk quotient calculated based on median concentration and PNEC, *F* is the frequency of concentrations exceeding PNEC.

2.3.4. Tier-4 Joint probability curves (JPCs): A refined probability risk assessment.

The approaches used in the previous assessments of risk are dependent on the selection of PNECs, which are derived from single-species toxicity tests, and failure to protect diverse ecosystems (Mebane et al., 2010). For chemicals that posed high risk, it would be valuable to characterize their risk for various species at national scale. Thus, JPCs were adopted to identify chemicals that are most likely to have adverse effects on the widest range of species in the widest range of locations/times. In this method, positively detected concentrations in surface waters of China and chronic toxicity data for responses of various species were compiled and transformed to *probits* by fitting appropriate distributions. Linear regressions of the two data sets can then be used to calculate probabilities of concentrations causing adverse effects to a specified proportion (%) of species. Each point on the curve represents both the probability that the chosen proportion of species will be affected (magnitude of effect) and the frequency with which that magnitude of effect would be exceeded in surface waters (exceedance probability). The closer the JPC is to the axes, the less the probability of adverse effects (Solomon et al., 2000). To facilitate communication of the risk outputs, the risk products (risk product = exceedance probability × magnitude of effect) were then used to categorize risk as de minimis, low, intermediate, or high based on the criteria described in

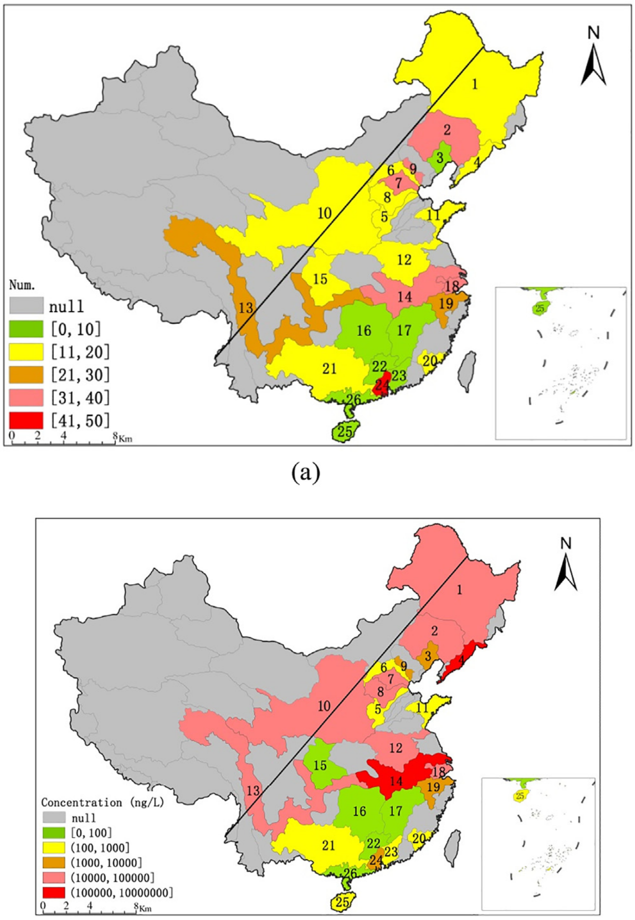

Fig. 1. Total number of PPCPs analyzed (a) and the highest concentration (b) in Chinese surface waters by river system region. The secondary river system regions IDs: 1. Songhua River; 2. Liao River; 3. Daling River; 4. Liaodong Peninsula; 5. Zhangweinan Canal; 6. Yongding River; 7. Daqing River; 8. Ziya River; 9. Chaobai-Beiyun-Jiyun River; 10. Yellow River; 11. Shandong Peninsula; 12. Huai River; 13. Yangtze River Upstream; 14. Yangtze River Downstream; 15. Jialing River; 16. Dongting Lake; 17. Poyang Lake; 18. Taihu Lake; 19. Qiantang River; 20. Mindong-Yuedong; 21. Xijiang River; 22. Beijiang River; 23. Dongjiang River; 24. Pearl River Delta; 25. Hainan; 26. Yueguiqiong. Watersheds IDs: 1–4. Songliao River; 5–9. Hai River; 10. Yellow River; 11–12. Huai River; 13–18. Yangtze River; 19–20. Southeast coast; 21–26. Pearl River.

Moore et al. (2010), Moore et al. (2014), Aslund et al. (2016), and Clemow et al. (2018), in which the risk categories are defined as follows:

If the maximum risk product was < 0.25%, then the risk was categorized as de minimis.
If the maximum risk product was ≥0.25% but < 2%, then the risk was categorized as low.
If the maximum risk product was ≥2% but < 10%, then the risk was categorized as intermediate.
If the maximum risk product was ≥10%, then the risk was categorized as high.

3. Results and discussion

3.1. PPCPs occurrence in Chinese surface waters

In total, 1934 exposure data of 50 target chemicals (Table S1) were collected from 26 secondary river system regions, spread over the sever river watersheds of China (Songliao River, Hai River, Yellow River, Huai River, Yangtze River, Southeast coast, Pearl River) (Fig. 1). The 26 secondary river system regions recovering most of the high population density area that reflected by the famous geographic "Hu Huanyong line" (Zhang et al., 2015), and 20 regions located in eastern coastal China. Pearl River Delta analyzed the most PPCPs (42), followed by Yangtze River downstream (38), Taihu Lake (38), Daqing River (36), Chaobai-Beiyun-Jiyun River (34), and Liao River (33). Liaodong Peninsula (14,718,411 ng L^{-1}) and Yangtze River downstream (731,100 ng L^{-1}) showed the highest concentration, followed by Ziya River (97,434 ng L^{-1}), and Huai River (81,250 ng L^{-1}). The most frequently reported watershed was Yangtze River (ID: 14–18), where 643 samples were reported and approximately 96% (43 out of 45) of the analyzed PPCPs were detected at concentrations above the limit of detection levels. PPCPs were most commonly found in Hai River (ID: 5–9), where 45 chemicals were analyzed and positively detected in 489 samples. Followed by Pearl River (ID: 21–26), where 46 PPCPs was analyzed and 44 of them were positively detected in 352 samples. It should be noted that studies in some watersheds were quite limited, for example, only 52 and 41 samples were reported in Yellow River (ID: 10) and Huai River (ID: 21, 22) respectively, and further studies should be done considering their 100% detection frequency.

Fig. 2 shows measured environmental concentrations of each compound and the frequencies of detection shown as the number of positively detected/all data points. Nationally, except for phantolide, PPCPs were frequently detected in Chinese surface waters (50% to 100%). Among the 50 targeted PPCPs, 23 were found in over 90% of samples. Predominant PCPs groups, such as phthalic acid esters (di-n-octyl phthalate, di (2-ethylhexyl) phthalate, and dibutyl phthalate), were detected frequently (67% to 100%) and at highest concentration levels (up to 14,718,411 ng L^{-1}) (Yao et al., 2011). The antibiotic sulfamethoxazole was the most concerned and investigated chemical, which was positively detected at over 95% of 120 sites collected in 7 watersheds. The highest concentration of sulfamethoxazole (984 ng L^{-1}) was similar to that in India (900 ng L^{-1}) (Balakrishna et al., 2017), but lower than those in Europe (11,920 ng L^{-1}) (Zhou et al., 2019), America (1,500 ng L^{-1}) (Fang et al., 2019) and Australia (2,000 ng L^{-1}) (Watkinson et al., 2009). The most ubiquitous antibiotics were erythromycin and sulfadiazine. Erythromycin was detected in 97% of 65 samples with the highest concentration of 1,418 ng L^{-1} detected in Yangtze River (Yao et al., 2017), similar to those in Europe (1,700 ng L^{-1}) (Zhou et al., 2019). Compared to Europe, sulfadiazine was more frequently detected (97%) in China but with lower exposure concentrations.

Among the seven hormones, the highest concentration was found for estriol in Yangtze River (67 ng L^{-1}) (Zhang et al., 2014), lower than in European surface waters (up to 480 ng L^{-1}), while the frequency of detection (61%) in all the 36 samples was higher than that found in Europe (20%) (Zhou et al., 2019). The most frequently studied hormone was estrone, occurring in 96% of 53 samples in seven watersheds. The concentrations of estrone in China (0.12–57 ng L^{-1}) were comparable to those in European countries (up to 89 ng L^{-1}) (Zhou et al., 2019). Especially, androgens androstenedione and testosterone were less reported globally, but were detected with 100% frequency in three Chinese watersheds with concentrations between 2 and 28 and 0.2–2.5 ng L^{-1}.

For other pharmaceutical groups, the highest concentration was found for iopromide in Yangtze River (26,000 ng L^{-1}) (Zhao et al., 2012). The psychoactive stimulant caffeine was positively detected in all 23 analyzed samples up to a concentration level of 3,712 ng L^{-1} in a river receiving treated wastewater in Beijing (Zhou et al., 2010), five times higher than the reported maximum concentration in Ganges River (743 ng L^{-1}) in India (Sharma et al., 2019), and one order of magnitude lower than those detected in Europe waters (up to 39,813 ng L^{-1}) (Loos et al., 2009), what may be caused by differences in use and release. The most popularity studies were carbamazepine and ibuprofen.

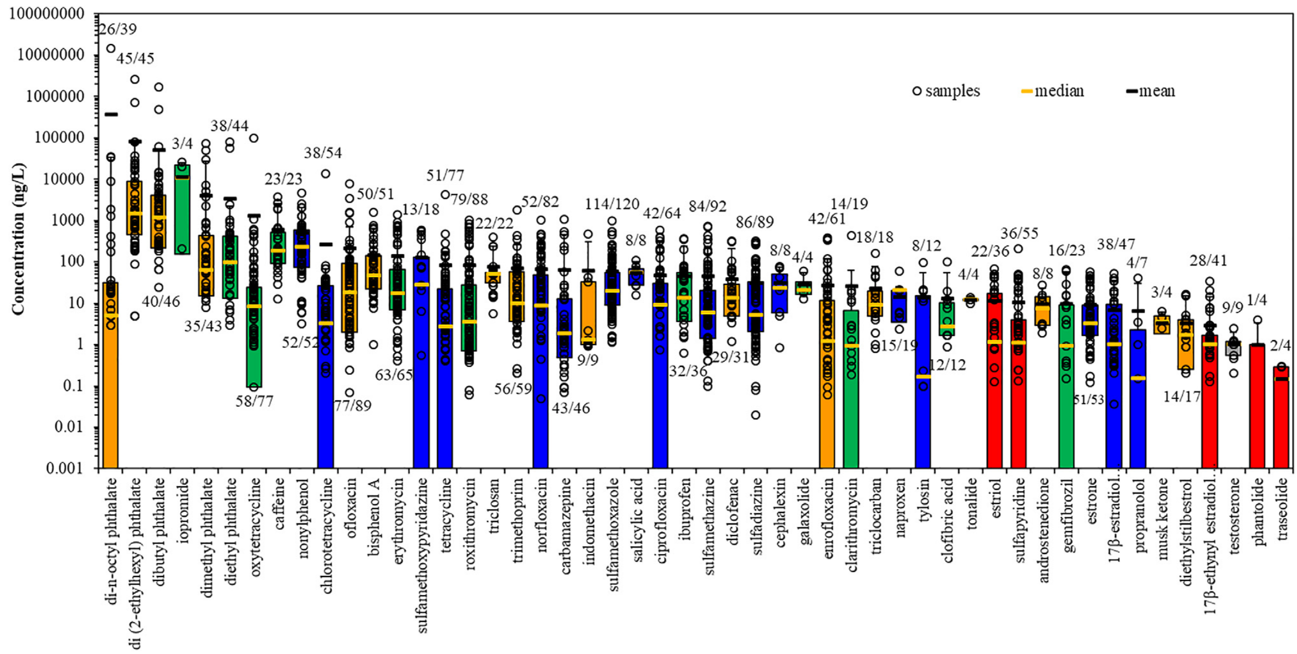

Fig. 2. Box and whisker plots of measured concentrations of 50 target chemicals in 1934 water samples. Concentrations for each sample are shown as individual points. The horizontal lines represent 95th centiles, and the boxes represent 25th and 75th centiles. The color indicates the categorization of compounds: orange: personal care products, green: other pharmaceuticals, blue: antibiotics, red: hormone. Median and mean concentrations are shown as solid horizontal lines. The numbers for each chemical indicate frequencies of detection, shown as the number of positively detected/all data points per data set, for example, di-n-octyl phthalate, ranked 1st, with 26 positively detected samples from 39 samples.

Carbamazepine was found in 93% of 42 samples collected in seven watersheds, with the highest concentration of up to 1,090 ng L^{-1} (Zhou et al., 2011), slightly lower than that reported from Europe (up to 1700 ng L^{-1}) (Fang et al. 2019), and much higher than the concentration range commonly reported in other regions of the world (Vieno et al., 2007; Nakada et al., 2007; Kumar et al., 2010; Sharma et al., 2019). Ibuprofen was detected in 32 out of 36 sites, with the highest concentration of 360 ng L^{-1}, two orders of magnitude lower than that reported in Europe (up to 31,323 ng L^{-1}) (Zhou et al., 2019).

In most cases, the mean concentrations were approximately equal to 75th centiles. While, due to a wide range of concentration in various samples, the distribution of concentrations of residues were skewed to the right (positive skewness). In the present study, 17 mean concentrations were higher than the 75th centile by 2-fold. For example, the mean concentrations of dimethyl phthalate and carbamazepine were higher than the 75th centile values by 9 and 5 times, respectively, with detection frequencies of 81% and 93%. Furthermore, in these 17 compounds, the mean concentrations for six PPCPs, di-n-octyl phthalate, oxytetracycline, chlorotetracycline, diethyl phthalate, dibutyl phthalate, and di (2-ethylhexyl) phthalate, were higher than the 95th centile. This demonstrates how the mean can be skewed by a few higher concentrations, and therefore the results of risk assessment based on median concentrations would be less uncertainty.

3.2. Toxic potencies of PPCPs

For use in this study, available chronic data for aquatic organisms were secured for 50 PPCPs tested (Table 2). The results displayed here possibly represent the most sensitive endpoints yet collated for the 50 PPCPs. All the 50 PPCPs may cause effects on growth, development, or reproduction of aquatic organisms. The data set contained single-species toxicity data for 29 taxa, of which 9 were vertebrates, 11 were invertebrates and 9 were primary producers. The thresholds for chronic toxicity endpoints for vertebrates ranged from 0.03 to 1.2×10^4 ng L^{-1}; for invertebrates, from 0.1 to 1×10^9 ng L^{-1}; and for primary producers, from 1.6×10^3 to 3.2×10^7 ng L^{-1}.

From this collection of 18 antibiotics, 13 of them appear to be more toxic to primary producers, and the other 5 antibiotics were more toxic to aquatic animals. EC_{50} for most antibiotics in lower aquatic organisms (alga and microorganism) were μg L^{-1}-mg L^{-1}, which were 100 to 1000 times more sensitive than higher organisms (Chen et al., 2012; Meng et al., 2015). In comparison, aquatic vertebrates were more sensitive to effects of PCPs, and fishes were more sensitive to hormones and other pharmaceuticals.

3.3. Risk characterization

3.3.1. RQs of 50 PPCPs based on median concentrations

The 50 PPCPs were ranked by RQ values in descending order (Fig. 3). For 9 compounds, the RQ values were higher than 10, meaning high environmental risks in Chinese surface waters according to this approach, among which sulfamethoxazole posed the second highest risk to aquatic organisms, with a RQ of 1955, because of its toxic potency to *Caenorhabditis elegans* (Yu et al., 2011). For 7 compounds the yielded RQ values were between 1 and 10, which would mean that a moderate environmental risk was probable. Among these 16 PPCPs that posted certain risk to aquatic organisms (RQ ≥ 1), PCPs made the largest contribution (8 out of 16), followed by hormones (3 out of 16) and other pharmaceuticals group (3 out of 16). Antibiotics were the most important group in this study, due to their large amount of consumption and extensively reported, but only sulfamethoxazole and tetracycline were identified as high risk in Chinese surface waters. This is expected because the hydrophilicity of antibiotics led to the relatively less toxicity to aquatic organisms. A similar result was achieved by the predicted environmental concentration and ecological effects conducted by Sui et al. (2012), in their study, only 32% of the antibiotics were listed as priority pharmaceuticals.

3.3.2. Characterization of semi-probabilistic risk

While using median concentrations can distort the analysis and therefore be over- cautionary, an alternative is to quantify the probability of concentrations of PPCPs in surface waters exceeding the PNEC

Table 2
Toxic potencies of four categories of PPCPs to aquatic organisms[a].

Category	Chemicals	Species	Class	Effect	Duration (days)	Endpoint	Concentration (ng L^{-1})	AF	PNEC (ng L^{-1})
antibiotic	sulfamethoxazole	*Caenorhabditis elegans*	Worm	Morphology	4	EC10	0.1	10	0.01
antibiotic	tetracycline	*Gambusia holbrooki*	Fish	Biochemical	4	LOEC	5	20	0.25
antibiotic	norfloxacin	*Microcystis aeruginosa*	Alage	Population	6	NOEC	1600	10	160
antibiotic	clarithromycin	*Pseudokirchneriella subcapitata*	Alage	Population	3	NOEC	2000	10	200
antibiotic	erythromycin	*Synechococcus leopoliensis*	Alage	Population	6	NOEC	2000	10	200
antibiotic	ofloxacin	*Microcystis aeruginosa*	Alage	Population	5	EC50	21,000	100	210
antibiotic	sulfapyridine	*Lemna gibba*	Alage	Population	4	NOEC	4600	10	460
antibiotic	roxithromycin	*subcapitata*	Alage	Population	3	LOEC	10,000	20	500
antibiotic	sulfadiazine	*Phaeodactylum tricornutum*	Alage	Population	4	NOEC	10,000	10	1000
antibiotic	trimethoprim	*Brachionus koreanus*	Rotifer	Genetic	1	NOEC	10,000	10	1000
antibiotic	enrofloxacin	*Penaeus monodon*	Crustacean	Growth	4	NR[b]	11,000	10	1100
antibiotic	chlorotetracycline	*Oreochromis niloticus*	Fish	Growth	48	NOEC	12,000	10	1200
antibiotic	oxytetracycline	*Egeria densa -Population*	Plant	Population	42	NOEC	20,000	10	2000
antibiotic	ciprofloxacin	*Lemna gibba*	Plant	Population	7	NOEC	100,000	10	10,000
antibiotic	tylosin	*Lemna gibba*	Plant	Population	7	NOEC	100,000	10	10,000
antibiotic	sulfamethazine	*Lemna gibba*	Plant	Population	7	NOEC	300,000	10	30,000
antibiotic	cephalexin	*Lemna gibba*	Plant	Population	7	NOEC	1,000,000	10	100,000
antibiotic	sulfamethoxypyridazine	*Chlorella fusca* var. *vacuolata*	Alage	Population	1	EC50	32,250,000	100	322,500
hormone	17β-ethynyl estradiol	*Oryzias latipes*	Fish	Morphology	100	NOEC	0.03	10	0.003
hormone	testosterone	*Oncorhynchus kisutch*	Fish	Reproduction	21	LOEC	30	20	1.5
hormone	17β-estradiol	*Oncorhynchus mykiss*	Fish	Reproduction	50	NOEC	0.42	10	0.042
hormone	estrone	*Oncorhynchus mykiss*	Fish	Vitellin	14	NOEC	0.74	10	0.074
hormone	estriol	*Oryzias latipes*	Fish	Hatch	15	NOEC	46.5	10	4.65
hormone	androstenedione	*Poecilia reticulata*	Fish	Morphology	12 ~ 14	NOEC	700	10	70
hormone	diethylstilbestrol	*Nitocra Spinipes*	Copepod	Reproduction	15–18	NOEC	3000	10	300
others	caffeine	*Salmo salar*[c]	Fish	Growth	5	NOEC	10	10	1
others	ibuprofen	*Gammarus pulex*	Crustaceans	Behavior	0.0833	LOEC	10	20	0.5
others	gemfibrozil	*Danio rerio*[c]	Fish	Genetic	7	LOEC	380	20	19
others	diclofenac	*Oncorhynchus mykiss*	Fish	Morphology	21	LOEC	460	20	23
others	carbamazepine	*Gammarus pulex*	Crustaceans	Behavior	0.0833	NOEC	10	10	1
others	indomethacin	*Danio rerio*[c]	Fish	Reproduction	16	NOEC	1000	10	100
others	clofibric acid	*Oncorhynchus mykiss*	Fish	Morphology	28	NOEC	1000	10	100
others	propranolol	*Oryzias latipes*	Fish	Hormone	28	NOEC	1000	10	100
others	naproxen	*Limnodynastes peronii*[d]	Amphibians	Developmental	21	NOEC	10,000	10	1000
others	salicylic acid	*Daphnia longispina*	Crustaceans	Reproduction	21	NOEC	1,000,000	10	100,000
others	iopromide	*Daphnia magna*	Crustaceans	Reproduction	22	NOEC	1,000,000,000	10	100,000,000
PCP	nonylphenol	*Danio rerio*[c]	Fish	Genetic	3	LOEC	2.2	20	0.11
PCP	tonalide	*Dreissena polymorpha*[d]	Molluscs	Physiological	7	NOEC	20.5	10	2.05
PCP	triclocarban	*Americamysis bahia*[c]	Crustaceans	Reproduction	28	NOEC	60	10	6
PCP	galaxolide	*Dreissena polymorpha*[d]	Molluscs	Physiological	4 ~ 21	NOEC	97	10	9.7
PCP	bisphenol A	*Oryzias latipes*	Fish	Reproduction	4	NOEC	100	10	10
PCP	triclosan	*Ruditapes philippinarum*	Molluscs	Reproduction	7	NOEC	300	10	30
PCP	di (2-ethylhexyl) phthalate	*Oryzias latipes*	Fish	Developmental	90	NOEC	1000	10	100
PCP	traseolide	*crucian*	Fish	Physiological	NR	NOEC	1500	10	150
PCP	phantolide	*crucian*	Fish	Physiological	NR	NOEC	1500	10	150
PCP	dibutyl phthalate	*Danio rerio*[c]	Fish	Biochemical	4	LOEC	5000	20	250
PCP	musk ketone	*Danio rerio*[c]	Fish	Physiological	2	NOEC	3300	10	330
PCP	diethyl phthalate	*Danio rerio*[c]	Fish	Genetic	4	NOEC	5000	10	500
PCP	di-n-octyl phthalate	*Haliotis diversicolor*	Molluscs	Developmental	4	NOEC	20,000	10	2000
PCP	dimethyl phthalate	*Haliotis diversicolor*	Molluscs	Developmental	4	NOEC	20,000	10	2000

Note: a. Toxicology data of 50 PPCPs were retrieved from the ECOTOX Knowledgebase (https://cfpub.epa.gov/ecotox/search.cfm). b. NR refers to not reported. c. *Salmo sala*, *Danio rerio*, and *Americamysis bahia were* nonnative species but standard test species. d. *Limnodynastes peronii* and *Dreissena polymorpha were* neither nonnative species nor standard test species.

for aquatic organisms. The percentage of monitoring values which exceed PNEC values can be identified. In this case, 33 PPCPs (Fig. 4) in surface waters of China were predicted with adverse effects on some sensitive species. In this group, the highest likelihood of exceeding PNECs (100% of monitoring values) were nonylphenol, caffeine, tonalide, and galaxolide. Closely followed, with more than 90% of monitoring values exceeding the PNEC were estrone, sulfamethoxazole, bisphenol A, and di (2-ethylhexyl) phthalate. As expected, a possible threat (1–10%) were observed for 6 chemicals (roxithromycin, di-n-octyl phthalate, clarithromycin, trimethoprim, oxytetracycline, chlorotetracycline) that indicated as insignificant risks using the RQ method. The frequencies of PNEC exceedance of the remaining 17 PPCPs were zero, meaning that no ecotoxicological risk to aquatic organisms is to be expected at current environmental concentrations. In a case study performed in Greece by Thomaidi et al. (2015), for 25/25 rivers, 22/25 rivers, and 20/25 rivers, triclosan, caffeine and nonylphenol presented RQ values higher than 1, respectively. Additionally, sulfamethoxazole, bisphenol A, and ofloxacin presented RQ > 1 in two rivers. These results indicated that the distribution of concentrations in surface waters is an important factor to consider when ranking the potential risks of PPCPs.

In order to prioritize chemicals more reasonable, it was essential to compare the results of the semi-probabilistic approach with the frequency of detection. For example, the proportions of 17β-ethynyl estradiol and 17β-estradiol that exceeded their respective PNECs were 68% and 69% respectively, approaching the frequency of detection 68% and 74%. Thus, aquatic organisms could be at risk once such chemicals were detected in waters. According to Burns et al. (2018), risk-based and hazard-based methods identified estrone, 17β-estradiol, 17β-ethynyl estradiol, and testosterone as the highest priority, despite

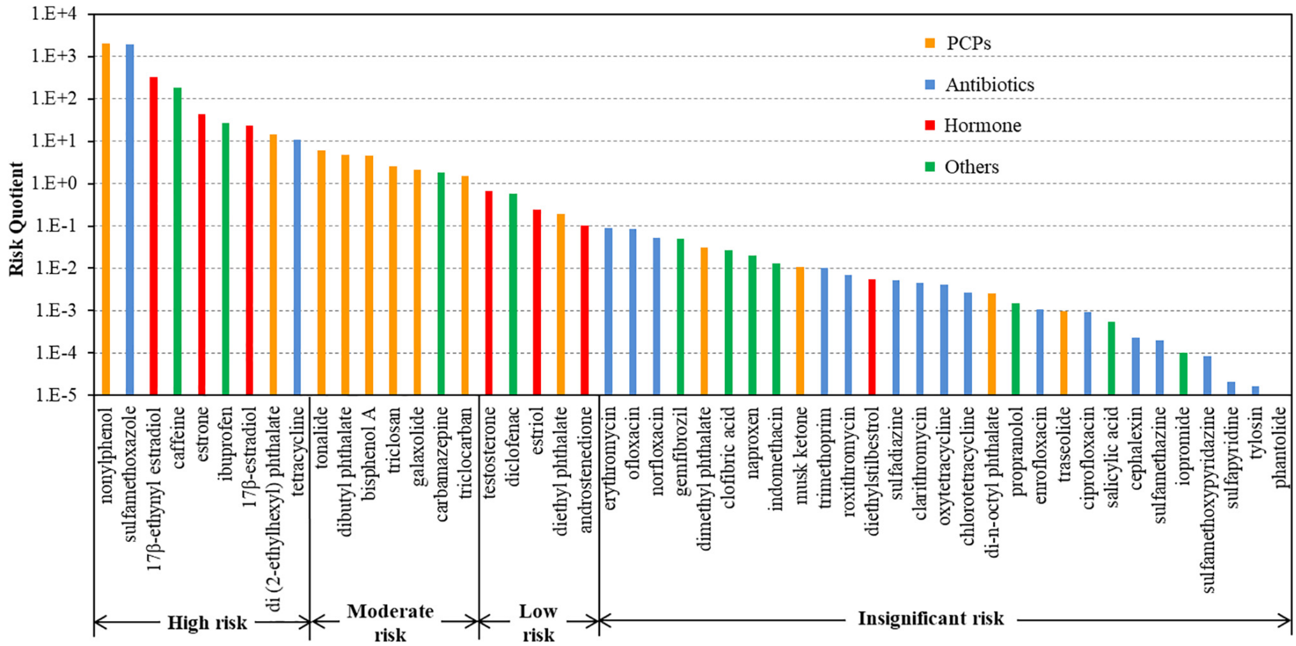

Fig. 3. Risk ranking of 18 antibiotics, 7 hormone, 11 other pharmaceuticals, and 14 PCPs, based on effect concentration for the most sensitive species and the median concentrations in surface waters. Colors refer to the chemical groups.

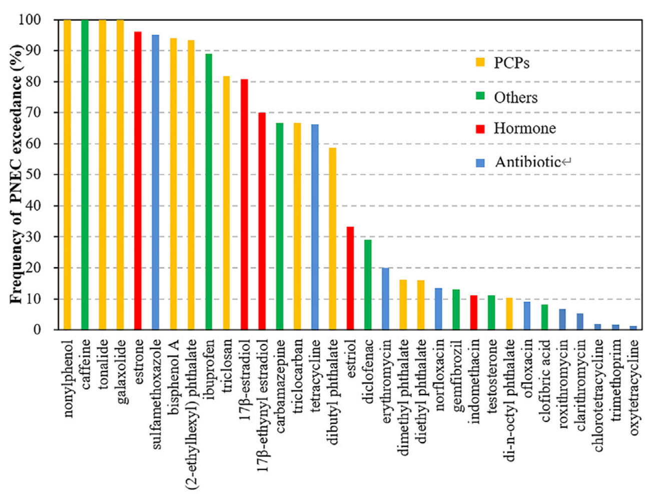

Fig. 4. Proportions (%) of concentrations of 33 PPCPs detected in surface waters of China that exceeded PNEC. Colors refer to the chemical groups.

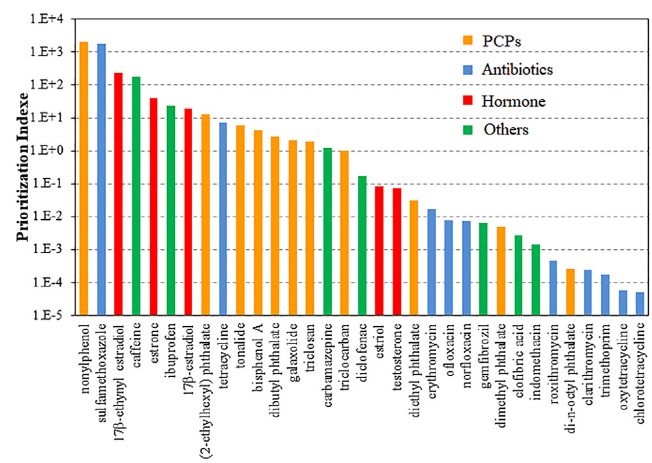

Fig. 5. 33 Prioritized PPCPs according to prioritization indexes in descending order. Colors refer to the chemical groups.

they were not selected in any of the exposure-based exercises, indicating that the perceived risks of these chemicals are more likely a result of toxicity than high exposure. This is expected because they are potent to some species.

3.3.3. Optimization of screening-level risk assessment for 33 PPCPs.

Fig. 5 shows 33 prioritized PPCPs according to prioritization indexes in descending order. Prioritization indexes ranged from 2046 for nonylphenol to 4.9×10^{-5} for chlorotetracycline. Compared to the RQ value, prioritization indexes showed a greater difference in the potential environmental risks of the compounds that presented a lower frequency of concentrations exceeding PNECs. For the 15 PPCPs those posed high or moderate risk with the RQ method were still identified as risk due to their great frequency of exceedance ($\geq$59%). For the 3 PPCPs (estriol, testosterone, dimethyl phthalate), however, class of risk were downgraded from a low risk with RQ method to an insignificant risk with prioritization indexes, because they presented a lower frequency of exceedance. Thus, by considering the variability of concentrations above PNECs, the optimized risk assessment method is more convenient to select contaminants that should be prioritized in a large-scale water resources management.

Among these 15 compounds with high or moderate environmental risks, five of them (nonylphenol, caffeine, carbamazepine, ibuprofen, and triclosan) were included in the priority list of the European Demonstration Program (EDP) on the basis of their frequency and extent of exceedance of PNECs (Tousova et al., 2017). Similarly, six compounds, i.e. 17β-ethynyl estradiol, ibuprofen, carbamazepine, caffeine, 17β-estradiol, and triclosan were identified as high or moderate risk in the priority list of pharmaceuticals in European surface waters (Zhou et al., 2019). Galaxolide and nonylphenol was identified as very important and important contaminants in Sava River, Croatia (Smital et al., 2013). Nonylphenol was also found among the ten most important contaminants within a prioritization exercise from Spain carried out by Kuzmanović et al. (2015).

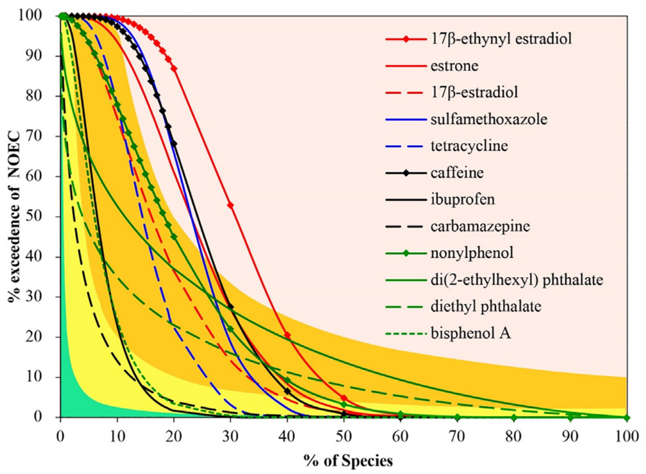

Fig. 6. Joint probability curves for estimated measured environment concentrations (MECs) of 12 PPCPs in surface waters and species sensitivity distributions. The color of risk curves for hormones, antibiotics, other pharmaceuticals, PCPs are shown as red, blue, black, green, respectively. The font color indicates the categorization of risk that identified these compounds: green: *de minimis* risk, yellow: low risk, orange: intermediate risk, pink: high risk.

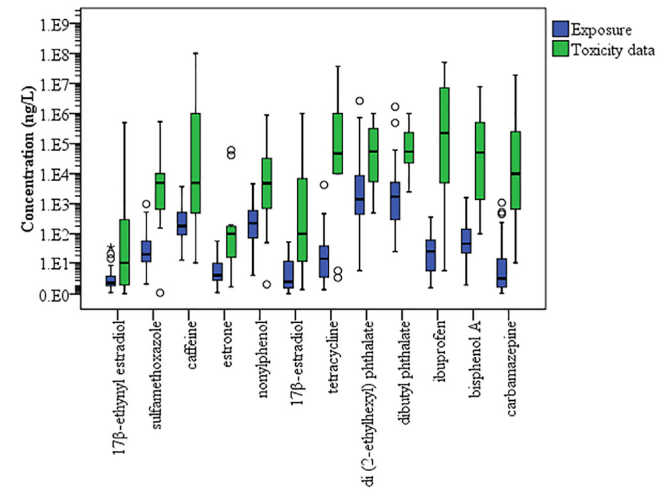

Fig. 7. Comparisons among point-estimates of exposure and effects for 12 PPCPs. The horizontal lines represent 10th and 90th percentiles, and the boxes represent 25th and 75th percentiles. Median concentrations are shown as solid lines. Outliers (< 3 times higher of boxes) and extreme (> 3 times higher of boxes) are shown as "○" and "*", respectively.

3.3.4. Refined risk assessment for twelve PPCPs.

For the 15 PPCPs that posed ecological risks identified by the prioritization indexes, a refined probability risk assessment based on variability in exposure and ecotoxicity data was required. Joint probability curves for each compound, excluding tonalide, galaxolide and triclosan for which less exposure data were available, were derived by integrating the distribution for surface water concentrations with chronic toxicity effects on varies species to indicate the probability of exceeding effects of differing magnitudes (Fig. 6). In the case of JPCs, the measured environment concentrations and toxicity data used are reported in the Supporting Information (Table S1 and S2). Data sets for each chemical were tested for normality by use of the Shapiro-Wilk test ($p < 0.05$) prior to application of parametric statistics (Table S3).

It is not surprising that JPCs of the three hormones were parallel due to their similar modes of action on aquatic species, with a relative rank of risks was as follows: 17β-ethynyl estradiol > estrone > 17β-estradiol. For the same reason, the two antibiotics and the two phthalates are also parallel to each other, with an order of risk at the national scale of: sulfamethoxazole > tetracycline, di (2-ethylhexyl) phthalate > dibutyl phthalate. Based on these results, the twelve PPCPs posed low to high risks to aquatic organisms at the national scale. Chronic risk for 17β-ethynyl estradiol, caffeine, sulfamethoxazole and estrone were categorized as high, with maximum risk product of 17.38%, 13.77%, 13.76%, and 12.39%, respectively. For carbamazepine, the results indicate a low risk of chronic effects in all surface waters of China (maximum risk product of 1.54%). Intermediate risk of chronic effects on aquatic organisms was identified for the other seven PPCPs, with maximum risk products ranged from 3% to 9.21%.

Results from the estimated risk curves can also be used to describe the probability of exceeding percentages of taxa that would be affected. The probability of exceeding 5% adverse effect depended on the most sensitive species, while the shape of the risk curve was related to the ranges and variability of datasets (Fig. 7) that could be described by coefficients of variation (CV). For example, JPCs for ibuprofen and bisphenol A were classified as intermediate risk to 5–10% species, and a low risk to 15–20% species. This is because both chemicals were predicted to exhibit toxicity to a small subgroup, with a large CV for effect data and a small value of exposures (Table S3). Alternatively, the JPCs for di (2-ethylhexyl) phthalate and dibutyl phthalate decreased more slowly, and represented an intermediate risk to a wider range of species (from 5% to > 70%). That was because the CVs for estimates of exposure were much larger than those for relative potencies among species and the maximum exposure data were larger than those for toxic potencies. Because their exposure data were mainly distributed in lower concentrations that were slightly higher than the most sensitive species, with a low CV of exposure and a higher CV of effect, 17β-ethynyl estradiol, sulfamethoxazole, caffeine, and estrone presented high risks to some species, but insignificant risks to 60% of species at the national scale.

3.3.5. Comparing results of risk assessment produced by the four methods

Comparing the results of the risk assessment of the four methods (Table 3), it appears that there is an advantage for the implementation of the multiple-level system. The RQ can be useful in answering whether the relative risks are higher or lower, but a disadvantage of this method is that outliers for estimates of exposure or relative potencies occur. The semi-probabilistic approach provided the possibility of chemicals that posed an ecological risk to aquatic organisms at the national scale. And in the optimized risk assessment, both concentration and frequency were considered, what could make for the utility of the results. For example, the RQ of di-n-octyl phthalate (1 9 0) was similar to that of 17β-estradiol (1 6 3), while the frequency of PNEC exceedance of di-n-octyl phthalate was much lower (10%) than that of 17β-estradiol (81%), so that the results obtained with the optimized method were more reasonable. The risk of trimethoprim was identified as insignificant risk using the RQ method (RQ = 0.07) and the optimized method (PI = 0.001), but it should not be neglected completely because of the 2% frequency of PNEC exceedance in surface waters of China, especially in the water where trimethoprim posed a potential risk to aquatic organisms.

The main disadvantage of the optimized method was that the PNECs were derived from the most sensitive endpoints, which did not take into account the range of species present in the environment. In relative terms, the JPCs method incorporated variability in estimates of both exposure and effects, and then given out a refined result. Take carbamazepine for instance, the frequency of PNEC exceedance was 67% and the prioritization indexes was 43 that presented high risk, but the probability of concentrations causing adverse effects in 5% of species was only 30%, which means it posed a low risk for waters when considering all the aquatic species. While the use of the JPC provides more information, it also requires more information to provide complete results and can thus be severely limited by a lack of information. In addition, due to the log transformation performed, this approach also

Table 3
Information obtained for each level of risk assessment.

Relative ranking	Risk quotient	Frequency of PNEC exceedance (%)	Prioritization index	Maximum risk product (%)
1	sulfamethoxazole (5964)	nonylphenol (1 0 0)	sulfamethoxazole (5666)	17β-ethynyl estradiol (17.38)
2	nonylphenol (4650)	caffeine (1 0 0)	nonylphenol (4651)	caffeine (13.77)
3	17β-ethynyl estradiol (9 8 0)	estrone (95)	di (2-ethylhexyl) phthalate (7 6 2)	sulfamethoxazole (13.76)
4	di (2-ethylhexyl) phthalate (8 1 7)	sulfamethoxazole (94)	17β-ethynyl estradiol (6 8 6)	estrone (12.39)
5	caffeine (6 1 6)	di (2-ethylhexyl) phthalate (93)	caffeine (6 1 6)	nonylphenol (9.21)
6	tetracycline (3 3 6)	bisphenol A (93)	tetracycline (2 2 4)	17β-estradiol (8.12)
7	dibutyl phthalate (2 0 3)	ibuprofen (89)	17β-estradiol (1 3 2)	di (2-ethylhexyl) phthalate (8.06)
8	di-n-octyl phthalate(1 9 0)	tetracycline (70)	estrone (1 2 3)	tetracycline (7.91)
9	17β-estradiol (1 6 3)	17β-estradiol (69)	dibutyl phthalate (1 1 9)	dibutyl phthalate (5)
10	estrone (1 2 7)	17β-ethynyl estradiol (68)	ibuprofen (84)	ibuprofen (3.29)
11	ibuprofen (94)	carbamazepine (67)	carbamazepine (43)	bisphenol A (3)
12	carbamazepine (65)	dibutyl phthalate (59)	di-n-octyl phthalate (19)	carbamazepine (1.54)
13	bisphenol A (15)	di-n-octyl phthalate (10)	bisphenol A (14)	di-n-octyl phthalate (− − −)

had the disadvantage that “0″ values are not allowed, which might limit the utility of the method. For example, 17β-ethynyl estradiol presented the greatest risk according to JPCs, but was less detected (68%) than estrone (96%), 17β-estradiol (81%), and caffeine (100%) in surface waters, so it may not be appropriate for identifying 17β-ethynyl estradiol as the first priority chemical.

4. Limitations

Rankings of chemicals carried out in this study were limited by quantities and quality of available data on exposure and effects. There are many examples of measurements of hormones like 17β-ethynyl estradiol, which are problematic due to their low concentrations in aquatic environments (Hannah et al., 2009). Data used to estimate the exposures of chemicals such as musks and iopromide were limited to only 4 samples, and some chemicals were reported mostly for drinking waters, while existing exposure information on heavily polluted surface waters is sparse and limited. In similar cases, toxic potency data for sensitive species are also limited for some chemicals, especially for antibiotics, and potential drug resistance to multiple generations of organisms have been ignored. There were also limitations imposed by chiral chemicals that might have significant differences in biodegradation and toxic potency among enantiomers (Wong, 2006). For example, chronic responses of the fathead minnow (*Pimephales promelas*) to enantiomers of propranolol followed the hypothesis that (S)-propranolol is more toxic than (R)-propranolol (Stanley et al., 2006). The enantioselective biodegradation and ecotoxicity of chiral PPCPs tend to complicate their potential risk (Yin et al., 2016). Therefore, the risks of such chemicals might have been underestimated or overestimated, and this is likely to change drastically as new information becomes available.

Furthermore, the toxicity arising from complex mixtures of PPCPs at low concentrations could lead to additive or synergistic interactions, as demonstrated for similar acting compounds such as antibiotics or estrogens (Ferrari et al., 2004). This means that even though individual PPCPs are present in low concentrations that do not elicit significant toxic effects, PPCP mixtures can still exert considerable ecotoxicity. PPCPs found in the aquatic environment usually occur as mixtures, further research on the toxicity of the target compounds should include not only the individual PPCPs but also mixtures of these compounds (Altenburger et al., 2019; Brack et al., 2019).

In addition, this study was based solely on the measured concentrations and adverse effects, but did not take into account the environmental behavior and bioaccumulation. According to Palma et al. (2014), compounds with logKow higher than 3.0 show hydrophobic behavior and have a high potential for bioaccumulation. For example, the bioconcentration factors measured for ibuprofen and naproxen in rainbow trout (*Oncorhynchus mykiss*) bile were 14,000–49,000 (Brozinski et al., 2013) and 500–2300 (Brozinski et al., 2011) respectively, also Coogan et al. (2007) revealed the accumulation of triclosan and triclocarban in filamentous algae species with the bioaccumulation factor ranged from 900–2100 and 1600–2700 respectively, suggesting a high bioconcentration in aquatic organisms (EU, 2007). In this study, around 46% (23 out of 50) of PPCPs have high potentials for bioaccumulation (Table 1) and should be considered as priority at the same risk level. A more thorough re-analysis of their position following careful bioaccumulation considerations is necessary. Conclusions

The 50 selected PPCPs were frequently detected in surface waters of China, with concentrations ranging from ng L^{-1} to the low-g L^{-1}, which were lower or comparable to those reported worldwide in most cases. The risk quotients of the 50 PPCPs based on median concentrations ranged from 2046 for nonylphenol to 0 for phantolide. When considering all the concentrations analyzed in environment, 33 PPCPs posed risks to the most sensitive aquatic organisms, among which 4 chemicals (caffeine, nonylphenol, tonalide, and galaxolide) posed an ecological risk to 100% surface waters, and 15 chemicals (nonylphenol, sulfamethoxazole, di (2-ethylhexyl) phthalate, 17β-ethynyl estradiol, caffeine, tetracycline, 17β-estradiol, estrone, dibutyl phthalate, ibuprofen, carbamazepine, tonalide, galaxolide, triclosan, and bisphenol A) were identified as high or moderate risk according to prioritization indexes. When considering all the aquatic ecosystems, 17β-ethynyl estradiol, caffeine, estrone, and sulfamethoxazole posed high risks to freshwater species.

The results of this study suggest that researchers should attempt to rank PPCPs using multiple approaches for regulatory goals. In this way, the RQ method may be more useful to prioritize substances at a specific region than on a large scale, while the semi-probabilistic risk approach can be used as initial identification for chemicals that posed an aquatic ecological risk at the national scale. The approach of prioritization indexes incorporated various elements that determine target organism exposure to a chemical would reduce uncertainty and could be considered by risk managers who need to make a decision requiring an incremental quantification of risks. The JPCs method that accounts for variability in exposure and toxicity profiles is appropriate to estimate environmental risk for the whole aquatic ecosystem posed by contaminants.

CRediT authorship contribution statement

Na Liu: Conceptualization, Investigation, Methodology, Software, Visualization, Writing - original draft. **Xiaowei Jin:** Conceptualization, Methodology, Supervision, Writing - review & editing. **Chenglian Feng:** Writing - review & editing. **Zijian Wang:** Methodology, Writing - review & editing. **Fengchang Wu:** Supervision, Writing - review & editing. **Andrew C. Johnson:** Methodology, Writing - review & editing. **Hongxia Xiao:** Writing - review & editing. **Henner Hollert:** Writing -

review & editing. **John P. Giesy:** Methodology, Software, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.envint.2019.105454.

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Table S1 Concentrations of 50 PPCPs in surface waters of China

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration ($ng\ L^{-1}$)	Reference
antibiotics					
cephalexin	Hai River	Baiyangdian Lake	2009	25.9	(Cheng, et al. 2014)
cephalexin	Pearl River	Hong Kong coastal waters	December 2006	42.7	(Gulkowska, et al. 2007)
cephalexin	Pearl River	Reservoir, Shenzhen	September 2012	0.83	(Zhu, et al. 2015)
cephalexin	Pearl River	Reservoir, Shenzhen	January 2013	6.04	(Zhu, et al. 2015)
cephalexin	Pearl River	Victoria Harbour	June to August 2008	72.6	(Tu, et al. 2009)
cephalexin	Southeast coast	Qiantang River	October 2010	5.00	(Chen, et al. 2012)
cephalexin	Yangtze River	Huangpu River	November 2014	20.3	(Xu, 2015)
cephalexin	Yangtze River	Jiaxing	April 2015	77.5	(Guo, et al. 2016)
chlorotetracycline	Hai River	Baiyangdian Lake	2009	27.9	(Cheng, et al. 2014)
chlorotetracycline	Hai River	Beitang discharge River	December 2009	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Beiyun River	June 2007	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Beiyun River	December 2007	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Dagu Drainage River	December 2009	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Hai River	June 2007	12.7	(Hu, 2011 a)
chlorotetracycline	Hai River	Hai River	December 2007	10.3	(Hu, 2011 a)
chlorotetracycline	Hai River	Jiyun River	May 2013	12.9	(Zhang, et al. 2014 b)
chlorotetracycline	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Nanyun River	December 2007	37.0	(Hu, 2011 a)
chlorotetracycline	Hai River	Qing River	September 2011	4.80	(Wei, 2013)
chlorotetracycline	Hai River	Qing River	January 2012	5.2	(Wei, 2013)
chlorotetracycline	Hai River	Qing River	May 2012	6.5	(Wei, 2013)
chlorotetracycline	Hai River	Qing River	June 2012	5.8	(Wei, 2013)
chlorotetracycline	Hai River	Reservoirs, Tianjin	July 2005	2.36	(Li, et al. 2014 a)
chlorotetracycline	Hai River	Reservoirs, Tianjin	July 2005	7.95	(Li, et al. 2014 a)
chlorotetracycline	Hai River	Wangyanggou River	June 2013	13641	(Jiang, et al. 2014)
chlorotetracycline	Hai River	Xinkai River	June 2007	31.0	(Hu, 2011 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
chlorotetracycline	Hai River	Xinkai River	December 2007	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
chlorotetracycline	Hai River	Ziya River, Tianjin	June 2007	27.0	(Hu, 2011 a)
chlorotetracycline	Hai River	Ziya River, Tianjin	December 2007	29.0	(Hu, 2011 a)
chlorotetracycline	Pearl River	Dongguan City	January 2010	0	(Chen, et al. 2013)
chlorotetracycline	Pearl River	Heyuan	January 2010	0	(Chen, et al. 2013)
chlorotetracycline	Pearl River	Huizhou	January 2010	0	(Chen, et al. 2013)
chlorotetracycline	Pearl River	Shenzhen	January 2010	0	(Chen, et al. 2013)
chlorotetracycline	Pearl River	Yuen Long River Downstream	June 2010	34.8	(Chen, et al. 2013)
chlorotetracycline	Pearl River	Yuen Long River Middlestream	June 2010	69.6	(Chen, et al. 2013)
chlorotetracycline	Pearl River	Yuen Long River Upstream	June 2010	79.4	(Chen, et al. 2013)
chlorotetracycline	Songliao River	Daliao River	July 2013	23.0	(Qin, et al. 2015).
chlorotetracycline	Songliao River	Liao River	/	1.38	(Bai, et al. 2014)
chlorotetracycline	Songliao River	Yellow Sea coast	July 2010	0.70	(Na, et al. 2011)
chlorotetracycline	Southeast coast	Jiulong River	July 2012	12.0	(Jiang, et al. 2013)
chlorotetracycline	Southeast coast	Jiulong River	January and August 2010	68.0	(Zhang, et al. 2011 a)
chlorotetracycline	Yangtze River	Chao Lake	March 2012	0.2	(Tang, et al. 2015)
chlorotetracycline	Yangtze River	Chao Lake	July 2012	0	(Tang, et al. 2015)
chlorotetracycline	Yangtze River	Chao Lake	September 2012	0	(Tang, et al. 2015)
chlorotetracycline	Yangtze River	Chao Lake	January 2013	1.30	(Tang, et al. 2015)
chlorotetracycline	Yangtze River	Huangpu River	June 2009	0.26	(Jiang, et al. 2011)
chlorotetracycline	Yangtze River	Huangpu River	December 2009	2.15	(Jiang, et al. 2011)
chlorotetracycline	Yangtze River	Rivers in Shahu County	December 2013	37.8	(Yao, et al. 2015)
chlorotetracycline	Yangtze River	Rivers in Shahu County	April 2014	36.0	(Yao, et al. 2015)
chlorotetracycline	Yangtze River	Rivers in Shahu County	August 2014	20.6	(Yao, et al. 2015)
chlorotetracycline	Yangtze River	Rivers in Shahu County	December 2014	40.6	(Yao, et al. 2015)
chlorotetracycline	Yangtze River	Rivers in Shahu County	May 2014	6.64	(Tong, et al. 2014)
chlorotetracycline	Yangtze River	Rivers in Shahu County	October 2011	33.3	(Tong, et al. 2014)
chlorotetracycline	Yangtze River	Tai Lake	2013	3.95	(Hu, et al. 2016)
chlorotetracycline	Yangtze River	Tai Lake	November 2013	2.41	(Zhou, et al. 2016)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
chlorotetracycline	Yangtze River	Tai Lake	May 2014	0	(Zhou, et al. 2016)
chlorotetracycline	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
chlorotetracycline	Yangtze River	Yangtze Estuary	July 2011	0.30	(Yan, et al. 2013 a)
chlorotetracycline	Yangtze River	Yangtze Estuary	January 2012	1.20	(Yan, et al. 2013 a)
chlorotetracycline	Yangtze River	Yangtze Estuary	May 2012	0	(Yan, et al. 2013 a)
chlorotetracycline	Yangtze River	Yangtze River	2013	2.4	(Hu, et al. 2016)
ciprofloxacin	Hai River	Baiyangdian Lake	2009	23.1	(Cheng, et al. 2014)
ciprofloxacin	Hai River	Baiyangdian Lake	August 2008, October 2010	9.45	(Li, et al. 2012)
ciprofloxacin	Hai River	Beitang discharge River	December 2009	1.60	(Hu, 2011 a)
ciprofloxacin	Hai River	Beiyun River	June 2007	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Beiyun River	December 2007	383	(Hu, 2011 a)
ciprofloxacin	Hai River	Chentaizi Drainage River	2010	21.2	(Gao, et al. 2012)
ciprofloxacin	Hai River	Dagu Drainage River	2010	40.3	(Gao, et al. 2012)
ciprofloxacin	Hai River	Dagu Drainage River	December 2009	1.60	(Hu, 2011 a)
ciprofloxacin	Hai River	Duliujian River	2010	31.3	(Gao, et al. 2012)
ciprofloxacin	Hai River	Hai River	2010	11.3	(Gao, et al. 2012)
ciprofloxacin	Hai River	Hai River	June 2007	124	(Hu, 2011 a)
ciprofloxacin	Hai River	Hai River	December 2007	64.7	(Hu, 2011 a)
ciprofloxacin	Hai River	Hai River	August 2009	40.7	(Luo, et al. 2011 a)
ciprofloxacin	Hai River	Hai River	December 2009	52.5	(Luo, et al. 2011 a)
ciprofloxacin	Hai River	Jiyun River	May 2013	11.6	(Zhang, et al. 2014 b)
ciprofloxacin	Hai River	Jiyun River	May 2013	2.68	(Zhang, et al. 2014 b)
ciprofloxacin	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Nanyun River	December 2007	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Qing River	September 2011	405	(Wei, 2013)
ciprofloxacin	Hai River	Qing River	March 2012	581	(Wei, 2013)
ciprofloxacin	Hai River	tributaries	December 2009	182	(Luo, et al. 2011 a)
ciprofloxacin	Hai River	tributaries	August 2010	201	(Luo, et al. 2011 a)
ciprofloxacin	Hai River	tributary	2010	30.2	(Gao, et al. 2012)
ciprofloxacin	Hai River	Urban surface water of Beijing	July 2013 to June 2014	9.87	(Li, et al. 2015 b)
ciprofloxacin	Hai River	Wangyanggou River	June 2013	205	(Jiang, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
ciprofloxacin	Hai River	Xinkai River	June 2007	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Xinkai River	December 2007	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
ciprofloxacin	Hai River	Ziya River, Tianjin	December 2007	0	(Hu, 2011 a)
ciprofloxacin	Huai River	Laizhou Bay	September 2009	31.0	(Zhang, et al. 2012 a)
ciprofloxacin	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	16.9	(Li, et al. 2016)
ciprofloxacin	Pearl River	Guangzhou	/	0	(Huang, et al. 2016)
ciprofloxacin	Pearl River	Haikou	July 2012	317	(Xu, 2013)
ciprofloxacin	Pearl River	tributary, Shaoguan	August 2013	0	(Jiang, 2015)
ciprofloxacin	Pearl River	tributary, Shaoguan	January 2014	0	(Jiang, 2015)
ciprofloxacin	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
ciprofloxacin	Songliao River	Daliao River	July 2013	23.0	(Qin, et al. 2015).
ciprofloxacin	Songliao River	Liao River	/	11.6	(Bai, et al. 2014)
ciprofloxacin	Songliao River	Liao River, Jilin	/	11.2	(Dong, et al. 2016)
ciprofloxacin	Songliao River	Yellow Sea coast	July 2010	9.37	(Na, et al. 2011)
ciprofloxacin	Southeast coast	Jiulong River	July 2012	0	(Jiang, et al. 2013)
ciprofloxacin	Southeast coast	Qiantang River	July 2009	10.2	(Tong, et al. 2011)
ciprofloxacin	Yangtze River	Chao Lake	March 2012	2.40	(Tang, et al. 2015)
ciprofloxacin	Yangtze River	Chao Lake	July 2012	0	(Tang, et al. 2015)
ciprofloxacin	Yangtze River	Chao Lake	September 2012	0	(Tang, et al. 2015)
ciprofloxacin	Yangtze River	Chao Lake	January 2013	9.00	(Tang, et al. 2015)
ciprofloxacin	Yangtze River	Huangpu River	December 2009	0	(Jiang, et al. 2011)
ciprofloxacin	Yangtze River	Huangpu River	December 2009	0.74	(Jiang, et al. 2011)
ciprofloxacin	Yangtze River	Huangpu River	July 2012	2.70	(Zhang, et al. 2014 b)
ciprofloxacin	Yangtze River	Rivers in Shahu County	December 2013	57.2	(Yao, et al. 2017)
ciprofloxacin	Yangtze River	Rivers in Shahu County	April 2014	60.8	(Yao, et al. 2017)
ciprofloxacin	Yangtze River	Rivers in Shahu County	August 2014	9.48	(Yao, et al. 2017)
ciprofloxacin	Yangtze River	Rivers in Shahu County	December 2014	8.73	(Yao, et al. 2017)
ciprofloxacin	Yangtze River	Rivers in Shahu County	May 2014	2.71	(Tong, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
ciprofloxacin	Yangtze River	Rivers in Shahu County	October 2011	5.32	(Tong, et al. 2014)
ciprofloxacin	Yangtze River	Tai Lake	November 2013	0	(Zhou, et al. 2016 a)
ciprofloxacin	Yangtze River	Tai Lake	May 2014	0	(Zhou, et al. 2016 a)
ciprofloxacin	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
ciprofloxacin	Yangtze River	Yangtze Estuary	July 2011	0	(Yan, et al. 2013 a)
ciprofloxacin	Yangtze River	Yangtze Estuary	January 2012	0	(Yan, et al. 2013 a)
ciprofloxacin	Yangtze River	Yangtze Estuary	May 2012	0	(Yan, et al. 2013 a)
ciprofloxacin	Yellow River	Yellow River Delta	April 2014	24.4	(Zhao, et al. 2016)
ciprofloxacin	Yellow River	Yellow River Delta	September 2014	27.6	(Zhao, et al. 2016)
clarithromycin	Huai River	Laizhou Bay	September 2009	0.19	(Zhang, et al. 2012 a)
clarithromycin	Huai River	Rivers adjacent the Jiaozhou Bay	April 2010	1.27	(Zhang, et al. 2013)
clarithromycin	Huai River	Rivers discharging into the Yantai Bays	April 2010	2.80	(Zhang, et al. 2013)
clarithromycin	Pearl River	Dongjiang River	July 2009	0.90	(Zhang, et al. 2012 b)
clarithromycin	Pearl River	Guangzhou	/	434	(Huang, et al. 2016)
clarithromycin	Pearl River	Maoling River	October 2010	0	(Zheng, et al. 2012)
clarithromycin	Pearl River	tributary of Yongjiang River	June 2011	3.00	(Xue, et al. 2013 a)
clarithromycin	Pearl River	Upstream of Pearl River	/	20.0	(Huang, et al. 2016)
clarithromycin	Pearl River	Yongjiang River	June 2011	0.62	(Xue, et al. 2013 a)
clarithromycin	Yangtze River	Chao Lake	January and March 2013	10.6	(Wu, et al. 2014)
clarithromycin	Yangtze River	Dafeng River	October 2010	0	(Zheng, et al. 2012)
clarithromycin	Yangtze River	Dongting Lake	January and March 2013	0	(Wu, et al. 2014)
clarithromycin	Yangtze River	Jingu River	October 2010	0	(Zheng, et al. 2012)
clarithromycin	Yangtze River	Poyang Lake	January and March 2013	0.40	(Wu, et al. 2014)
clarithromycin	Yangtze River	Qin River	October 2010	0.30	(Zheng, et al. 2012)
clarithromycin	Yangtze River	Rivers in Shahu County	December 2013	0	(Yao, et al. 2017)
clarithromycin	Yangtze River	Rivers in Shahu County	April 2014	2.38	(Yao, et al. 2017)
clarithromycin	Yangtze River	Tai Lake	January and March 2013	0	(Wu, et al. 2014)
clarithromycin	Yangtze River	Yangtze River	January and March 2013	18.0	(Wu, et al. 2014)
enrofloxacin	Hai River	Baiyangdian Lake	August 2008, October 2010	1.28	(Li, et al. 2012)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
enrofloxacin	Hai River	Beitang discharge River	December 2009	31.4	(Hu, 2011 a)
enrofloxacin	Hai River	Beiyun River	June 2007	0	(Hu, 2011 a)
enrofloxacin	Hai River	Beiyun River	December 2007	383	(Hu, 2011 a)
enrofloxacin	Hai River	Chentaizi Drainage River	2010	4.40	(Gao, et al. 2012)
enrofloxacin	Hai River	Dagu Drainage River	2010	0.20	(Gao, et al. 2012)
enrofloxacin	Hai River	Dagu Drainage River	December 2009	0.30	(Hu, 2011 a)
enrofloxacin	Hai River	Duliujian River	2010	0	(Gao, et al. 2012)
enrofloxacin	Hai River	Hai River	2010	0.40	(Gao, et al. 2012)
enrofloxacin	Hai River	Hai River	June 2007	0	(Hu, 2011 a)
enrofloxacin	Hai River	Hai River	December 2007	64.7	(Hu, 2011 a)
enrofloxacin	Hai River	Jiyun River	May 2013	3.79	(Zhang, et al. 2014 b)
enrofloxacin	Hai River	Jiyun River	May 2013	0.06	(Zhang, et al. 2014 b)
enrofloxacin	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
enrofloxacin	Hai River	Nanyun River	December 2007	117	(Hu, 2011 a)
enrofloxacin	Hai River	Qing River	September 2011	3.70	(Wei, 2013)
enrofloxacin	Hai River	Qing River	January 2012	10.2	(Wei, 2013)
enrofloxacin	Hai River	Qing River	March 2012	19.9	(Wei, 2013)
enrofloxacin	Hai River	Qing River	June 2012	353	(Wei, 2013)
enrofloxacin	Hai River	tributary	2010	1.20	(Gao, et al. 2012)
enrofloxacin	Hai River	Urban surface water of Beijing	July 2013 to June 2014	0.31	(Li, et al. 2015 b)
enrofloxacin	Hai River	Wangyanggou River	June 2013	332	(Jiang, et al. 2014)
enrofloxacin	Hai River	Xinkai River	June 2007	0	(Hu, 2011 a)
enrofloxacin	Hai River	Xinkai River	December 2007	0	(Hu, 2011 a)
enrofloxacin	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
enrofloxacin	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
enrofloxacin	Hai River	Ziya River, Tianjin	December 2007	0	(Hu, 2011 a)
enrofloxacin	Huai River	Laizhou Bay	September 2009	1.80	(Zhang, et al. 2012 a)
enrofloxacin	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	9.60	(Li, et al. 2016)
enrofloxacin	Pearl River	Guangzhou	/	0	(Huang, et al. 2016)
enrofloxacin	Pearl River	the west of Pearl River Estuary	March 2013	0	(Liang, et al. 2013)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
enrofloxacin	Pearl River	tributary, Shaoguan	August 2013	0	(Jiang, 2015)
enrofloxacin	Pearl River	tributary, Shaoguan	January 2014	0.09	(Jiang, 2015)
enrofloxacin	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
enrofloxacin	Songliao River	Daliao River	July 2013	16.0	(Qin, et al. 2015).
enrofloxacin	Songliao River	Liao River	/	25.7	(Bai, et al. 2014)
enrofloxacin	Songliao River	Liao River, Jilin	/	23.7	(Dong, et al. 2016)
enrofloxacin	Songliao River	Yellow Sea coast	July 2010	1.96	(Na, et al. 2011)
enrofloxacin	Southeast coast	Jiulong River	July 2012	0	(Jiang, et al. 2013)
enrofloxacin	Southeast coast	Jiulong River estuary	2009	3.91	(Zheng, et al. 2011)
enrofloxacin	Southeast coast	Qiantang River	July 2009	14.6	(Tong, et al. 2011)
enrofloxacin	Southeast coast	Tributaries of Jiulong River	2009	4.57	(Zheng, et al. 2011)
enrofloxacin	Yangtze River	Huangpu River	June 2009	0	(Jiang, et al. 2011)
enrofloxacin	Yangtze River	Huangpu River	December 2009	0	(Jiang, et al. 2011)
enrofloxacin	Yangtze River	Huangpu River	July 2012	2.80	(Zhang, et al. 2014 b)
enrofloxacin	Yangtze River	Huangpu River	November 2014	0.45	(Xu, 2015)
enrofloxacin	Yangtze River	Jiaxing	April 2015	38.5	(Guo, et al. 2016)
enrofloxacin	Yangtze River	Rivers in Shahu County	December 2013	96.6	(Yao, et al. 2017)
enrofloxacin	Yangtze River	Rivers in Shahu County	April 2014	61.4	(Yao, et al. 2017)
enrofloxacin	Yangtze River	Rivers in Shahu County	August 2014	5.99	(Yao, et al. 2017)
enrofloxacin	Yangtze River	Rivers in Shahu County	December 2014	4.07	(Yao, et al. 2017)
enrofloxacin	Yangtze River	Rivers in Shahu County	May 2014	1.01	(Tong, et al. 2014)
enrofloxacin	Yangtze River	Rivers in Shahu County	October 2011	16.1	(Tong, et al. 2014)
enrofloxacin	Yangtze River	Tai Lake	November 2013	0.24	(Zhou, et al. 2016 a)
enrofloxacin	Yangtze River	Tai Lake	May 2014	0.17	(Zhou, et al. 2016 a)
enrofloxacin	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
enrofloxacin	Yangtze River	Yangtze Estuary	July 2011	0	(Yan, et al. 2013 a)
enrofloxacin	Yangtze River	Yangtze Estuary	January 2012	0	(Yan, et al. 2013 a)
enrofloxacin	Yangtze River	Yangtze Estuary	May 2012	0.84	(Yan, et al. 2013 a)
enrofloxacin	Yellow River	Yellow River Delta	April 2014	11.8	(Zhao, et al. 2016)
enrofloxacin	Yellow River	Yellow River Delta	September 2014	6.53	(Zhao, et al. 2016)
erythromycin	Hai River	Baiyangdian Lake	2009	3.97	(Cheng, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration ($ng\ L^{-1}$)	Reference
erythromycin	Hai River	Baiyangdian Lake	August 2008, October 2010	19.5	(Li, et al. 2012)
erythromycin	Hai River	Bohai Bay	June 2009	6.49	(Cheng, et al. 2016)
erythromycin	Hai River	Bohai Bay	November 2009	9.20	(Cheng, et al. 2016)
erythromycin	Hai River	Bohai Bay	May 2008	24.8	(Zou, et al. 2011)
erythromycin	Hai River	Chentaizi Drainage River	2010	77.3	(Gao, et al. 2012)
erythromycin	Hai River	Duliujian River	2010	31.0	(Gao, et al. 2012)
erythromycin	Hai River	Hai River	August 2009	463	(Luo, et al. 2011 a)
erythromycin	Hai River	Hai River	December 2009	476	(Luo, et al. 2011 a)
erythromycin	Hai River	Reservoirs, Tianjin	2010	2.13	(Li, et al. 2014 a)
erythromycin	Hai River	Reservoirs, Tianjin	2011	1.22	(Li, et al. 2014 a)
erythromycin	Hai River	Rivers in Beijing	July 2008	711	(Zhou, et al. 2010)
erythromycin	Hai River	Suyun River	May 2008	256	(Zou, et al. 2011)
erythromycin	Hai River	tributaries	December 2009	12.6	(Luo, et al. 2011 a)
erythromycin	Hai River	tributaries	August 2010	11.0	(Luo, et al. 2011 a)
erythromycin	Hai River	Ziya River, Tianjin	May 2008	45.5	(Zou, et al. 2011)
erythromycin	Huai River	Laizhou Bay	September 2009	11.2	(Zhang, et al. 2012 a)
erythromycin	Huai River	Rivers adjacent the Jiaozhou Bay	April 2010	36.0	(Zhang, et al. 2013)
erythromycin	Huai River	Rivers discharging into the Yantai Bays	April 2010	59.6	(Zhang, et al. 2013)
erythromycin	Pearl River	Dongguan City	January 2010	47.2	(Chen, et al. 2013)
erythromycin	Pearl River	Guangzhou	September 2008, February 2009	558	(Yang, et al. 2011)
erythromycin	Pearl River	Guangzhou	/	689	(Huang, et al. 2016)
erythromycin	Pearl River	Heyuan	January 2010	13.6	(Chen, et al. 2013)
erythromycin	Pearl River	Huizhou	January 2010	28.4	(Chen, et al. 2013)
erythromycin	Pearl River	Liuxi River	September 2008, February 2009	6.92	(Yang, et al. 2011)
erythromycin	Pearl River	Shenzhen	January 2010	891	(Chen, et al. 2013)
erythromycin	Pearl River	Shijing River	September 2008, February 2009	697	(Yang, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
erythromycin	Pearl River	tributary of Yongjiang River	June 2011	43.5	(Xue, et al. 2013 a)
erythromycin	Pearl River	Upstream of Pearl River	/	106	(Huang, et al. 2016)
erythromycin	Pearl River	Yongjiang River	June 2011	7.70	(Xue, et al. 2013 a)
erythromycin	Pearl River	Yuen Long River Downstream	June 2010	36.7	(Chen, et al. 2013)
erythromycin	Pearl River	Yuen Long River Middlestream	June 2010	33.7	(Chen, et al. 2013)
erythromycin	Pearl River	Yuen Long River Upstream	June 2010	16.5	(Chen, et al. 2013)
erythromycin	Songliao River	Liao River, Jilin	/	103	(Dong, et al. 2016)
erythromycin	Southeast coast	Jiulong River	July 2012	0.41	(Jiang, et al. 2013)
erythromycin	Yangtze River	Chao Lake	March 2012	8.20	(Tang, et al. 2015)
erythromycin	Yangtze River	Chao Lake	July 2012	1.20	(Tang, et al. 2015)
erythromycin	Yangtze River	Chao Lake	September 2012	5.10	(Tang, et al. 2015)
erythromycin	Yangtze River	Chao Lake	January 2013	1.50	(Tang, et al. 2015)
erythromycin	Yangtze River	Chao Lake	January and March 2013	20.7	(Wu, et al. 2014)
erythromycin	Yangtze River	Chongqing	January 2013	19.0	(Yan, et al. 2013 b)
erythromycin	Yangtze River	Chongqing	/	6.00	(Chang, et al. 2010)
erythromycin	Yangtze River	Dongting Lake	January and March 2013	8.40	(Wu, et al. 2014)
erythromycin	Yangtze River	Huangpu River	July 2012	3.90	(Zhang, et al. 2014 b)
erythromycin	Yangtze River	Huangpu River	November 2014	8.14	(Xu, 2015)
erythromycin	Yangtze River	Jialing River	/	17.5	(Chang, et al. 2010)
erythromycin	Yangtze River	Nanjing	October 2013	13.0	(Liu, et al. 2015)
erythromycin	Yangtze River	Poyang Lake	January and March 2013	1.10	(Wu, et al. 2014)
erythromycin	Yangtze River	Rivers in Shahu County	December 2013	1418	(Yao, et al. 2017)
erythromycin	Yangtze River	Rivers in Shahu County	April 2014	254	(Yao, et al. 2017)
erythromycin	Yangtze River	Rivers in Shahu County	August 2014	772	(Yao, et al. 2017)
erythromycin	Yangtze River	Rivers in Shahu County	December 2014	546	(Yao, et al. 2017)
erythromycin	Yangtze River	Tai Lake	2013	0	(Hu, et al. 2016)
erythromycin	Yangtze River	Tai Lake	January and March 2013	6.70	(Wu, et al. 2014)
erythromycin	Yangtze River	Tributary in Chongqing	/	8.50	(Chang, et al. 2010)
erythromycin	Yangtze River	Yangtze Estuary	January 2011	0.53	(Yan, et al. 2013 a)
erythromycin	Yangtze River	Yangtze Estuary	July 2011	0.80	(Yan, et al. 2013 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
erythromycin	Yangtze River	Yangtze Estuary	January 2012	9.39	(Yan, et al. 2013 a)
erythromycin	Yangtze River	Yangtze Estuary	May 2012	9.68	(Yan, et al. 2013 a)
erythromycin	Yangtze River	Yangtze Estuary	Autumn 2013	20.8	(Zhao, et al. 2017)
erythromycin	Yangtze River	Yangtze Estuary	Spring 2014	51.8	(Zhao, et al. 2017)
erythromycin	Yangtze River	Yangtze Estuary	Summer 2013	9.43	(Zhao, et al. 2017)
erythromycin	Yangtze River	Yangtze Estuary	Winter 2013	64.3	(Zhao, et al. 2017)
erythromycin	Yangtze River	Yangtze River	2013	0	(Hu, et al. 2016)
erythromycin	Yangtze River	Yangtze River	January and March 2013	296	(Wu, et al. 2014)
norfloxacin	Hai River	Baiyangdian Lake	August 2008, October 2010	28.6	(Li, et al. 2012)
norfloxacin	Hai River	Beitang discharge River	December 2009	41.4	(Hu, 2011 a)
norfloxacin	Hai River	Beiyun River	June 2007	278	(Hu, 2011 a)
norfloxacin	Hai River	Beiyun River	December 2007	466	(Hu, 2011 a)
norfloxacin	Hai River	Bohai Bay	June 2009	16.0	(Cheng, et al. 2016)
norfloxacin	Hai River	Bohai Bay	November 2009	10.2	(Cheng, et al. 2016)
norfloxacin	Hai River	Bohai Bay	May 2008	256	(Zou, et al. 2011)
norfloxacin	Hai River	Chentaizi Drainage River	2010	462	(Gao, et al. 2012)
norfloxacin	Hai River	Dagu Drainage River	2010	225	(Gao, et al. 2012)
norfloxacin	Hai River	Dagu Drainage River	December 2009	19.4	(Hu, 2011 a)
norfloxacin	Hai River	Douhe River	May 2008	30.8	(Zou, et al. 2011)
norfloxacin	Hai River	Duliujian River	2010	128	(Gao, et al. 2012)
norfloxacin	Hai River	Hai River	2010	65.5	(Gao, et al. 2012)
norfloxacin	Hai River	Hai River	June 2007	76.7	(Hu, 2011 a)
norfloxacin	Hai River	Hai River	December 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Nanyun River	December 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Qing River	September 2011	404	(Wei, 2013)
norfloxacin	Hai River	Qing River	March 2012	1049	(Wei, 2013)
norfloxacin	Hai River	Suyun River	May 2008	0	(Zou, et al. 2011)
norfloxacin	Hai River	tributary	2010	62.1	(Gao, et al. 2012)
norfloxacin	Hai River	Urban surface water of Beijing	July 2013 to June 2014	27.6	(Li, et al. 2015 b)
norfloxacin	Hai River	Wangyanggou River	June 2013	260	(Jiang, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
norfloxacin	Hai River	Xinkai River	June 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Xinkai River	December 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
norfloxacin	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Ziya River, Tianjin	December 2007	0	(Hu, 2011 a)
norfloxacin	Hai River	Ziya River, Tianjin	May 2008	0	(Zou, et al. 2011)
norfloxacin	Huai River	Laizhou Bay	September 2009	40.0	(Zhang, et al. 2012 a)
norfloxacin	Huai River	Rivers adjacent the Jiaozhou Bay	April 2010	7.39	(Zhang, et al. 2013)
norfloxacin	Huai River	Rivers discharging into the Yantai Bays	April 2010	7.89	(Zhang, et al. 2013)
norfloxacin	Pearl River	Dongguan City	January 2010	0	(Chen, et al. 2013)
norfloxacin	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	12.5	(Li, et al. 2016)
norfloxacin	Pearl River	Guangzhou	/	0	(Huang, et al. 2016)
norfloxacin	Pearl River	Heyuan	January 2010	0	(Chen, et al. 2013)
norfloxacin	Pearl River	Huizhou	January 2010	0	(Chen, et al. 2013)
norfloxacin	Pearl River	Shenzhen	January 2010	38.5	(Chen, et al. 2013)
norfloxacin	Pearl River	the west of Pearl River Estuary	March 2013	59.0	(Liang, et al. 2013)
norfloxacin	Pearl River	tributary, Shaoguan	August 2013	4.56	(Jiang, 2015)
norfloxacin	Pearl River	tributary, Shaoguan	January 2014	1.23	(Jiang, 2015)
norfloxacin	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
norfloxacin	Pearl River	Victoria Harbour	June to August 2008	9.14	(Tu, et al. 2009)
norfloxacin	Pearl River	Yuen Long River Downstream	June 2010	0	(Chen, et al. 2013)
norfloxacin	Pearl River	Yuen Long River Middlestream	June 2010	0	(Chen, et al. 2013)
norfloxacin	Pearl River	Yuen Long River Upstream	June 2010	0	(Chen, et al. 2013)
norfloxacin	Songliao River	Daliao River	July 2013	214	(Qin, et al. 2015).
norfloxacin	Songliao River	Liao River	/	49.0	(Bai, et al. 2014)
norfloxacin	Songliao River	Liao River, Jilin	/	35.8	(Dong, et al. 2016)
norfloxacin	Songliao River	Yellow Sea coast	July 2010	25.5	(Na, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
norfloxacin	Southeast coast	Jiulong River	July 2012	0	(Jiang, et al. 2013)
norfloxacin	Southeast coast	Qiantang River	October 2010	250	(Chen, et al. 2012)
norfloxacin	Southeast coast	Qiantang River	July 2009	10.0	(Tong, et al. 2011)
norfloxacin	Yangtze River	Chao Lake	March 2012	6.60	(Tang, et al. 2015)
norfloxacin	Yangtze River	Chao Lake	July 2012	0	(Tang, et al. 2015)
norfloxacin	Yangtze River	Chao Lake	September 2012	0	(Tang, et al. 2015)
norfloxacin	Yangtze River	Chao Lake	January 2013	16.6	(Tang, et al. 2015)
norfloxacin	Yangtze River	Chongqing	January 2013	6.00	(Yan, et al. 2013 b)
norfloxacin	Yangtze River	Chongqing	/	0	(Chang, et al. 2010)
norfloxacin	Yangtze River	Huangpu River	June 2009	0	(Jiang, et al. 2011)
norfloxacin	Yangtze River	Huangpu River	December 2009	0	(Jiang, et al. 2011)
norfloxacin	Yangtze River	Huangpu River	July 2012	2.60	(Zhang, et al. 2014 b)
norfloxacin	Yangtze River	Jialing River	/	0	(Chang, et al. 2010)
norfloxacin	Yangtze River	Jiaxing	April 2015	105	(Guo, et al. 2016)
norfloxacin	Yangtze River	Rivers in Shahu County	December 2013	142	(Yao, et al. 2017)
norfloxacin	Yangtze River	Rivers in Shahu County	April 2014	159	(Yao, et al. 2017)
norfloxacin	Yangtze River	Rivers in Shahu County	August 2014	31.7	(Yao, et al. 2017)
norfloxacin	Yangtze River	Rivers in Shahu County	December 2014	23.9	(Yao, et al. 2017)
norfloxacin	Yangtze River	Rivers in Shahu County	May 2014	38.2	(Tong, et al. 2014)
norfloxacin	Yangtze River	Rivers in Shahu County	October 2011	1.33	(Tong, et al. 2014)
norfloxacin	Yangtze River	Tai Lake	2013	0.45	(Hu, et al. 2016)
norfloxacin	Yangtze River	Tai Lake	November 2013	0	(Zhou, et al. 2016 a)
norfloxacin	Yangtze River	Tai Lake	May 2014	0.05	(Zhou, et al. 2016 a)
norfloxacin	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
norfloxacin	Yangtze River	Yangtze Estuary	July 2011	0	(Yan, et al. 2013 a)
norfloxacin	Yangtze River	Yangtze Estuary	January 2012	0	(Yan, et al. 2013 a)
norfloxacin	Yangtze River	Yangtze Estuary	May 2012	0	(Yan, et al. 2013 a)
norfloxacin	Yangtze River	Yangtze River	2013	1.60	(Hu, et al. 2016)
norfloxacin	Yellow River	Middle and lower part	June 2006	152	(Xu, et al. 2009)
norfloxacin	Yellow River	six tributrles	June 2006	240	(Xu, et al. 2009)
norfloxacin	Yellow River	Yellow River Delta	April 2014	30.0	(Zhao, et al. 2016)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
norfloxacin	Yellow River	Yellow River Delta	September 2014	45.5	(Zhao, et al. 2016)
ofloxacin	Hai River	Baiyangdian Lake	August 2008, October 2010	9.23	(Li, et al. 2012)
ofloxacin	Hai River	Beitang discharge River	December 2009	79.6	(Hu, 2011 a)
ofloxacin	Hai River	Beiyun River	June 2007	92.0	(Hu, 2011 a)
ofloxacin	Hai River	Beiyun River	December 2007	202	(Hu, 2011 a)
ofloxacin	Hai River	Bohai Bay	June 2009	2.00	(Cheng, et al. 2016)
ofloxacin	Hai River	Bohai Bay	November 2009	2.00	(Cheng, et al. 2016)
ofloxacin	Hai River	Bohai Bay	May 2008	213	(Zou, et al. 2011)
ofloxacin	Hai River	Chentaizi Drainage River	2010	276	(Gao, et al. 2012)
ofloxacin	Hai River	Dagu Drainage River	2010	206	(Gao, et al. 2012)
ofloxacin	Hai River	Dagu Drainage River	December 2009	82.7	(Hu, 2011 a)
ofloxacin	Hai River	Duliujian River	2010	69.3	(Gao, et al. 2012)
ofloxacin	Hai River	Hai River	2010	36.4	(Gao, et al. 2012)
ofloxacin	Hai River	Hai River	June 2007	30.7	(Hu, 2011 a)
ofloxacin	Hai River	Hai River	December 2007	105	(Hu, 2011 a)
ofloxacin	Hai River	Hai River	August 2009	57.8	(Luo, et al. 2011 a)
ofloxacin	Hai River	Hai River	December 2009	62.3	(Luo, et al. 2011 a)
ofloxacin	Hai River	Jiyun River	May 2013	27.9	(Zhang, et al. 2014 b)
ofloxacin	Hai River	Jiyun River	May 2013	1.64	(Zhang, et al. 2014 b)
ofloxacin	Hai River	Nanyun River	June 2007	95.0	(Hu, 2011 a)
ofloxacin	Hai River	Nanyun River	December 2007	102	(Hu, 2011 a)
ofloxacin	Hai River	Qing River	September 2011	913	(Wei, 2013)
ofloxacin	Hai River	Qing River	January 2012	3484	(Wei, 2013)
ofloxacin	Hai River	Qing River	March 2012	7632	(Wei, 2013)
ofloxacin	Hai River	Qing River	June 2012	1510	(Wei, 2013)
ofloxacin	Hai River	Suyun River	May 2008	0	(Zou, et al. 2011)
ofloxacin	Hai River	tributaries	December 2009	113	(Luo, et al. 2011 a)
ofloxacin	Hai River	tributaries	August 2010	121	(Luo, et al. 2011 a)
ofloxacin	Hai River	tributary	2010	42.5	(Gao, et al. 2012)
ofloxacin	Hai River	Urban surface water of Beijing	July 2013 to June 2014	93.5	(Li, et al. 2015 b)
ofloxacin	Hai River	Wangyanggou River	June 2013	1583	(Jiang, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
ofloxacin	Hai River	Xinkai River	June 2007	93.0	(Hu, 2011 a)
ofloxacin	Hai River	Xinkai River	December 2007	97.0	(Hu, 2011 a)
ofloxacin	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
ofloxacin	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
ofloxacin	Hai River	Ziya River, Tianjin	December 2007	104	(Hu, 2011 a)
ofloxacin	Huai River	Laizhou Bay	September 2009	0.24	(Zhang, et al. 2012 a)
ofloxacin	Pearl River	Dongguan City	January 2010	0	(Chen, et al. 2013)
ofloxacin	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	11.0	(Li, et al. 2016)
ofloxacin	Pearl River	Guangzhou	/	0	(Huang, et al. 2016)
ofloxacin	Pearl River	Haikou	July 2012	341	(Xu, 2013)
ofloxacin	Pearl River	Heyuan	January 2010	0	(Chen, et al. 2013)
ofloxacin	Pearl River	Hong Kong	September 2014	1.14	(Deng, et al. 2016)
ofloxacin	Pearl River	Huizhou	January 2010	0	(Chen, et al. 2013)
ofloxacin	Pearl River	Shenzhen	January 2010	52.4	(Chen, et al. 2013)
ofloxacin	Pearl River	the west of Pearl River Estuary	March 2013	7.63	(Liang, et al. 2013)
ofloxacin	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
ofloxacin	Pearl River	Victoria Harbour	June to August 2008	95.9	(Tu, et al. 2009)
ofloxacin	Pearl River	Yuen Long River Downstream	June 2010	119	(Chen, et al. 2013)
ofloxacin	Pearl River	Yuen Long River Middlestream	June 2010	91.2	(Chen, et al. 2013)
ofloxacin	Pearl River	Yuen Long River Upstream	June 2010	67.2	(Chen, et al. 2013)
ofloxacin	Songliao River	Daliao River	July 2013	200	(Qin, et al. 2015).
ofloxacin	Songliao River	Liao River	/	37.9	(Bai, et al. 2014)
ofloxacin	Songliao River	Liao River, Jilin	/	67.1	(Dong, et al. 2016)
ofloxacin	Songliao River	Yellow Sea coast	July 2010	0	(Na, et al. 2011)
ofloxacin	Southeast coast	Jiulong River	July 2012	4.29	(Jiang, et al. 2013)
ofloxacin	Southeast coast	Jiulong River estuary	2009	2.56	(Zheng, et al. 2011)
ofloxacin	Southeast coast	Qiantang River	October 2010	72.5	(Chen, et al. 2012)
ofloxacin	Southeast coast	Qiantang River	July 2009	48.7	(Tong, et al. 2011)
ofloxacin	Southeast coast	Tributaries of Jiulong River	2009	1.79	(Zheng, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
ofloxacin	Yangtze River	Chao Lake	March 2012	20.0	(Tang, et al. 2015)
ofloxacin	Yangtze River	Chao Lake	July 2012	2.40	(Tang, et al. 2015)
ofloxacin	Yangtze River	Chao Lake	September 2012	13.4	(Tang, et al. 2015)
ofloxacin	Yangtze River	Chao Lake	January 2013	4.40	(Tang, et al. 2015)
ofloxacin	Yangtze River	Chongqing	January 2013	9.30	(Yan, et al. 2013 b)
ofloxacin	Yangtze River	Chongqing	/	24.7	(Chang, et al. 2010)
ofloxacin	Yangtze River	Huangpu River	June 2009	1.54	(Jiang, et al. 2011)
ofloxacin	Yangtze River	Huangpu River	December 2009	2.55	(Jiang, et al. 2011)
ofloxacin	Yangtze River	Huangpu River	July 2012	6.50	(Zhang, et al. 2014 b)
ofloxacin	Yangtze River	Huangpu River	November 2014	6.48	(Xu, 2015)
ofloxacin	Yangtze River	Jialing River	/	6.50	(Chang, et al. 2010)
ofloxacin	Yangtze River	Jiaxing	April 2015	51.2	(Guo, et al. 2016)
ofloxacin	Yangtze River	Rivers in Shahu County	December 2013	18.0	(Yao, et al. 2017)
ofloxacin	Yangtze River	Rivers in Shahu County	April 2014	3.65	(Yao, et al. 2017)
ofloxacin	Yangtze River	Rivers in Shahu County	August 2014	4.41	(Yao, et al. 2017)
ofloxacin	Yangtze River	Rivers in Shahu County	December 2014	4.68	(Yao, et al. 2017)
ofloxacin	Yangtze River	Rivers in Shahu County	May 2014	14.6	(Tong, et al. 2014)
ofloxacin	Yangtze River	Rivers in Shahu County	October 2011	4.26	(Tong, et al. 2014)
ofloxacin	Yangtze River	Tai Lake	2013	3.35	(Hu, et al. 2016)
ofloxacin	Yangtze River	Tai Lake	November 2013	1.05	(Zhou, et al. 2016 a)
ofloxacin	Yangtze River	Tai Lake	May 2014	0.07	(Zhou, et al. 2016 a)
ofloxacin	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
ofloxacin	Yangtze River	Yangtze Estuary	July 2011	0	(Yan, et al. 2013 a)
ofloxacin	Yangtze River	Yangtze Estuary	January 2012	0	(Yan, et al. 2013 a)
ofloxacin	Yangtze River	Yangtze Estuary	May 2012	0.85	(Yan, et al. 2013 a)
ofloxacin	Yangtze River	Yangtze River	2013	1.60	(Hu, et al. 2016)
ofloxacin	Yellow River	Middle and lower part	June 2006	114	(Xu, et al. 2009)
ofloxacin	Yellow River	six tributrles	June 2006	109	(Xu, et al. 2009)
ofloxacin	Yellow River	Yellow River Delta	April 2014	10.6	(Zhao, et al. 2016)
ofloxacin	Yellow River	Yellow River Delta	September 2014	3.00	(Zhao, et al. 2016)
oxytetracycline	Hai River	Beitang discharge River	December 2009	10.6	(Hu, 2011 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
oxytetracycline	Hai River	Beiyun River	June 2007	464	(Hu, 2011 a)
oxytetracycline	Hai River	Beiyun River	December 2007	1080	(Hu, 2011 a)
oxytetracycline	Hai River	Bohai Bay	June 2009	5.00	(Cheng, et al. 2016)
oxytetracycline	Hai River	Bohai Bay	November 2009	22.4	(Cheng, et al. 2016)
oxytetracycline	Hai River	Bohai Bay	May 2008	9.67	(Zou, et al. 2011)
oxytetracycline	Hai River	Dagu Drainage River	December 2009	45.7	(Hu, 2011 a)
oxytetracycline	Hai River	Douhe River	May 2008	71.8	(Zou, et al. 2011)
oxytetracycline	Hai River	Duliujian River	May 2008	0	(Zou, et al. 2011)
oxytetracycline	Hai River	Hai River	June 2007	0	(Hu, 2011 a)
oxytetracycline	Hai River	Hai River	December 2007	10.0	(Hu, 2011 a)
oxytetracycline	Hai River	Hai River	August 2009	10.6	(Luo, et al. 2011 a)
oxytetracycline	Hai River	Hai River	December 2009	6.67	(Luo, et al. 2011 a)
oxytetracycline	Hai River	Hai River	May 2008	0	(Zou, et al. 2011)
oxytetracycline	Hai River	Jiyun River	May 2013	16.1	(Zhang, et al. 2014 b)
oxytetracycline	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
oxytetracycline	Hai River	Nanyun River	December 2007	26.0	(Hu, 2011 a)
oxytetracycline	Hai River	Qing River	September 2011	16.3	(Wei, 2013)
oxytetracycline	Hai River	Qing River	January 2012	409	(Wei, 2013)
oxytetracycline	Hai River	Qing River	March 2012	622	(Wei, 2013)
oxytetracycline	Hai River	Qing River	June 2012	128	(Wei, 2013)
oxytetracycline	Hai River	Reservoirs, Tianjin	2010	6.16	(Li, et al. 2014 a)
oxytetracycline	Hai River	Reservoirs, Tianjin	2011	1.63	(Li, et al. 2014 a)
oxytetracycline	Hai River	Suyun River	May 2008	0	(Zou, et al. 2011)
oxytetracycline	Hai River	tributaries	December 2009	560	(Luo, et al. 2011 a)
oxytetracycline	Hai River	tributaries	August 2010	303	(Luo, et al. 2011 a)
oxytetracycline	Hai River	Wangyanggou River	June 2013	97434	(Jiang, et al. 2014)
oxytetracycline	Hai River	Xinkai River	June 2007	0	(Hu, 2011 a)
oxytetracycline	Hai River	Xinkai River	December 2007	52.0	(Hu, 2011 a)
oxytetracycline	Hai River	Yongding River	May 2008	0	(Zou, et al. 2011)
oxytetracycline	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
oxytetracycline	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
oxytetracycline	Hai River	Ziya River, Tianjin	December 2007	26.0	(Hu, 2011 a)
oxytetracycline	Hai River	Ziya River, Tianjin	May 2008	36.0	(Zou, et al. 2011)
oxytetracycline	Pearl River	Dongguan City	January 2010	0	(Chen, et al. 2013)
oxytetracycline	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	8.02	(Li, et al. 2016)
oxytetracycline	Pearl River	Guangzhou	/	0	(Huang, et al. 2016)
oxytetracycline	Pearl River	Heyuan	January 2010	0	(Chen, et al. 2013)
oxytetracycline	Pearl River	Huizhou	January 2010	0	(Chen, et al. 2013)
oxytetracycline	Pearl River	Shenzhen	January 2010	18.8	(Chen, et al. 2013)
oxytetracycline	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
oxytetracycline	Pearl River	Victoria Harbour	June to August 2008	2.20	(Tu, et al. 2009)
oxytetracycline	Pearl River	Yuen Long River Downstream	June 2010	8.40	(Chen, et al. 2013)
oxytetracycline	Pearl River	Yuen Long River Middlestream	June 2010	16.1	(Chen, et al. 2013)
oxytetracycline	Pearl River	Yuen Long River Upstream	June 2010	29.3	(Chen, et al. 2013)
oxytetracycline	Songliao River	Daliao River	July 2013	115	(Qin, et al. 2015).
oxytetracycline	Songliao River	Liao River	/	22.4	(Bai, et al. 2014)
oxytetracycline	Songliao River	Liao River, Jilin	/	175	(Dong, et al. 2016)
oxytetracycline	Songliao River	Yellow Sea coast	July 2010	2.17	(Na, et al. 2011)
oxytetracycline	Southeast coast	Jiulong River	July 2012	1.15	(Jiang, et al. 2013)
oxytetracycline	Southeast coast	Jiulong River	January and August 2010	24.1	(Zhang, et al. 2011 a)
oxytetracycline	Yangtze River	Chao Lake	March 2012	1.00	(Tang, et al. 2015)
oxytetracycline	Yangtze River	Chao Lake	July 2012	0	(Tang, et al. 2015)
oxytetracycline	Yangtze River	Chao Lake	September 2012	0	(Tang, et al. 2015)
oxytetracycline	Yangtze River	Chao Lake	January 2013	0.90	(Tang, et al. 2015)
oxytetracycline	Yangtze River	Chongqing	/	2.50	(Chang, et al. 2010)
oxytetracycline	Yangtze River	Huangpu River	June 2009	23.7	(Jiang, et al. 2011)
oxytetracycline	Yangtze River	Huangpu River	December 2009	8.53	(Jiang, et al. 2011)
oxytetracycline	Yangtze River	Huangpu River	July 2012	4.20	(Zhang, et al. 2014 b)
oxytetracycline	Yangtze River	Huangpu River	July 2012	78.3	(Zhang, et al. 2014 b)
oxytetracycline	Yangtze River	Jialing River	/	2.50	(Chang, et al. 2010)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
oxytetracycline	Yangtze River	Rivers in Shahu County	December 2013	57.3	(Yao, et al. 2017)
oxytetracycline	Yangtze River	Rivers in Shahu County	April 2014	10.2	(Yao, et al. 2017)
oxytetracycline	Yangtze River	Rivers in Shahu County	August 2014	4.37	(Yao, et al. 2017)
oxytetracycline	Yangtze River	Rivers in Shahu County	December 2014	12.7	(Yao, et al. 2017)
oxytetracycline	Yangtze River	Rivers in Shahu County	May 2014	8.38	(Tong, et al. 2014)
oxytetracycline	Yangtze River	Rivers in Shahu County	October 2011	1.91	(Tong, et al. 2014)
oxytetracycline	Yangtze River	Tai Lake	2013	1.30	(Hu, et al. 2016)
oxytetracycline	Yangtze River	Tai Lake	2013	5.10	(Hu, et al. 2016)
oxytetracycline	Yangtze River	Tai Lake	November 2013	1.72	(Zhou, et al. 2016 a)
oxytetracycline	Yangtze River	Tai Lake	May 2014	0	(Zhou, et al. 2016 a)
oxytetracycline	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
oxytetracycline	Yangtze River	Yangtze Estuary	July 2011	0	(Yan, et al. 2013 a)
oxytetracycline	Yangtze River	Yangtze Estuary	January 2012	0.10	(Yan, et al. 2013 a)
oxytetracycline	Yangtze River	Yangtze Estuary	May 2012	11.6	(Yan, et al. 2013 a)
oxytetracycline	Yellow River	Yellow River Delta	April 2014	15.8	(Zhao, et al. 2016)
oxytetracycline	Yellow River	Yellow River Delta	September 2014	21.3	(Zhao, et al. 2016)
roxithromycin	Hai River	Baiyangdian Lake	August 2008, October 2010	27.2	(Li, et al. 2012)
roxithromycin	Hai River	Bohai Bay	June 2009	6.25	(Cheng, et al. 2016)
roxithromycin	Hai River	Bohai Bay	November 2009	2.50	(Cheng, et al. 2016)
roxithromycin	Hai River	Bohai Bay	May 2008	27.2	(Zou, et al. 2011)
roxithromycin	Hai River	Chentaizi Drainage River	2010	1046	(Gao, et al. 2012)
roxithromycin	Hai River	Dagu Drainage River	2010	470	(Gao, et al. 2012)
roxithromycin	Hai River	Duliujian River	2010	269	(Gao, et al. 2012)
roxithromycin	Hai River	Hai River	2010	10.5	(Gao, et al. 2012)
roxithromycin	Hai River	Hai River	August 2009	8.19	(Luo, et al. 2011 a)
roxithromycin	Hai River	Hai River	December 2009	422	(Luo, et al. 2011 a)
roxithromycin	Hai River	Hai River	cold season 2012	2.13	(Sun, et al. 2015)
roxithromycin	Hai River	Hai River	warm season 2013	2.22	(Sun, et al. 2015)
roxithromycin	Hai River	Qing River	September 2011	75.4	(Wei, 2013)
roxithromycin	Hai River	Qing River	January 2012	253	(Wei, 2013)
roxithromycin	Hai River	Qing River	March 2012	115	(Wei, 2013)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
roxithromycin	Hai River	Qing River	June 2012	104	(Wei, 2013)
roxithromycin	Hai River	Reservoirs, Tianjin	2010	2.19	(Li, et al. 2014 a)
roxithromycin	Hai River	Reservoirs, Tianjin	2011	2.81	(Li, et al. 2014 a)
roxithromycin	Hai River	Suyun River	May 2008	15.0	(Zou, et al. 2011)
roxithromycin	Hai River	tributaries	December 2009	823	(Luo, et al. 2011 a)
roxithromycin	Hai River	tributaries	August 2010	666	(Luo, et al. 2011 a)
roxithromycin	Hai River	tributary	2010	28.3	(Gao, et al. 2012)
roxithromycin	Hai River	Ziya River, Tianjin	May 2008	24.0	(Zou, et al. 2011)
roxithromycin	Huai River	Huai River	cold season 2012	0.48	(Sun, et al. 2015)
roxithromycin	Huai River	Huai River	warm season 2013	7.19	(Sun, et al. 2015)
roxithromycin	Huai River	Laizhou Bay	September 2009	0.38	(Zhang, et al. 2012 a)
roxithromycin	Pearl River	Dongguan City	January 2010	0	(Chen, et al. 2013)
roxithromycin	Pearl River	Dongjiang River	July 2009	2.10	(Zhang, et al. 2012 b)
roxithromycin	Pearl River	Guangzhou	September 2008, February 2009	558	(Yang, et al. 2011)
roxithromycin	Pearl River	Guangzhou	/	827	(Huang, et al. 2016)
roxithromycin	Pearl River	Heyuan	January 2010	0	(Chen, et al. 2013)
roxithromycin	Pearl River	Huizhou	January 2010	0	(Chen, et al. 2013)
roxithromycin	Pearl River	Liuxi River	September 2008, February 2009	6.92	(Yang, et al. 2011)
roxithromycin	Pearl River	Maoling River	October 2010	0.08	(Zheng, et al. 2012)
roxithromycin	Pearl River	Reservoir, Shenzhen	September 2012	0.79	(Zhu, et al. 2015)
roxithromycin	Pearl River	Reservoir, Shenzhen	January 2013	2.21	(Zhu, et al. 2015)
roxithromycin	Pearl River	Shenzhen	January 2010	349	(Chen, et al. 2013)
roxithromycin	Pearl River	Shijing River	September 2008, February 2009	697	(Yang, et al. 2011)
roxithromycin	Pearl River	the west of Pearl River Estuary	March 2013	0	(Liang, et al. 2013)
roxithromycin	Pearl River	tributary of Yongjiang River	June 2011	4.90	(Xue, et al. 2013 a)
roxithromycin	Pearl River	tributary, Shaoguan	August 2013	0	(Jiang, 2015)
roxithromycin	Pearl River	tributary, Shaoguan	January 2014	0	(Jiang, 2015)
roxithromycin	Pearl River	Upstream of Pearl River	/	32.0	(Huang, et al. 2016)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
roxithromycin	Pearl River	Victoria Harbour	June to August 2008	6.87	(Tu, et al. 2009)
roxithromycin	Pearl River	Yongjiang River	June 2011	0.57	(Xue, et al. 2013 a)
roxithromycin	Pearl River	Yuen Long River Downstream	June 2010	12.3	(Chen, et al. 2013)
roxithromycin	Pearl River	Yuen Long River Middlestream	June 2010	8.40	(Chen, et al. 2013)
roxithromycin	Pearl River	Yuen Long River Upstream	June 2010	0.95	(Chen, et al. 2013)
roxithromycin	Songliao River	Daliao River	July 2013	57.0	(Qin, et al. 2015).
roxithromycin	Songliao River	Liao River	/	36.5	(Bai, et al. 2014)
roxithromycin	Songliao River	Liao River	cold season 2012	0.72	(Sun, et al. 2015)
roxithromycin	Songliao River	Liao River	warm season 2013	1.78	(Sun, et al. 2015)
roxithromycin	Songliao River	Liao River, Jilin	/	48.2	(Dong, et al. 2016)
roxithromycin	Southeast coast	Jiulong River	July 2012	6.14	(Jiang, et al. 2013)
roxithromycin	Yangtze River	Chongqing	January 2013	8.90	(Yan, et al. 2013 b)
roxithromycin	Yangtze River	Chongqing	/	2.50	(Chang, et al. 2010)
roxithromycin	Yangtze River	Huangpu River	June 2009	0.76	(Jiang, et al. 2011)
roxithromycin	Yangtze River	Huangpu River	December 2009	4.55	(Jiang, et al. 2011)
roxithromycin	Yangtze River	Huangpu River	July 2012	0.90	(Zhang, et al. 2014 b)
roxithromycin	Yangtze River	Huangpu River	November 2014	0.58	(Xu, 2015)
roxithromycin	Yangtze River	Jialing River	/	20.8	(Chang, et al. 2010)
roxithromycin	Yangtze River	Nanjing	October 2013	19.5	(Liu, et al. 2015)
roxithromycin	Yangtze River	Rivers in Shahu County	December 2013	0	(Yao, et al. 2017)
roxithromycin	Yangtze River	Rivers in Shahu County	April 2014	0	(Yao, et al. 2017)
roxithromycin	Yangtze River	Rivers in Shahu County	August 2014	92.5	(Yao, et al. 2017)
roxithromycin	Yangtze River	Rivers in Shahu County	December 2014	22.6	(Yao, et al. 2017)
roxithromycin	Yangtze River	Rivers in Shahu County	May 2014	3.08	(Tong, et al. 2014)
roxithromycin	Yangtze River	Rivers in Shahu County	October 2011	4.79	(Tong, et al. 2014)
roxithromycin	Yangtze River	Tai Lake	November 2013	0.06	(Zhou, et al. 2016 a)
roxithromycin	Yangtze River	Tai Lake	May 2014	0	(Zhou, et al. 2016 a)
roxithromycin	Yangtze River	Tributary in Chongqing	/	15.8	(Chang, et al. 2010)
roxithromycin	Yangtze River	Yangtze Estuary	2013	1.60	(Shi, et al. 2014 b)
roxithromycin	Yangtze River	Yangtze Estuary	January 2011	1.23	(Yan, et al. 2013 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
roxithromycin	Yangtze River	Yangtze Estuary	July 2011	0.43	(Yan, et al. 2013 a)
roxithromycin	Yangtze River	Yangtze Estuary	January 2012	1.38	(Yan, et al. 2013 a)
roxithromycin	Yangtze River	Yangtze Estuary	May 2012	0.57	(Yan, et al. 2013 a)
roxithromycin	Yangtze River	Yangtze Estuary	Autumn 2013	0.60	(Zhao, et al. 2017)
roxithromycin	Yangtze River	Yangtze Estuary	Spring 2014	0.50	(Zhao, et al. 2017)
roxithromycin	Yangtze River	Yangtze Estuary	Summer 2013	0.70	(Zhao, et al. 2017)
roxithromycin	Yangtze River	Yangtze Estuary	Winter 2013	0.60	(Zhao, et al. 2017)
roxithromycin	Yangtze River	Yangtze River	cold season 2012	1.02	(Sun, et al. 2015)
roxithromycin	Yangtze River	Yangtze River	warm season 2013	1.26	(Sun, et al. 2015)
roxithromycin	Yellow River	Middle and lower part	June 2006	53.0	(Xu, et al. 2009)
roxithromycin	Yellow River	six tributrles	June 2006	53.0	(Xu, et al. 2009)
roxithromycin	Yellow River	Yellow River	cold season 2012	0.55	(Sun, et al. 2015)
roxithromycin	Yellow River	Yellow River	warm season 2013	0.88	(Sun, et al. 2015)
roxithromycin	Yellow River	Yellow River Delta	April 2014	3.88	(Zhao, et al. 2016)
roxithromycin	Yellow River	Yellow River Delta	September 2014	1.12	(Zhao, et al. 2016)
sulfadiazine	Hai River	Baiyangdian Lake	August 2008, October 2010	118	(Li, et al. 2012)
sulfadiazine	Hai River	Bohai Bay	June 2009	10.6	(Cheng, et al. 2016)
sulfadiazine	Hai River	Bohai Bay	November 2009	15.6	(Cheng, et al. 2016)
sulfadiazine	Hai River	Bohai Bay	May 2008	3.63	(Zou, et al. 2011)
sulfadiazine	Hai River	Chentaizi Drainage River	2010	36.8	(Gao, et al. 2012)
sulfadiazine	Hai River	Dagu Drainage River	2010	85.4	(Gao, et al. 2012)
sulfadiazine	Hai River	Duliujian River	2010	26.6	(Gao, et al. 2012)
sulfadiazine	Hai River	Duliujian River	May 2008	0	(Zou, et al. 2011)
sulfadiazine	Hai River	Hai River	2010	32.7	(Gao, et al. 2012)
sulfadiazine	Hai River	Hai River	August 2009	94.6	(Luo, et al. 2011 a)
sulfadiazine	Hai River	Hai River	December 2009	114	(Luo, et al. 2011 a)
sulfadiazine	Hai River	Jiyun River	May 2013	62.5	(Zhang, et al. 2014 b)
sulfadiazine	Hai River	Jiyun River	May 2013	0.53	(Zhang, et al. 2014 b)
sulfadiazine	Hai River	Reservoirs, Tianjin	2010	3.58	(Li, et al. 2014 a)
sulfadiazine	Hai River	Reservoirs, Tianjin	2011	4.04	(Li, et al. 2014 a)
sulfadiazine	Hai River	Suyun River	May 2008	16.0	(Zou, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfadiazine	Hai River	tributaries	December 2009	315	(Luo, et al. 2011 a)
sulfadiazine	Hai River	tributaries	August 2010	301	(Luo, et al. 2011 a)
sulfadiazine	Hai River	tributary	2010	35.6	(Gao, et al. 2012)
sulfadiazine	Hai River	Urban surface water of Beijing	July 2013 to June 2014	37.2	(Li, et al. 2015 b)
sulfadiazine	Hai River	Wangyanggou River	June 2013	24.5	(Jiang, et al. 2014)
sulfadiazine	Hai River	Ziya River, Tianjin	May 2008	33.0	(Zou, et al. 2011)
sulfadiazine	Huai River	Laizhou Bay	September 2009	0.02	(Zhang, et al. 2012 a)
sulfadiazine	Huai River	Rivers adjacent the Jiaozhou Bay	April 2010	0.88	(Zhang, et al. 2013)
sulfadiazine	Huai River	Rivers discharging into the Yantai Bays	April 2010	1.91	(Zhang, et al. 2013)
sulfadiazine	Pearl River	Dongguan City	January 2010	4.20	(Chen, et al. 2013)
sulfadiazine	Pearl River	Dongjiang River	July 2009	1.00	(Zhang, et al. 2012 b)
sulfadiazine	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	3.51	(Li, et al. 2016)
sulfadiazine	Pearl River	Guangzhou	September 2008, February 2009	11.2	(Yang, et al. 2011)
sulfadiazine	Pearl River	Guangzhou	/	93.0	(Huang, et al. 2016)
sulfadiazine	Pearl River	Haikou	July 2012	55.9	(Xu, 2013)
sulfadiazine	Pearl River	Heyuan	January 2010	3.00	(Chen, et al. 2013)
sulfadiazine	Pearl River	Hong Kong	September 2014	2.50	(Deng, et al. 2016)
sulfadiazine	Pearl River	Huizhou	January 2010	1.20	(Chen, et al. 2013)
sulfadiazine	Pearl River	Liuxi River	September 2008, February 2009	3.87	(Yang, et al. 2011)
sulfadiazine	Pearl River	Maoling River	October 2010	0.08	(Zheng, et al. 2012)
sulfadiazine	Pearl River	Qinzhou Bay	2010	0.41	(Xue, et al. 2013 b)
sulfadiazine	Pearl River	Shenzhen	January 2010	287	(Chen, et al. 2013)
sulfadiazine	Pearl River	Shijing River	September 2008, February 2009	258	(Yang, et al. 2011)
sulfadiazine	Pearl River	the west of Pearl River Estuary	March 2013	0	(Liang, et al. 2013)
sulfadiazine	Pearl River	tributary of Yongjiang River	June 2011	109	(Xue, et al. 2013 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfadiazine	Pearl River	tributary, Shaoguan	August 2013	3.03	(Jiang, 2015)
sulfadiazine	Pearl River	tributary, Shaoguan	January 2014	2.45	(Jiang, 2015)
sulfadiazine	Pearl River	Upstream of Pearl River	/	43.0	(Huang, et al. 2016)
sulfadiazine	Pearl River	Yongjiang River	June 2011	2.60	(Xue, et al. 2013 a)
sulfadiazine	Pearl River	Yuen Long River Downstream	June 2010	3.10	(Chen, et al. 2013)
sulfadiazine	Pearl River	Yuen Long River Middlestream	June 2010	3.30	(Chen, et al. 2013)
sulfadiazine	Pearl River	Yuen Long River Upstream	June 2010	37.9	(Chen, et al. 2013)
sulfadiazine	Songliao River	Daliao River	/	10.6	(Jia, et al. 2011)
sulfadiazine	Songliao River	Daling River	/	3.60	(Jia, et al. 2011)
sulfadiazine	Songliao River	Liao River, Jilin	/	0.90	(Dong, et al. 2016)
sulfadiazine	Songliao River	Liaodong Bay	/	2.08	(Jia, et al. 2011)
sulfadiazine	Songliao River	Shuangtaizi River	/	16.9	(Jia, et al. 2011)
sulfadiazine	Songliao River	Xiaoling River	/	1.65	(Jia, et al. 2011)
sulfadiazine	Songliao River	Yellow Sea coast	July 2010	1.44	(Na, et al. 2011)
sulfadiazine	Southeast coast	Jiulong River	July 2012	5.22	(Jiang, et al. 2013)
sulfadiazine	Southeast coast	Jiulong River	January and August 2010	53.8	(Zhang, et al. 2011 a)
sulfadiazine	Southeast coast	Jiulong River estuary	2009	2.36	(Zheng, et al. 2011)
sulfadiazine	Southeast coast	Tributaries of Jiulong River	2009	19.5	(Zheng, et al. 2011)
sulfadiazine	Yangtze River	Chao Lake	March 2012	4.90	(Tang, et al. 2015)
sulfadiazine	Yangtze River	Chao Lake	July 2012	0.10	(Tang, et al. 2015)
sulfadiazine	Yangtze River	Chao Lake	September 2012	2.00	(Tang, et al. 2015)
sulfadiazine	Yangtze River	Chao Lake	January 2013	3.20	(Tang, et al. 2015)
sulfadiazine	Yangtze River	Chongqing	January 2013	5.60	(Yan, et al. 2013 b)
sulfadiazine	Yangtze River	East China	2015	2.35	(Jin, et al. 2016)
sulfadiazine	Yangtze River	Huangpu River	June 2009	4.08	(Jiang, et al. 2011)
sulfadiazine	Yangtze River	Huangpu River	December 2009	21.7	(Jiang, et al. 2011)
sulfadiazine	Yangtze River	Huangpu River	July 2012	53.6	(Zhang, et al. 2014 b)
sulfadiazine	Yangtze River	Huangpu River	November 2014	30.1	(Xu, 2015)
sulfadiazine	Yangtze River	Jiaxing	April 2015	0.66	(Guo, et al. 2016)
sulfadiazine	Yangtze River	Rivers in Shahu County	December 2013	10.0	(Yao, et al. 2017)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfadiazine	Yangtze River	Rivers in Shahu County	April 2014	21.4	(Yao, et al. 2017)
sulfadiazine	Yangtze River	Rivers in Shahu County	August 2014	1.00	(Yao, et al. 2017)
sulfadiazine	Yangtze River	Rivers in Shahu County	December 2014	4.47	(Yao, et al. 2017)
sulfadiazine	Yangtze River	Rivers in Shahu County	May 2014	1.81	(Tong, et al. 2014)
sulfadiazine	Yangtze River	Rivers in Shahu County	October 2011	4.47	(Tong, et al. 2014)
sulfadiazine	Yangtze River	Tai Lake	2013	18.9	(Hu, et al. 2016)
sulfadiazine	Yangtze River	Tai Lake	November 2013	0	(Zhou, et al. 2016 a)
sulfadiazine	Yangtze River	Tai Lake	May 2014	0.86	(Zhou, et al. 2016 a)
sulfadiazine	Yangtze River	Yangtze Estuary	2013	30.2	(Shi, et al. 2014 b)
sulfadiazine	Yangtze River	Yangtze Estuary	January 2011	21.6	(Yan, et al. 2013 a)
sulfadiazine	Yangtze River	Yangtze Estuary	July 2011	13.0	(Yan, et al. 2013 a)
sulfadiazine	Yangtze River	Yangtze Estuary	January 2012	32.5	(Yan, et al. 2013 a)
sulfadiazine	Yangtze River	Yangtze Estuary	May 2012	20.8	(Yan, et al. 2013 a)
sulfadiazine	Yangtze River	Yangtze Estuary	Autumn 2013	0.70	(Zhao, et al. 2017)
sulfadiazine	Yangtze River	Yangtze Estuary	Spring 2014	51.5	(Zhao, et al. 2017)
sulfadiazine	Yangtze River	Yangtze Estuary	Summer 2013	12.7	(Zhao, et al. 2017)
sulfadiazine	Yangtze River	Yangtze Estuary	Winter 2013	21.2	(Zhao, et al. 2017)
sulfadiazine	Yangtze River	Yangtze River	2013	2.00	(Hu, et al. 2016)
sulfamethazine	Hai River	Baiyangdian Lake	August 2008, October 2010	5.25	(Li, et al. 2012)
sulfamethazine	Hai River	Beitang discharge River	December 2009	0.75	(Hu, 2011 a)
sulfamethazine	Hai River	Beiyun River	June 2007	0	(Hu, 2011 a)
sulfamethazine	Hai River	Beiyun River	December 2007	104	(Hu, 2011 a)
sulfamethazine	Hai River	Bohai Bay	June 2009	1.37	(Cheng, et al. 2016)
sulfamethazine	Hai River	Bohai Bay	November 2009	7.92	(Cheng, et al. 2016)
sulfamethazine	Hai River	Bohai Bay	May 2008	6.38	(Zou, et al. 2011)
sulfamethazine	Hai River	Chentaizi Drainage River	2010	34.1	(Gao, et al. 2012)
sulfamethazine	Hai River	Dagu Drainage River	2010	20.7	(Gao, et al. 2012)
sulfamethazine	Hai River	Dagu Drainage River	December 2009	1.31	(Hu, 2011 a)
sulfamethazine	Hai River	Duliujian River	2010	60.8	(Gao, et al. 2012)
sulfamethazine	Hai River	Duliujian River	May 2008	1.50	(Zou, et al. 2011)
sulfamethazine	Hai River	Hai River	2010	27.7	(Gao, et al. 2012)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfamethazine	Hai River	Hai River	June 2007	7.00	(Hu, 2011 a)
sulfamethazine	Hai River	Hai River	December 2007	345	(Hu, 2011 a)
sulfamethazine	Hai River	Hai River	May 2008	1.50	(Zou, et al. 2011)
sulfamethazine	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
sulfamethazine	Hai River	Nanyun River	December 2007	179	(Hu, 2011 a)
sulfamethazine	Hai River	Suyun River	May 2008	12.0	(Zou, et al. 2011)
sulfamethazine	Hai River	tributary	2010	21.3	(Gao, et al. 2012)
sulfamethazine	Hai River	Urban surface water of Beijing	July 2013 to June 2014	3.50	(Li, et al. 2015 b)
sulfamethazine	Hai River	Wangyanggou River	June 2013	13.4	(Jiang, et al. 2014)
sulfamethazine	Hai River	Xinkai River	June 2007	26.0	(Hu, 2011 a)
sulfamethazine	Hai River	Xinkai River	December 2007	14.0	(Hu, 2011 a)
sulfamethazine	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
sulfamethazine	Hai River	Ziya River, Tianjin	June 2007	13.0	(Hu, 2011 a)
sulfamethazine	Hai River	Ziya River, Tianjin	December 2007	173	(Hu, 2011 a)
sulfamethazine	Hai River	Ziya River, Tianjin	May 2008	0	(Zou, et al. 2011)
sulfamethazine	Huai River	Laizhou Bay	September 2009	0.13	(Zhang, et al. 2012 a)
sulfamethazine	Pearl River	Dongjiang River	July 2009	67.4	(Zhang, et al. 2012 b)
sulfamethazine	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	6.17	(Li, et al. 2016)
sulfamethazine	Pearl River	Guangzhou	May 2008	735	(Peng, et al. 2011)
sulfamethazine	Pearl River	Guangzhou	September 2008, February 2009	11.7	(Yang, et al. 2011)
sulfamethazine	Pearl River	Guangzhou	/	684	(Huang, et al. 2016)
sulfamethazine	Pearl River	Haikou	July 2012	6.73	(Xu, 2013)
sulfamethazine	Pearl River	Hong Kong	September 2014	83.4	(Deng, et al. 2016)
sulfamethazine	Pearl River	Liuxi River	September 2008, February 2009	19.8	(Yang, et al. 2011)
sulfamethazine	Pearl River	Qinzhou Bay	2010	0.41	(Xue, et al. 2013 b)
sulfamethazine	Pearl River	Reservoir, Shenzhen	September 2012	5.19	(Zhu, et al. 2015)
sulfamethazine	Pearl River	Reservoir, Shenzhen	January 2013	5.54	(Zhu, et al. 2015)
sulfamethazine	Pearl River	Shijing River	September 2008, February	436	(Yang, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration ($ng\ L^{-1}$)	Reference
			2009		
sulfamethazine	Pearl River	the west of Pearl River Estuary	March 2013	0	(Liang, et al. 2013)
sulfamethazine	Pearl River	tributary of Yongjiang River	June 2011	19.1	(Xue, et al. 2013 a)
sulfamethazine	Pearl River	tributary, Shaoguan	August 2013	3.90	(Jiang, 2015)
sulfamethazine	Pearl River	tributary, Shaoguan	January 2014	5.74	(Jiang, 2015)
sulfamethazine	Pearl River	Upstream of Pearl River	/	88.0	(Huang, et al. 2016)
sulfamethazine	Pearl River	Victoria Harbour	June to August 2008	0.78	(Tu, et al. 2009)
sulfamethazine	Pearl River	Yongjiang River	June 2011	0.83	(Xue, et al. 2013 a)
sulfamethazine	Songliao River	Daliao River	/	4.62	(Jia, et al. 2011)
sulfamethazine	Songliao River	Daling River	/	1.50	(Jia, et al. 2011)
sulfamethazine	Songliao River	Liaodong Bay	/	0.87	(Jia, et al. 2011)
sulfamethazine	Songliao River	Shuangtaizi River	/	5.69	(Jia, et al. 2011)
sulfamethazine	Songliao River	Xiaoling River	/	0.70	(Jia, et al. 2011)
sulfamethazine	Songliao River	Yellow Sea coast	July 2010	12.7	(Na, et al. 2011)
sulfamethazine	Southeast coast	Jiulong River	August 2011	5.53	(Ou, et al. 2015)
sulfamethazine	Southeast coast	Jiulong River	May 2012	78.3	(Ou, et al. 2015)
sulfamethazine	Southeast coast	Jiulong River	July 2012	18.5	(Jiang, et al. 2013)
sulfamethazine	Southeast coast	Jiulong River	January and August 2010	183	(Zhang, et al. 2011 a)
sulfamethazine	Southeast coast	Jiulong River estuary	2009	7.53	(Zheng, et al. 2011)
sulfamethazine	Southeast coast	Tributaries of Jiulong River	2009	17.9	(Zheng, et al. 2011)
sulfamethazine	Yangtze River	Chao Lake	March 2012	1.40	(Tang, et al. 2015)
sulfamethazine	Yangtze River	Chao Lake	July 2012	0.10	(Tang, et al. 2015)
sulfamethazine	Yangtze River	Chao Lake	September 2012	3.00	(Tang, et al. 2015)
sulfamethazine	Yangtze River	Chao Lake	January 2013	4.50	(Tang, et al. 2015)
sulfamethazine	Yangtze River	Chao Lake	January and March 2013	3.00	(Wu, et al. 2014)
sulfamethazine	Yangtze River	Chongqing	/	6.00	(Chang, et al. 2010)
sulfamethazine	Yangtze River	Dongting Lake	January and March 2013	0	(Wu, et al. 2014)
sulfamethazine	Yangtze River	East China	2015	3.27	(Jin, et al. 2016)
sulfamethazine	Yangtze River	Huangpu River	June 2009	4.88	(Jiang, et al. 2011)
sulfamethazine	Yangtze River	Huangpu River	December 2009	284	(Jiang, et al. 2011)
sulfamethazine	Yangtze River	Huangpu River	July 2012	189	(Zhang, et al. 2014 b)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfamethazine	Yangtze River	Huangpu River	November 2014	5.60	(Xu, 2015)
sulfamethazine	Yangtze River	Jialing River	/	8.50	(Chang, et al. 2010)
sulfamethazine	Yangtze River	Poyang Lake	January and March 2013	0.90	(Wu, et al. 2014)
sulfamethazine	Yangtze River	Rivers in Shahu County	December 2013	11.2	(Yao, et al. 2017)
sulfamethazine	Yangtze River	Rivers in Shahu County	April 2014	15.2	(Yao, et al. 2017)
sulfamethazine	Yangtze River	Rivers in Shahu County	August 2014	1.11	(Yao, et al. 2017)
sulfamethazine	Yangtze River	Rivers in Shahu County	December 2014	3.77	(Yao, et al. 2017)
sulfamethazine	Yangtze River	Rivers in Shahu County	May 2014	2.90	(Tong, et al. 2014)
sulfamethazine	Yangtze River	Rivers in Shahu County	October 2011	7.70	(Tong, et al. 2014)
sulfamethazine	Yangtze River	Tai Lake	2013	0.40	(Hu, et al. 2016)
sulfamethazine	Yangtze River	Tai Lake	November 2013	0.67	(Zhou, et al. 2016 a)
sulfamethazine	Yangtze River	Tai Lake	May 2014	1.33	(Zhou, et al. 2016 a)
sulfamethazine	Yangtze River	Tai Lake	January and March 2013	0	(Wu, et al. 2014)
sulfamethazine	Yangtze River	Tributary in Chongqing	/	3.00	(Chang, et al. 2010)
sulfamethazine	Yangtze River	Yangtze Estuary	2013	40.7	(Shi, et al. 2014 b)
sulfamethazine	Yangtze River	Yangtze Estuary	January 2011	47.6	(Yan, et al. 2013 a)
sulfamethazine	Yangtze River	Yangtze Estuary	July 2011	5.25	(Yan, et al. 2013 a)
sulfamethazine	Yangtze River	Yangtze Estuary	January 2012	36. 8	(Yan, et al. 2013 a)
sulfamethazine	Yangtze River	Yangtze Estuary	May 2012	12.2	(Yan, et al. 2013 a)
sulfamethazine	Yangtze River	Yangtze River	2013	0	(Hu, et al. 2016)
sulfamethazine	Yangtze River	Yangtze River	January and March 2013	14.5	(Wu, et al. 2014)
sulfamethoxazole	Hai River	Baiyangdian Lake	August 2008, October 2010	240	(Li, et al. 2012)
sulfamethoxazole	Hai River	Beijing	November 2015	0	(Ma, et al. 2017)
sulfamethoxazole	Hai River	Beijing	November 2015	0	(Ma, et al. 2017)
sulfamethoxazole	Hai River	Beitang discharge River	December 2009	57.8	(Hu, 2011 a)
sulfamethoxazole	Hai River	Beiyun River	June 2007	15.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Beiyun River	December 2007	20.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Bohai Bay	May 2008	18.8	(Zou, et al. 2011)
sulfamethoxazole	Hai River	Dagu Drainage River	December 2009	11.3	(Hu, 2011 a)
sulfamethoxazole	Hai River	Hai River	June 2007	10.3	(Hu, 2011 a)
sulfamethoxazole	Hai River	Hai River	December 2007	29.3	(Hu, 2011 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfamethoxazole	Hai River	Hai River	August 2009	150	(Luo, et al. 2011 a)
sulfamethoxazole	Hai River	Hai River	December 2009	263	(Luo, et al. 2011 a)
sulfamethoxazole	Hai River	Jiyun River	May 2013	54.7	(Zhang, et al. 2014 b)
sulfamethoxazole	Hai River	Jiyun River	May 2013	1.60	(Zhang, et al. 2014 b)
sulfamethoxazole	Hai River	Nanyun River	June 2007	37.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Nanyun River	December 2007	32.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Qing River	September 2011	8.40	(Wei, 2013)
sulfamethoxazole	Hai River	Qing River	January 2012	11.2	(Wei, 2013)
sulfamethoxazole	Hai River	Qing River	March 2012	94.7	(Wei, 2013)
sulfamethoxazole	Hai River	Qing River	June 2012	59.4	(Wei, 2013)
sulfamethoxazole	Hai River	Suyun River	May 2008	75.5	(Zou, et al. 2011)
sulfamethoxazole	Hai River	tributaries	December 2009	462	(Luo, et al. 2011 a)
sulfamethoxazole	Hai River	tributaries	August 2010	456	(Luo, et al. 2011 a)
sulfamethoxazole	Hai River	Urban surface water of Beijing	July 2013 to June 2014	56.9	(Li, et al. 2015 b)
sulfamethoxazole	Hai River	Wangyanggou River	June 2013	529	(Jiang, et al. 2014)
sulfamethoxazole	Hai River	Xinkai River	June 2007	6.00	(Hu, 2011 a)
sulfamethoxazole	Hai River	Xinkai River	December 2007	12.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Ziya River, Tianjin	June 2007	11.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Ziya River, Tianjin	December 2007	40.0	(Hu, 2011 a)
sulfamethoxazole	Hai River	Ziya River, Tianjin	May 2008	70.5	(Zou, et al. 2011)
sulfamethoxazole	Huai River	Laizhou Bay	September 2009	19.0	(Zhang, et al. 2012 a)
sulfamethoxazole	Huai River	Rivers adjacent the Jiaozhou Bay	April 2010	131	(Zhang, et al. 2013)
sulfamethoxazole	Huai River	Rivers discharging into the Yantai Bays	April 2010	12.4	(Zhang, et al. 2013)
sulfamethoxazole	Pearl River	Dongguan City	January 2010	22.6	(Chen, et al. 2013)
sulfamethoxazole	Pearl River	Dongjiang River	July 2009	14.9	(Zhang, et al. 2012 b)
sulfamethoxazole	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	8.58	(Li, et al. 2016)
sulfamethoxazole	Pearl River	Guangzhou	September 2008, February	62.8	(Yang, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
			2009		
sulfamethoxazole	Pearl River	Guangzhou	/	531	(Huang, et al. 2016)
sulfamethoxazole	Pearl River	Haikou	July 2012	984	(Xu, 2013)
sulfamethoxazole	Pearl River	Heyuan	January 2010	10.9	(Chen, et al. 2013)
sulfamethoxazole	Pearl River	Hong Kong	September 2014	1.20	(Deng, et al. 2016)
sulfamethoxazole	Pearl River	Huizhou	January 2010	10.5	(Chen, et al. 2013)
sulfamethoxazole	Pearl River	Liuxi River	September 2008, February 2009	1.64	(Yang, et al. 2011)
sulfamethoxazole	Pearl River	Qinzhou Bay	2010	4.10	(Xue, et al. 2013 b)
sulfamethoxazole	Pearl River	Reservoir, Shenzhen	September 2012	9.70	(Zhu, et al. 2015)
sulfamethoxazole	Pearl River	Reservoir, Shenzhen	January 2013	24.0	(Zhu, et al. 2015)
sulfamethoxazole	Pearl River	Shenzhen	January 2010	12.5	(Chen, et al. 2013)
sulfamethoxazole	Pearl River	Shijing River	September 2008, February 2009	141	(Yang, et al. 2011)
sulfamethoxazole	Pearl River	the west of Pearl River Estuary	March 2013	0	(Liang, et al. 2013)
sulfamethoxazole	Pearl River	tributary of Yongjiang River	June 2011	191	(Xue, et al. 2013 a)
sulfamethoxazole	Pearl River	Upstream of Pearl River	/	64.0	(Huang, et al. 2016)
sulfamethoxazole	Pearl River	Victoria Harbour	June to August 2008	7.19	(Tu, et al. 2009)
sulfamethoxazole	Pearl River	Yongjiang River	June 2011	19.6	(Xue, et al. 2013 a)
sulfamethoxazole	Pearl River	Yuen Long River Downstream	June 2010	18.0	(Chen, et al. 2013)
sulfamethoxazole	Pearl River	Yuen Long River Middlestream	June 2010	59.4	(Chen, et al. 2013)
sulfamethoxazole	Pearl River	Yuen Long River Upstream	June 2010	108	(Chen, et al. 2013)
sulfamethoxazole	Songliao River	Daliao River	July 2013	57.0	(Qin, et al. 2015).
sulfamethoxazole	Songliao River	Daliao River	/	114	(Jia, et al. 2011)
sulfamethoxazole	Songliao River	Daling River	/	69.7	(Jia, et al. 2011)
sulfamethoxazole	Songliao River	Liao River	/	105	(Bai, et al. 2014)
sulfamethoxazole	Songliao River	Liao River, Jilin	/	20.1	(Dong, et al. 2016)
sulfamethoxazole	Songliao River	Liaodong Bay	/	24.7	(Jia, et al. 2011)
sulfamethoxazole	Songliao River	Shuangtaizi River	/	69.2	(Jia, et al. 2011)
sulfamethoxazole	Songliao River	Xiaoling River	/	44.2	(Jia, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfamethoxazole	Songliao River	Yellow Sea coast	July 2010	103	(Na, et al. 2011)
sulfamethoxazole	Southeast coast	Jinxi River	dry season	12.3	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	Jinxi River	median water season	9.20	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	Jinxi River	wet season	16.4	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	Jiulong River	August 2011	1.15	(Ou, et al. 2015)
sulfamethoxazole	Southeast coast	Jiulong River	May 2012	8.58	(Ou, et al. 2015)
sulfamethoxazole	Southeast coast	Jiulong River	July 2012	1.51	(Jiang, et al. 2013)
sulfamethoxazole	Southeast coast	Jiulong River	January and August 2010	27.7	(Zhang, et al. 2011 a)
sulfamethoxazole	Southeast coast	Jiulong River estuary	2009	8.77	(Zheng, et al. 2011)
sulfamethoxazole	Southeast coast	Qingshan Lake	dry season	19.6	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	Qingshan Lake	median water season	7.65	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	Qingshan Lake	wet season	6.44	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	South Tiaoxi River	dry season	19.2	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	South Tiaoxi River	median water season	11.3	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	South Tiaoxi River	wet season	4.80	(Zhu, et al. 2013)
sulfamethoxazole	Southeast coast	Tributaries of Jiulong River	2009	13.3	(Zheng, et al. 2011)
sulfamethoxazole	Yangtze River	Chao Lake	March 2012	17.8	(Tang, et al. 2015)
sulfamethoxazole	Yangtze River	Chao Lake	July 2012	5.80	(Tang, et al. 2015)
sulfamethoxazole	Yangtze River	Chao Lake	September 2012	29.5	(Tang, et al. 2015)
sulfamethoxazole	Yangtze River	Chao Lake	January 2013	56.1	(Tang, et al. 2015)
sulfamethoxazole	Yangtze River	Chao Lake	January and March 2013	18.9	(Wu, et al. 2014)
sulfamethoxazole	Yangtze River	Chongqing	January 2013	19.0	(Yan, et al. 2013 b)
sulfamethoxazole	Yangtze River	Chongqing	/	22.0	(Chang, et al. 2010)
sulfamethoxazole	Yangtze River	Dongting Lake	January and March 2013	0	(Wu, et al. 2014)
sulfamethoxazole	Yangtze River	East China	2015	21.0	(Jin, et al. 2016)
sulfamethoxazole	Yangtze River	Huangpu River	June 2009	5.22	(Jiang, et al. 2011)
sulfamethoxazole	Yangtze River	Huangpu River	December 2009	31.9	(Jiang, et al. 2011)
sulfamethoxazole	Yangtze River	Huangpu River	July 2012	260	(Zhang, et al. 2014 b)
sulfamethoxazole	Yangtze River	Huangpu River	November 2014	17.1	(Xu, 2015)
sulfamethoxazole	Yangtze River	Jialing River	/	19.5	(Chang, et al. 2010)
sulfamethoxazole	Yangtze River	Jiaxing	April 2015	4.58	(Guo, et al. 2016)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfamethoxazole	Yangtze River	Poyang Lake	January and March 2013	0	(Wu, et al. 2014)
sulfamethoxazole	Yangtze River	Rivers in Shahu County	December 2013	20.3	(Yao, et al. 2017)
sulfamethoxazole	Yangtze River	Rivers in Shahu County	April 2014	122	(Yao, et al. 2017)
sulfamethoxazole	Yangtze River	Rivers in Shahu County	August 2014	12.3	(Yao, et al. 2017)
sulfamethoxazole	Yangtze River	Rivers in Shahu County	December 2014	8.31	(Yao, et al. 2017)
sulfamethoxazole	Yangtze River	Rivers in Shahu County	May 2014	3.04	(Tong, et al. 2014)
sulfamethoxazole	Yangtze River	Rivers in Shahu County	October 2011	1.54	(Tong, et al. 2014)
sulfamethoxazole	Yangtze River	Tai Lake	2013	3.70	(Hu, et al. 2016)
sulfamethoxazole	Yangtze River	Tai Lake	November 2013	38.3	(Zhou, et al. 2016 a)
sulfamethoxazole	Yangtze River	Tai Lake	May 2014	23.1	(Zhou, et al. 2016 a)
sulfamethoxazole	Yangtze River	Tai Lake	January and March 2013	15.7	(Wu, et al. 2014)
sulfamethoxazole	Yangtze River	Yangtze Estuary	2013	25.8	(Shi, et al. 2014 b)
sulfamethoxazole	Yangtze River	Yangtze Estuary	January 2011	30.3	(Yan, et al. 2013 a)
sulfamethoxazole	Yangtze River	Yangtze Estuary	July 2011	17.6	(Yan, et al. 2013 a)
sulfamethoxazole	Yangtze River	Yangtze Estuary	January 2012	43.8	(Yan, et al. 2013 a)
sulfamethoxazole	Yangtze River	Yangtze Estuary	May 2012	22.0	(Yan, et al. 2013 a)
sulfamethoxazole	Yangtze River	Yangtze Estuary	Autumn 2013	16.5	(Zhao, et al. 2017)
sulfamethoxazole	Yangtze River	Yangtze Estuary	Spring 2014	25.0	(Zhao, et al. 2017)
sulfamethoxazole	Yangtze River	Yangtze Estuary	Summer 2013	20.4	(Zhao, et al. 2017)
sulfamethoxazole	Yangtze River	Yangtze Estuary	Winter 2013	21.0	(Zhao, et al. 2017)
sulfamethoxazole	Yangtze River	Yangtze River	2013	3.70	(Hu, et al. 2016)
sulfamethoxazole	Yangtze River	Yangtze River	January and March 2013	7.90	(Wu, et al. 2014)
sulfamethoxazole	Yellow River	Middle and lower part	June 2006	25.0	(Xu, et al. 2009)
sulfamethoxazole	Yellow River	six tributries	June 2006	44.0	(Xu, et al. 2009)
sulfamethoxypyridazine	Hai River	Beitang discharge River	December 2009	0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Beiyun River	June 2007	0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Beiyun River	December 2007	549	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Dagu Drainage River	December 2009	0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Hai River	June 2007	72.7	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Hai River	December 2007	594	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Jiyun River	May 2013	74.8	(Zhang, et al. 2014 b)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfamethoxypyridazine	Hai River	Nanyun River	June 2007	20.0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Nanyun River	December 2007	433	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Xinkai River	June 2007	78.0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Xinkai River	December 2007	146	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
sulfamethoxypyridazine	Hai River	Ziya River, Tianjin	December 2007	346	(Hu, 2011 a)
sulfamethoxypyridazine	Songliao River	Liao River	/	0.56	(Bai, et al. 2014)
sulfamethoxypyridazine	Songliao River	Yellow Sea coast	July 2010	6.45	(Na, et al. 2011)
sulfamethoxypyridazine	Yangtze River	Rivers in Shahu County	December 2013	27.7	(Yao, et al. 2017)
sulfamethoxypyridazine	Yangtze River	Rivers in Shahu County	April 2014	26.5	(Yao, et al. 2017)
sulfapyridine	Hai River	Baiyangdian Lake	August 2008, October 2010	13.0	(Li, et al. 2012)
sulfapyridine	Hai River	Beitang discharge River	December 2009	24.6	(Hu, 2011 a)
sulfapyridine	Hai River	Beiyun River	June 2007	20.0	(Hu, 2011 a)
sulfapyridine	Hai River	Beiyun River	December 2007	46.0	(Hu, 2011 a)
sulfapyridine	Hai River	Chentaizi Drainage River	2010	48.9	(Gao, et al. 2012)
sulfapyridine	Hai River	Dagu Drainage River	2010	49.8	(Gao, et al. 2012)
sulfapyridine	Hai River	Dagu Drainage River	December 2009	0	(Hu, 2011 a)
sulfapyridine	Hai River	Duliujian River	2010	8.35	(Gao, et al. 2012)
sulfapyridine	Hai River	Hai River	2010	2.20	(Gao, et al. 2012)
sulfapyridine	Hai River	Hai River	June 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Hai River	December 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Nanyun River	June 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Nanyun River	December 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Reservoirs, Tianjin	2010	2.46	(Li, et al. 2014 a)
sulfapyridine	Hai River	Reservoirs, Tianjin	2011	0.95	(Li, et al. 2014 a)
sulfapyridine	Hai River	tributary	2010	4.50	(Gao, et al. 2012)
sulfapyridine	Hai River	Urban surface water of Beijing	July 2013 to June 2014	37.5	(Li, et al. 2015 b)
sulfapyridine	Hai River	Xinkai River	June 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Xinkai River	December 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfapyridine	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
sulfapyridine	Hai River	Ziya River, Tianjin	December 2007	0	(Hu, 2011 a)
sulfapyridine	Pearl River	Guangzhou	September 2008, February 2009	0	(Yang, et al. 2011)
sulfapyridine	Pearl River	Guangzhou	/	206	(Huang, et al. 2016)
sulfapyridine	Pearl River	Hong Kong	September 2014	1.15	(Deng, et al. 2016)
sulfapyridine	Pearl River	Liuxi River	September 2008, February 2009	0	(Yang, et al. 2011)
sulfapyridine	Pearl River	Shijing River	September 2008, February 2009	33.6	(Yang, et al. 2011)
sulfapyridine	Pearl River	tributary, Shaoguan	August 2013	0	(Jiang, 2015)
sulfapyridine	Pearl River	tributary, Shaoguan	January 2014	0	(Jiang, 2015)
sulfapyridine	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
sulfapyridine	Songliao River	Daliao River	/	3.28	(Jia, et al. 2011)
sulfapyridine	Songliao River	Daling River	/	0.72	(Jia, et al. 2011)
sulfapyridine	Songliao River	Liao River	/	0	(Bai, et al. 2014)
sulfapyridine	Songliao River	Liaodong Bay	/	0.24	(Jia, et al. 2011)
sulfapyridine	Songliao River	Shuangtaizi River	/	2.93	(Jia, et al. 2011)
sulfapyridine	Songliao River	Xiaoling River	/	1.16	(Jia, et al. 2011)
sulfapyridine	Southeast coast	Jiulong River	August 2011	0	(Ou, et al. 2015)
sulfapyridine	Southeast coast	Jiulong River	May 2012	3.43	(Ou, et al. 2015)
sulfapyridine	Southeast coast	Jiulong River estuary	2009	0.24	(Zheng, et al. 2011)
sulfapyridine	Southeast coast	Tributaries of Jiulong River	2009	1.20	(Zheng, et al. 2011)
sulfapyridine	Yangtze River	Huangpu River	June 2009	2.58	(Jiang, et al. 2011)
sulfapyridine	Yangtze River	Huangpu River	December 2009	18.2	(Jiang, et al. 2011)
sulfapyridine	Yangtze River	Rivers in Shahu County	December 2013	0	(Yao, et al. 2017)
sulfapyridine	Yangtze River	Rivers in Shahu County	April 2014	5.09	(Yao, et al. 2017)
sulfapyridine	Yangtze River	Tai Lake	November 2013	0	(Zhou, et al. 2016 a)
sulfapyridine	Yangtze River	Tai Lake	May 2014	0.13	(Zhou, et al. 2016 a)
sulfapyridine	Yangtze River	Yangtze Estuary	2013	40.0	(Shi, et al. 2014 b)
sulfapyridine	Yangtze River	Yangtze Estuary	January 2011	2.43	(Yan, et al. 2013 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
sulfapyridine	Yangtze River	Yangtze Estuary	July 2011	1.70	(Yan, et al. 2013 a)
sulfapyridine	Yangtze River	Yangtze Estuary	January 2012	1.98	(Yan, et al. 2013 a)
sulfapyridine	Yangtze River	Yangtze Estuary	May 2012	3.26	(Yan, et al. 2013 a)
sulfapyridine	Yangtze River	Yangtze Estuary	Autumn 2013	0.90	(Zhao, et al. 2017)
sulfapyridine	Yangtze River	Yangtze Estuary	Spring 2014	0.70	(Zhao, et al. 2017)
sulfapyridine	Yangtze River	Yangtze Estuary	Summer 2013	1.10	(Zhao, et al. 2017)
sulfapyridine	Yangtze River	Yangtze Estuary	Winter 2013	0.80	(Zhao, et al. 2017)
tetracycline	Hai River	Beitang discharge River	December 2009	0	(Hu, 2011 a)
tetracycline	Hai River	Beiyun River	June 2007	22.0	(Hu, 2011 a)
tetracycline	Hai River	Beiyun River	December 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Bohai Bay	June 2009	12.3	(Cheng, et al. 2016)
tetracycline	Hai River	Bohai Bay	November 2009	58.3	(Cheng, et al. 2016)
tetracycline	Hai River	Bohai Bay	May 2008	1.16	(Zou, et al. 2011)
tetracycline	Hai River	Dagu Drainage River	December 2009	0	(Hu, 2011 a)
tetracycline	Hai River	Douhe River	May 2008	0.75	(Zou, et al. 2011)
tetracycline	Hai River	Duliujian River	May 2008	0	(Zou, et al. 2011)
tetracycline	Hai River	Hai River	June 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Hai River	December 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Hai River	August 2009	8.31	(Luo, et al. 2011 a)
tetracycline	Hai River	Hai River	December 2009	8.42	(Luo, et al. 2011 a)
tetracycline	Hai River	Hai River	May 2008	0	(Zou, et al. 2011)
tetracycline	Hai River	Jiyun River	May 2013	2.17	(Zhang, et al. 2014 b)
tetracycline	Hai River	Jiyun River	May 2013	5.16	(Zhang, et al. 2014 b)
tetracycline	Hai River	Nanyun River	June 2007	14.0	(Hu, 2011 a)
tetracycline	Hai River	Nanyun River	December 2007	14.0	(Hu, 2011 a)
tetracycline	Hai River	Qing River	September 2011	12.0	(Wei, 2013)
tetracycline	Hai River	Qing River	January 2012	135	(Wei, 2013)
tetracycline	Hai River	Qing River	March 2012	187	(Wei, 2013)
tetracycline	Hai River	Qing River	June 2012	53.7	(Wei, 2013)
tetracycline	Hai River	Reservoirs, Tianjin	2010	4.97	(Li, et al. 2014 a)
tetracycline	Hai River	Reservoirs, Tianjin	2011	2.99	(Li, et al. 2014 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
tetracycline	Hai River	Suyun River	May 2008	0	(Zou, et al. 2011)
tetracycline	Hai River	tributaries	December 2009	177	(Luo, et al. 2011 a)
tetracycline	Hai River	tributaries	August 2010	143	(Luo, et al. 2011 a)
tetracycline	Hai River	Wangyanggou River	June 2013	4279	(Jiang, et al. 2014)
tetracycline	Hai River	Xinkai River	June 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Xinkai River	December 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Yongding River	May 2008	0	(Zou, et al. 2011)
tetracycline	Hai River	Yuqiao Reservoir	October 2009	0	(Hu, 2011 a)
tetracycline	Hai River	Ziya River, Tianjin	June 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Ziya River, Tianjin	December 2007	0	(Hu, 2011 a)
tetracycline	Hai River	Ziya River, Tianjin	May 2008	36.0	(Zou, et al. 2011)
tetracycline	Pearl River	Dongguan City	January 2010	0	(Chen, et al. 2013)
tetracycline	Pearl River	Gaoqiao mangrove national nature reserve	April to June, 2012	46.6	(Li, et al. 2016)
tetracycline	Pearl River	Guangzhou	/	0	(Huang, et al. 2016)
tetracycline	Pearl River	Heyuan	January 2010	2.80	(Chen, et al. 2013)
tetracycline	Pearl River	Huizhou	January 2010	0	(Chen, et al. 2013)
tetracycline	Pearl River	Shenzhen	January 2010	16.4	(Chen, et al. 2013)
tetracycline	Pearl River	the west of Pearl River Estuary	March 2013	40.8	(Liang, et al. 2013)
tetracycline	Pearl River	Upstream of Pearl River	/	0	(Huang, et al. 2016)
tetracycline	Pearl River	Victoria Harbour	June to August 2008	35.6	(Tu, et al. 2009)
tetracycline	Pearl River	Yuen Long River Downstream	June 2010	128	(Chen, et al. 2013)
tetracycline	Pearl River	Yuen Long River Middlestream	June 2010	284	(Chen, et al. 2013)
tetracycline	Pearl River	Yuen Long River Upstream	June 2010	468	(Chen, et al. 2013)
tetracycline	Songliao River	Daliao River	July 2013	14.0	(Qin, et al. 2015).
tetracycline	Songliao River	Liao River	/	0	(Bai, et al. 2014)
tetracycline	Songliao River	Liao River, Jilin	/	12.2	(Dong, et al. 2016)
tetracycline	Songliao River	Yellow Sea coast	July 2010	1.21	(Na, et al. 2011)
tetracycline	Southeast coast	Jiulong River	July 2012	2.65	(Jiang, et al. 2013)
tetracycline	Southeast coast	Jiulong River	January and August 2010	19.3	(Zhang, et al. 2011 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
tetracycline	Yangtze River	Chao Lake	March 2012	0.80	(Tang, et al. 2015)
tetracycline	Yangtze River	Chao Lake	July 2012	2.70	(Tang, et al. 2015)
tetracycline	Yangtze River	Chao Lake	September 2012	1.60	(Tang, et al. 2015)
tetracycline	Yangtze River	Chao Lake	January 2013	1.60	(Tang, et al. 2015)
tetracycline	Yangtze River	Chongqing	/	0	(Chang, et al. 2010)
tetracycline	Yangtze River	Huangpu River	June 2009	30.9	(Jiang, et al. 2011)
tetracycline	Yangtze River	Huangpu River	December 2009	1.72	(Jiang, et al. 2011)
tetracycline	Yangtze River	Jialing River	/	0	(Chang, et al. 2010)
tetracycline	Yangtze River	Rivers in Shahu County	December 2013	79.9	(Yao, et al. 2017)
tetracycline	Yangtze River	Rivers in Shahu County	April 2014	13.0	(Yao, et al. 2017)
tetracycline	Yangtze River	Rivers in Shahu County	August 2014	3.84	(Yao, et al. 2017)
tetracycline	Yangtze River	Rivers in Shahu County	December 2014	24.9	(Yao, et al. 2017)
tetracycline	Yangtze River	Rivers in Shahu County	May 2014	37.2	(Tong, et al. 2014)
tetracycline	Yangtze River	Rivers in Shahu County	October 2011	2.33	(Tong, et al. 2014)
tetracycline	Yangtze River	Tai Lake	2013	0.40	(Hu, et al. 2016)
tetracycline	Yangtze River	Tai Lake	November 2013	0	(Zhou, et al. 2016 a)
tetracycline	Yangtze River	Tai Lake	May 2014	1.14	(Zhou, et al. 2016 a)
tetracycline	Yangtze River	Yangtze Estuary	January 2011	0	(Yan, et al. 2013 a)
tetracycline	Yangtze River	Yangtze Estuary	July 2011	0	(Yan, et al. 2013 a)
tetracycline	Yangtze River	Yangtze Estuary	January 2012	0	(Yan, et al. 2013 a)
tetracycline	Yangtze River	Yangtze Estuary	May 2012	0.44	(Yan, et al. 2013 a)
tetracycline	Yangtze River	Yangtze River	2013	0	(Hu, et al. 2016)
tetracycline	Yellow River	Yellow River Delta	April 2014	18.6	(Zhao, et al. 2016)
tetracycline	Yellow River	Yellow River Delta	September 2014	28.5	(Zhao, et al. 2016)
trimethoprim	Hai River	Beijing	May 2014	51.1	(Dai, et al. 2016)
trimethoprim	Hai River	Bohai Bay	May 2008	5.59	(Zou, et al. 2011)
trimethoprim	Hai River	Hai River	August 2009	92.6	(Luo, et al. 2011 a)
trimethoprim	Hai River	Hai River	December 2009	124	(Luo, et al. 2011 a)
trimethoprim	Hai River	Qing River	January 2012	1788	(Wei, 2013)
trimethoprim	Hai River	Qing River	June 2012	355	(Wei, 2013)
trimethoprim	Hai River	Rivers in Beijing	July 2008	23.8	(Zhou, et al. 2010)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
trimethoprim	Hai River	Suyun River	May 2008	15.0	(Zou, et al. 2011)
trimethoprim	Hai River	tributaries	December 2009	67.7	(Luo, et al. 2011 a)
trimethoprim	Hai River	tributaries	August 2010	61.3	(Luo, et al. 2011 a)
trimethoprim	Hai River	tributary	December 2009	62.1	(Luo, et al. 2011 a)
trimethoprim	Hai River	tributary	December 2009	108	(Luo, et al. 2011 a)
trimethoprim	Hai River	Wangyanggou River	June 2013	242	(Jiang, et al. 2014)
trimethoprim	Hai River	Ziya River, Tianjin	May 2008	70.5	(Zou, et al. 2011)
trimethoprim	Huai River	Laizhou Bay	September 2009	53.0	(Zhang, et al. 2012 a)
trimethoprim	Huai River	Rivers adjacent the Jiaozhou Bay	April 2010	9.29	(Zhang, et al. 2013)
trimethoprim	Huai River	Rivers discharging into the Yantai Bays	April 2010	13.7	(Zhang, et al. 2013)
trimethoprim	Pearl River	Dongjiang River	July 2009	5.60	(Zhang, et al. 2012 b)
trimethoprim	Pearl River	Guangdong	/	0	(Peng, et al. 2010)
trimethoprim	Pearl River	Guangzhou	September 2008, February 2009	123	(Yang, et al. 2011)
trimethoprim	Pearl River	Guangzhou	/	428	(Huang, et al. 2016)
trimethoprim	Pearl River	Hong Kong coastal waters	December 2006	6.23	(Gulkowska, et al. 2007)
trimethoprim	Pearl River	Liuxi River	September 2008, February 2009	93.1	(Yang, et al. 2011)
trimethoprim	Pearl River	Qinzhou Bay	2010	1.50	(Xue, et al. 2013 b)
trimethoprim	Pearl River	Shijing River	September 2008, February 2009	71.5	(Yang, et al. 2011)
trimethoprim	Pearl River	tributary of Yongjiang River	June 2011	11.8	(Xue, et al. 2013 a)
trimethoprim	Pearl River	Upstream of Pearl River	/	27.0	(Huang, et al. 2016)
trimethoprim	Pearl River	Victoria Harbour	June to August 2008	26.2	(Tu, et al. 2009)
trimethoprim	Pearl River	Yongjiang River	June 2011	4.90	(Xue, et al. 2013 a)
trimethoprim	Songliao River	Daliao River	July 2013	41.0	(Qin, et al. 2015).
trimethoprim	Songliao River	Daliao River	/	61.6	(Jia, et al. 2011)
trimethoprim	Songliao River	Daling River	/	20.9	(Jia, et al. 2011)
trimethoprim	Songliao River	Liaodong Bay	/	4.88	(Jia, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
trimethoprim	Songliao River	Shuangtaizi River	/	30.5	(Jia, et al. 2011)
trimethoprim	Songliao River	Xiaoling River	/	38.7	(Jia, et al. 2011)
trimethoprim	Southeast coast	Jinxi River	dry season	4.40	(Zhu, et al. 2013)
trimethoprim	Southeast coast	Jinxi River	median water season	3.30	(Zhu, et al. 2013)
trimethoprim	Southeast coast	Jinxi River	wet season	2.20	(Zhu, et al. 2013)
trimethoprim	Southeast coast	Qingshan Lake	dry season	7.62	(Zhu, et al. 2013)
trimethoprim	Southeast coast	Qingshan Lake	median water season	0.27	(Zhu, et al. 2013)
trimethoprim	Southeast coast	Qingshan Lake	wet season	0.20	(Zhu, et al. 2013)
trimethoprim	Southeast coast	South Tiaoxi River	dry season	6.80	(Zhu, et al. 2013)
trimethoprim	Southeast coast	South Tiaoxi River	median water season	2.40	(Zhu, et al. 2013)
trimethoprim	Southeast coast	South Tiaoxi River	wet season	0.20	(Zhu, et al. 2013)
trimethoprim	Yangtze River	Chao Lake	January and March 2013	26.0	(Wu, et al. 2014)
trimethoprim	Yangtze River	Chongqing	/	6.00	(Chang, et al. 2010)
trimethoprim	Yangtze River	Dongting Lake	January and March 2013	10.0	(Wu, et al. 2014)
trimethoprim	Yangtze River	East China	2015	2.38	(Jin, et al. 2016)
trimethoprim	Yangtze River	Jialing River	/	6.00	(Chang, et al. 2010)
trimethoprim	Yangtze River	Jiaxing	April 2015	1.04	(Guo, et al. 2016)
trimethoprim	Yangtze River	Poyang Lake	January and March 2013	0	(Wu, et al. 2014)
trimethoprim	Yangtze River	Rivers in Shahu County	May 2014	1.89	(Tong, et al. 2014)
trimethoprim	Yangtze River	Rivers in Shahu County	October 2011	3.99	(Tong, et al. 2014)
trimethoprim	Yangtze River	Rivers in Shanghai	2014	8.00	(Zhou, et al. 2016 b)
trimethoprim	Yangtze River	Tai Lake	November 2013	2.24	(Zhou, et al. 2016 a)
trimethoprim	Yangtze River	Tai Lake	May 2014	2.04	(Zhou, et al. 2016 a)
trimethoprim	Yangtze River	Tai Lake	January and March 2013	12.6	(Wu, et al. 2014)
trimethoprim	Yangtze River	Tributary in Chongqing	/	7.50	(Chang, et al. 2010)
trimethoprim	Yangtze River	Yangtze River	January and March 2013	0	(Wu, et al. 2014)
tylosin	Hai River	Baiyangdian Lake	August 2008, October 2010	0.10	(Li, et al. 2012)
tylosin	Hai River	Chentaizi Drainage River	2010	19.5	(Gao, et al. 2012)
tylosin	Hai River	Dagu Drainage River	2010	0	(Gao, et al. 2012)
tylosin	Hai River	Duliujian River	2010	0	(Gao, et al. 2012)
tylosin	Hai River	Hai River	2010	0	(Gao, et al. 2012)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
tylosin	Hai River	tributary	2010	0	(Gao, et al. 2012)
tylosin	Hai River	Wangyanggou River	June 2013	13.4	(Jiang, et al. 2014)
tylosin	Yangtze River	Chongqing	/	11.0	(Chang, et al. 2010)
tylosin	Yangtze River	Huangpu River	June 2009	0.10	(Jiang, et al. 2011)
tylosin	Yangtze River	Huangpu River	December 2009	0.23	(Jiang, et al. 2011)
tylosin	Yangtze River	Jialing River	/	98.0	(Chang, et al. 2010)
tylosin	Yangtze River	Tributary in Chongqing	/	21.0	(Chang, et al. 2010)
hormone					
17β-estradiol	Hai River	Ba River	August 2006	0.37	(Chang, et al. 2009)
17β-estradiol	Hai River	Qing River	August 2006	0.95	(Chang, et al. 2009)
17β-estradiol	Hai River	Reservoir	March and July 2010	0	(Jiang, et al. 2012)
17β-estradiol	Hai River	Tonghui River	August 2006	0.47	(Chang, et al. 2009)
17β-estradiol	Hai River	Tonghui River	May 2006 and January 2007	0.33	(Wang, 2007)
17β-estradiol	Hai River	Wenyu River	August 2006	0.31	(Chang, et al. 2009)
17β-estradiol	Hai River	Zhangweinanyun River	September 2008 and January 2009	0	(Cao, et al. 2010)
17β-estradiol	Huai River	Licun River	April 2007	34.8	(Zhou, et al. 2011 a)
17β-estradiol	Huai River	Loma Lake region	April 2016	9.41	(Liu, et al. 2017 a)
17β-estradiol	Pearl River	Guangdong	June 2009 and January 2010	0.34	(Xu, et al. 2014)
17β-estradiol	Pearl River	Guangzhou	December 2006	0	(Gong, et al. 2008)
17β-estradiol	Pearl River	Guangzhou	December 2007	0.69	(Zhao,et al. 2009)
17β-estradiol	Pearl River	Guangzhou	May 2008	0.20	(Yu, et al. 2011)
17β-estradiol	Pearl River	Liuxi River	December 2007	0.72	(Zhao,et al. 2009)
17β-estradiol	Pearl River	Pearl River Estuary	High flow season 2006	0	(Peng, et al. 2008)
17β-estradiol	Pearl River	Pearl River Estuary	Low flow season 2006	0.38	(Peng, et al. 2008)
17β-estradiol	Pearl River	River	March and July 2010	0.04	(Jiang, et al. 2012)
17β-estradiol	Pearl River	Shijing River	December 2007	1.88	(Zhao,et al. 2009)
17β-estradiol	Songliao River	Heilongjiang	April 2009	0	(Zhang, et al. 2014 c)
17β-estradiol	Songliao River	Liao River	July 2008	1.00	(Li, et al. 2011)
17β-estradiol	Songliao River	Liao River	November 2008	1.30	(Li, et al. 2011)
17β-estradiol	Songliao River	Reservoir	March and July 2010	0.30	(Jiang, et al. 2012)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
17β-estradiol	Songliao River	Rivers in Dalian	February 2009	9.72	(Gao, et al. 2011)
17β-estradiol	Songliao River	Rivers in Dalian	May 2009	19.3	(Gao, et al. 2011)
17β-estradiol	Songliao River	Rivers in Dalian	August 2009	19.7	(Gao, et al. 2011)
17β-estradiol	Songliao River	Rivers in Dalian	November 2009	52.5	(Gao, et al. 2011)
17β-estradiol	Songliao River	Songhua River Downstream	March 2009	11.4	(Zhang, et al. 2011 c)
17β-estradiol	Songliao River	Songhua River Midstream	March 2009	11.3	(Zhang, et al. 2011 c)
17β-estradiol	Songliao River	Songhua River Upstream	March 2009	11.3	(Zhang, et al. 2011 c)
17β-estradiol	Southeast coast	Fenghua River	February 2014	0	(Wang, et al. 2015)
17β-estradiol	Southeast coast	Jiulong River	August 2010 and January 2011	35.1	(Xian, et al. 2012)
17β-estradiol	Southeast coast	Yao River	February 2014	0	(Wang, et al. 2015)
17β-estradiol	Southeast coast	Yong River	February 2014	0	(Wang, et al. 2015)
17β-estradiol	Southeast coast	Yundang Lagoon	Apirl 2008	0.72	(Zhang, et al. 2011 b)
17β-estradiol	Yangtze River	Huangpu River	October 2010	19.9	(Zhang, et al. 2014 a)
17β-estradiol	Yangtze River	Huangpu River	February 2012	3.39	(Zhang, et al. 2014 a)
17β-estradiol	Yangtze River	Huangpu River	April 2012	2.50	(Zhang, et al. 2014 a)
17β-estradiol	Yangtze River	Huangpu River	June 2012	4.38	(Zhang, et al. 2014 a)
17β-estradiol	Yangtze River	Huangpu River	December 2012	41.4	(Zhang, et al. 2014 a)
17β-estradiol	Yangtze River	Huangpu River	August 2010 and February 2011	0	(Shi, et al. 2014 a)
17β-estradiol	Yangtze River	Jiangsu	April 2011	1.96	(Tan, 2014)
17β-estradiol	Yangtze River	Jiangsu	July 2011	1.01	(Tan, 2014)
17β-estradiol	Yangtze River	Lake	March and July 2010	1.07	(Jiang, et al. 2012)
17β-estradiol	Yangtze River	Nanjing	March 2010	2.08	(Tan, 2014)
17β-estradiol	Yangtze River	Reservoir	March and July 2010	1.22	(Jiang, et al. 2012)
17β-estradiol	Yangtze River	southern Jiangsu	October 2012	17.2	(Yuan, et al. 2014)
17β-estradiol	Yangtze River	Tributary	March and July 2010	0.61	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Hai River	Reservoir	March and July 2010	1.55	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Hai River	Tonghui River	May 2006 and January 2007	0	(Wang, 2007)
17β-Ethynyl estradiol	Hai River	Zhangweinanyun River	September 2008 and January 2009	0	(Cao, et al. 2010)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration ($ng\ L^{-1}$)	Reference
17β-Ethynyl estradiol	Huai River	Licun River	April 2007	14.2	(Zhou, et al. 2011 a)
17β-Ethynyl estradiol	Huai River	Loma Lake region	April 2016	7.97	(Liu, et al. 2017 a)
17β-Ethynyl estradiol	Pearl River	Dengcun River	/	0	(Hou, et al. 2013)
17β-Ethynyl estradiol	Pearl River	Dengcun River	/	0	(Hou, et al. 2013)
17β-Ethynyl estradiol	Pearl River	Dongjiang River	August 2011	1.13	(Yang, et al. 2014)
17β-Ethynyl estradiol	Pearl River	Guangdong	June 2009 and January 2010	2.90	(Xu, et al. 2014)
17β-Ethynyl estradiol	Pearl River	Guangzhou	December 2006	0	(Gong, et al. 2008)
17β-Ethynyl estradiol	Pearl River	Guangzhou	May 2008	0	(Yu, et al. 2011)
17β-Ethynyl estradiol	Pearl River	Guangzhou	August 2011	1.25	(Yang, et al. 2014)
17β-Ethynyl estradiol	Pearl River	Park-lake	August 2011	0.88	(Yang, et al. 2014)
17β-Ethynyl estradiol	Pearl River	Pearl River Estuary	High flow season 2006	0	(Peng, et al. 2008)
17β-Ethynyl estradiol	Pearl River	Pearl River Estuary	Low flow season 2006	0.13	(Peng, et al. 2008)
17β-Ethynyl estradiol	Pearl River	Reservoirs, Guangzhou	August 2011	1.33	(Yang, et al. 2014)
17β-Ethynyl estradiol	Pearl River	River	March and July 2010	0	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Pearl River	Rivers in Guangzhou	August 2011	0.48	(Yang, et al. 2014)
17β-Ethynyl estradiol	Songliao River	Heilongjiang	April 2009	0	(Zhang, et al. 2014 c)
17β-Ethynyl estradiol	Songliao River	Reservoir	March and July 2010	0.83	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Songliao River	Songhua River Downstream	March 2009	1.00	(Zhang, et al. 2011 c)
17β-Ethynyl estradiol	Songliao River	Songhua River Midstream	March 2009	1.12	(Zhang, et al. 2011 c)
17β-Ethynyl estradiol	Songliao River	Songhua River Upstream	March 2009	1.53	(Zhang, et al. 2011 c)
17β-Ethynyl estradiol	Southeast coast	Fenghua River	February 2014	0	(Wang, et al. 2015)
17β-Ethynyl estradiol	Southeast coast	Yao River	February 2014	7.62	(Wang, et al. 2015)
17β-Ethynyl estradiol	Southeast coast	Yong River	February 2014	0	(Wang, et al. 2015)
17β-Ethynyl estradiol	Southeast coast	Yundang Lagoon	Apirl 2008	0.18	(Zhang, et al. 2011 b)
17β-Ethynyl estradiol	Yangtze River	Huangpu River	October 2010	1.15	(Zhang, et al. 2014 a)
17β-Ethynyl estradiol	Yangtze River	Huangpu River	February 2012	6.44	(Zhang, et al. 2014 a)
17β-Ethynyl estradiol	Yangtze River	Huangpu River	April 2012	34.7	(Zhang, et al. 2014 a)
17β-Ethynyl estradiol	Yangtze River	Huangpu River	June 2012	1.41	(Zhang, et al. 2014 a)
17β-Ethynyl estradiol	Yangtze River	Huangpu River	December 2012	20.6	(Zhang, et al. 2014 a)
17β-Ethynyl estradiol	Yangtze River	Huangpu River	August 2010 and February 2011	0	(Shi, et al. 2014 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
17β-Ethynyl estradiol	Yangtze River	Jiangsu	April 2011	2.80	(Tan, 2014)
17β-Ethynyl estradiol	Yangtze River	Jiangsu	July 2011	0.98	(Tan, 2014)
17β-Ethynyl estradiol	Yangtze River	Lake	March and July 2010	1.68	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Yangtze River	Nanjing	March 2010	2.95	(Tan, 2014)
17β-Ethynyl estradiol	Yangtze River	Nanjing	October 2013	0.56	(Liu, et al. 2015)
17β-Ethynyl estradiol	Yangtze River	Reservoir	March and July 2010	2.60	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Yangtze River	Tributary	March and July 2010	0.60	(Jiang, et al. 2012)
17β-Ethynyl estradiol	Yangtze River	Yangtze Estuary	July 2011	0	(Nie, et al. 2015)
androstenedione	Hai River	Ba River	August 2006	11.4	(Chang, et al. 2009)
androstenedione	Hai River	Qing River	August 2006	27.8	(Chang, et al. 2009)
androstenedione	Hai River	Tonghui River	August 2006	14.0	(Chang, et al. 2009)
androstenedione	Hai River	Wenyu River	August 2006	15.9	(Chang, et al. 2009)
androstenedione	Pearl River	Dengcun River	/	3.00	(Hou, et al. 2013)
androstenedione	Yangtze River	Jiangsu	April 2011	2.77	(Tan, 2014)
androstenedione	Yangtze River	Jiangsu	July 2011	1.95	(Tan, 2014)
androstenedione	Yangtze River	Nanjing	March 2010	3.26	(Tan, 2014)
diethylstilbestrol	Huai River	Loma Lake region	April 2016	0.26	(Liu, et al. 2017 a)
diethylstilbestrol	Pearl River	Guangzhou	December 2006	0	(Gong, et al. 2008)
diethylstilbestrol	Songliao River	Heilongjiang	April 2009	0.20	(Zhang, et al. 2014 c)
diethylstilbestrol	Songliao River	Rivers in Dalian	February 2009	5.07	(Gao, et al. 2011)
diethylstilbestrol	Songliao River	Rivers in Dalian	May 2009	1.93	(Gao, et al. 2011)
diethylstilbestrol	Songliao River	Rivers in Dalian	August 2009	16.5	(Gao, et al. 2011)
diethylstilbestrol	Songliao River	Rivers in Dalian	November 2009	14.8	(Gao, et al. 2011)
diethylstilbestrol	Songliao River	Songhua River Downstream	March 2009	0.87	(Zhang, et al. 2011 c)
diethylstilbestrol	Songliao River	Songhua River Midstream	March 2009	1.76	(Zhang, et al. 2011 c)
diethylstilbestrol	Songliao River	Songhua River Upstream	March 2009	1.67	(Zhang, et al. 2011 c)
diethylstilbestrol	Southeast coast	Yao River	February 2014	4.21	(Wang, et al. 2015)
diethylstilbestrol	Southeast coast	Yao River	February 2014	0	(Wang, et al. 2015)
diethylstilbestrol	Southeast coast	Yundang Lagoon	Apirl 2008	4.04	(Zhang, et al. 2011 b)
diethylstilbestrol	Yangtze River	Fenghua River	February 2014	0	(Wang, et al. 2015)
diethylstilbestrol	Yangtze River	Jiangsu	April 2011	1.38	(Tan, 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
diethylstilbestrol	Yangtze River	Jiangsu	July 2011	0.88	(Tan, 2014)
diethylstilbestrol	Yangtze River	Nanjing	March 2010	2.56	(Tan, 2014)
estriol	Hai River	Reservoir	March and July 2010	0	(Jiang, et al. 2012)
estriol	Hai River	Tonghui River	May 2006 and January 2007	1.47	(Wang, 2007)
estriol	Hai River	Zhangweinanyun River	September 2008 and January 2009	0	(Cao, et al. 2010)
estriol	Huai River	Licun River	April 2007	42.7	(Zhou, et al. 2011 a)
estriol	Pearl River	Dengcun River	/	0	(Hou, et al. 2013)
estriol	Pearl River	Guangdong	June 2009 and January 2010	0.28	(Xu, et al. 2014)
estriol	Pearl River	Guangzhou	December 2006	0	(Gong, et al. 2008)
estriol	Pearl River	Guangzhou	May 2008	0	(Yu, et al. 2011)
estriol	Pearl River	Pearl River Estuary	High flow season 2006	0	(Peng, et al. 2008)
estriol	Pearl River	Pearl River Estuary	Low flow season 2006	0.13	(Peng, et al. 2008)
estriol	Pearl River	River	March and July 2010	0	(Jiang, et al. 2012)
estriol	Songliao River	Heilongjiang	April 2009	0.84	(Zhang, et al. 2014 c)
estriol	Songliao River	Reservoir	March and July 2010	0	(Jiang, et al. 2012)
estriol	Songliao River	Rivers in Dalian	February 2009	12.3	(Gao, et al. 2011)
estriol	Songliao River	Rivers in Dalian	May 2009	17.0	(Gao, et al. 2011)
estriol	Songliao River	Rivers in Dalian	August 2009	50.3	(Gao, et al. 2011)
estriol	Songliao River	Rivers in Dalian	November 2009	39.9	(Gao, et al. 2011)
estriol	Songliao River	Songhua River Downstream	March 2009	0	(Zhang, et al. 2011 c)
estriol	Songliao River	Songhua River Midstream	March 2009	0	(Zhang, et al. 2011 c)
estriol	Songliao River	Songhua River Upstream	March 2009	0	(Zhang, et al. 2011 c)
estriol	Southeast coast	Fenghua River	February 2014	0	(Wang, et al. 2015)
estriol	Southeast coast	Jiulong River	August 2010 and January 2011	21.2	(Xian, et al. 2012)
estriol	Southeast coast	Yao River	February 2014	0	(Wang, et al. 2015)
estriol	Southeast coast	Yong River	February 2014	0	(Wang, et al. 2015)
estriol	Yangtze River	Huangpu River	October 2010	12.8	(Zhang, et al. 2014 a)
estriol	Yangtze River	Huangpu River	February 2012	51.5	(Zhang, et al. 2014 a)
estriol	Yangtze River	Huangpu River	April 2012	27.8	(Zhang, et al. 2014 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
estriol	Yangtze River	Huangpu River	June 2012	45.1	(Zhang, et al. 2014 a)
estriol	Yangtze River	Huangpu River	December 2012	67.2	(Zhang, et al. 2014 a)
estriol	Yangtze River	Jiangsu	April 2011	3.08	(Tan, 2014)
estriol	Yangtze River	Jiangsu	July 2011	3.40	(Tan, 2014)
estriol	Yangtze River	Lake	March and July 2010	2.14	(Jiang, et al. 2012)
estriol	Yangtze River	Nanjing	March 2010	0.77	(Tan, 2014)
estriol	Yangtze River	Reservoir	March and July 2010	2.71	(Jiang, et al. 2012)
estriol	Yangtze River	southern Jiangsu	October 2012	18.4	(Yuan, et al. 2014)
estriol	Yangtze River	Tributary	March and July 2010	2.21	(Jiang, et al. 2012)
estrone	Hai River	Ba River	August 2006	3.16	(Chang, et al. 2009)
estrone	Hai River	Qing River	August 2006	3.24	(Chang, et al. 2009)
estrone	Hai River	Reservoir	March and July 2010	0.45	(Jiang, et al. 2012)
estrone	Hai River	Tonghui River	August 2006	3.25	(Chang, et al. 2009)
estrone	Hai River	Tonghui River	May 2006 and January 2007	1.87	(Wang, 2007)
estrone	Hai River	Wenyu River	August 2006	1.91	(Chang, et al. 2009)
estrone	Hai River	Zhangweinanyun River	September 2008 and January 2009	0.12	(Cao, et al. 2010)
estrone	Huai River	Licun River	April 2007	46.8	(Zhou, et al. 2011 a)
estrone	Pearl River	Dengcun River	/	2.79	(Hou, et al. 2013)
estrone	Pearl River	Dongjiang River	August 2011	0.69	(Yang, et al. 2014)
estrone	Pearl River	Guangdong	June 2009 and January 2010	9.20	(Xu, et al. 2014)
estrone	Pearl River	Guangzhou	December 2006	4.71	(Gong, et al. 2008)
estrone	Pearl River	Guangzhou	December 2007	2.18	(Zhao,et al. 2009)
estrone	Pearl River	Guangzhou	May 2008	5.70	(Yu, et al. 2011)
estrone	Pearl River	Guangzhou	August 2011	0.70	(Yang, et al. 2014)
estrone	Pearl River	Liuxi River	December 2007	1.23	(Zhao,et al. 2009)
estrone	Pearl River	Park-lake	August 2011	0.50	(Yang, et al. 2014)
estrone	Pearl River	Pearl River Estuary	High flow season 2006	9.00	(Peng, et al. 2008)
estrone	Pearl River	Pearl River Estuary	Low flow season 2006	34.0	(Peng, et al. 2008)
estrone	Pearl River	Pearl River system	December 2007	13.9	(Zhao,et al. 2009)
estrone	Pearl River	Reservoirs, Guangzhou	August 2011	0.50	(Yang, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
estrone	Pearl River	River	March and July 2010	0.78	(Jiang, et al. 2012)
estrone	Pearl River	Rivers in Guangzhou	August 2011	0.54	(Yang, et al. 2014)
estrone	Pearl River	Shijing River	December 2007	46.9	(Zhao,et al. 2009)
estrone	Songliao River	Heilongjiang	April 2009	4.20	(Zhang, et al. 2014 c)
estrone	Songliao River	Liao River	July 2008	2.90	(Li, et al. 2011)
estrone	Songliao River	Liao River	November 2008	10.0	(Li, et al. 2011)
estrone	Songliao River	Reservoir	March and July 2010	1.06	(Jiang, et al. 2012)
estrone	Songliao River	Rivers in Dalian	February 2009	6.43	(Gao, et al. 2011)
estrone	Songliao River	Rivers in Dalian	May 2009	4.55	(Gao, et al. 2011)
estrone	Songliao River	Rivers in Dalian	August 2009	22.5	(Gao, et al. 2011)
estrone	Songliao River	Rivers in Dalian	November 2009	25.5	(Gao, et al. 2011)
estrone	Songliao River	Songhua River Downstream	March 2009	2.72	(Zhang, et al. 2011 c)
estrone	Songliao River	Songhua River Midstream	March 2009	3.15	(Zhang, et al. 2011 c)
estrone	Songliao River	Songhua River Upstream	March 2009	3.94	(Zhang, et al. 2011 c)
estrone	Southeast coast	Fenghua River	February 2014	0	(Wang, et al. 2015)
estrone	Southeast coast	Jiulong River	August 2010 and January 2011	38.4	(Xian, et al. 2012)
estrone	Southeast coast	Yao River	February 2014	4.46	(Wang, et al. 2015)
estrone	Southeast coast	Yong River	February 2014	0	(Wang, et al. 2015)
estrone	Southeast coast	Yundang Lagoon	Apirl 2008	2.50	(Zhang, et al. 2011 b)
estrone	Yangtze River	Huangpu River	October 2010	32.2	(Zhang, et al. 2014 a)
estrone	Yangtze River	Huangpu River	February 2012	11.9	(Zhang, et al. 2014 a)
estrone	Yangtze River	Huangpu River	April 2012	40.1	(Zhang, et al. 2014 a)
estrone	Yangtze River	Huangpu River	June 2012	11.4	(Zhang, et al. 2014 a)
estrone	Yangtze River	Huangpu River	December 2012	57.0	(Zhang, et al. 2014 a)
estrone	Yangtze River	Huangpu River	August 2010 and February 2011	0.17	(Shi, et al. 2014 a)
estrone	Yangtze River	Jiangsu	April 2011	2.40	(Tan, 2014)
estrone	Yangtze River	Jiangsu	July 2011	3.36	(Tan, 2014)
estrone	Yangtze River	Lake	March and July 2010	2.34	(Jiang, et al. 2012)
estrone	Yangtze River	Nanjing	March 2010	5.04	(Tan, 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
estrone	Yangtze River	Reservoir	March and July 2010	2.51	(Jiang, et al. 2012)
estrone	Yangtze River	southern Jiangsu	October 2012	2.96	(Yuan, et al. 2014)
estrone	Yangtze River	Tributary	March and July 2010	1.67	(Jiang, et al. 2012)
testosterone	Hai River	Ba River	August 2006	0.45	(Chang, et al. 2009)
testosterone	Hai River	Qing River	August 2006	1.23	(Chang, et al. 2009)
testosterone	Hai River	Tonghui River	August 2006	0.55	(Chang, et al. 2009)
testosterone	Hai River	Tonghui River	May 2006 and January 2007	2.50	(Wang, 2007)
testosterone	Hai River	Wenyu River	August 2006	0.20	(Chang, et al. 2009)
testosterone	Pearl River	Dengcun River	/	1.00	(Hou, et al. 2013)
testosterone	Yangtze River	Jiangsu	April 2011	0.99	(Tan, 2014)
testosterone	Yangtze River	Jiangsu	July 2011	1.13	(Tan, 2014)
testosterone	Yangtze River	Nanjing	March 2010	1.21	(Tan, 2014)
others					
caffeine	Hai River	Beiyun River	March 2013	2607	(Dai, et al. 2015)
caffeine	Hai River	Lake, Beijing	July and November of 2015	182	(Ma, et al. 2017)
caffeine	Hai River	Qing River and Liangshui River	May 2014	1990	(Dai, et al. 2016)
caffeine	Hai River	Rivers in Beijing	July 2008	3712	(Zhou, et al. 2010)
caffeine	Hai River	Rivers in Beijing	July and November of 2015	177	(Ma, et al. 2017)
caffeine	Pearl River	Yonghe	/	222	(Ding, et al. 2015)
caffeine	Southeast coast	Jinxi River	dry season	626	(Zhu, et al. 2013)
caffeine	Southeast coast	Jinxi River	median water season	428	(Zhu, et al. 2013)
caffeine	Southeast coast	Jinxi River	wet season	361	(Zhu, et al. 2013)
caffeine	Southeast coast	Qingshan Lake	dry season	96.2	(Zhu, et al. 2013)
caffeine	Southeast coast	Qingshan Lake	median water season	88.3	(Zhu, et al. 2013)
caffeine	Southeast coast	Qingshan Lake	wet season	70.4	(Zhu, et al. 2013)
caffeine	Southeast coast	South Tiaoxi River	dry season	345	(Zhu, et al. 2013)
caffeine	Southeast coast	South Tiaoxi River	median water season	201	(Zhu, et al. 2013)
caffeine	Southeast coast	South Tiaoxi River	wet season	135	(Zhu, et al. 2013)
caffeine	Yangtze River	Central and lower reaches	January and March 2013	142	(Wu, et al. 2014)
caffeine	Yangtze River	Chao lake	January and March 2013	659	(Wu, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
caffeine	Yangtze River	Dongting lake	January and March 2013	41.6	(Wu, et al. 2014)
caffeine	Yangtze River	Huangpu River	May 2012	55.0	(Wang, et al. 2013)
caffeine	Yangtze River	Poyang lake	January and March 2013	29.1	(Wu, et al. 2014)
caffeine	Yangtze River	Tai lake	May 2016	12.5	(Liu, et al. 2017 b)
caffeine	Yangtze River	Tai lake	January and March 2013	113	(Wu, et al. 2014)
caffeine	Yangtze River	urban Rivers in Shanghai	2014-2015	1870	(Zhou, et al. 2016 b)
carbamazepine	Hai River	Beiyun River	March 2013	56.4	(Dai, et al. 2015)
carbamazepine	Hai River	Hai River	cold season 2012	0.45	(Sun, et al. 2015)
carbamazepine	Hai River	Hai River	warm season 2013	0.29	(Sun, et al. 2015)
carbamazepine	Hai River	Lake, Beijing	July and November of 2015	0	(Ma, et al. 2017)
carbamazepine	Hai River	Qing River and Liangshui River	May 2014	24.7	(Dai, et al. 2016)
carbamazepine	Hai River	Rivers in Beijing	July 2008	456	(Zhou, et al. 2010)
carbamazepine	Hai River	Rivers in Beijing	July and November of 2015	1.06	(Ma, et al. 2017)
carbamazepine	Huai River	Huai River	cold season 2012	1.73	(Sun, et al. 2015)
carbamazepine	Huai River	Huai River	warm season 2013	1.03	(Sun, et al. 2015)
carbamazepine	Pearl River	Guangzhou	May 2008	15.0	(Yu, et al. 2011)
carbamazepine	Pearl River	Guangzhou	/	15.6	(Zhao,et al. 2010 a)
carbamazepine	Pearl River	Yonghe	/	0.83	(Ding, et al. 2015)
carbamazepine	Songliao River	Liao River	cold season 2012	0.07	(Sun, et al. 2015)
carbamazepine	Songliao River	Liao River	warm season 2013	0.09	(Sun, et al. 2015)
carbamazepine	Southeast coast	Jinxi River	dry season	2.44	(Zhu, et al. 2013)
carbamazepine	Southeast coast	Jinxi River	median water season	3.20	(Zhu, et al. 2013)
carbamazepine	Southeast coast	Jinxi River	wet season	12.2	(Zhu, et al. 2013)
carbamazepine	Southeast coast	Qingshan Lake	dry season	4.20	(Zhu, et al. 2013)
carbamazepine	Southeast coast	Qingshan Lake	median water season	0.22	(Zhu, et al. 2013)
carbamazepine	Southeast coast	Qingshan Lake	wet season	0.59	(Zhu, et al. 2013)
carbamazepine	Southeast coast	South Tiaoxi River	dry season	5.40	(Zhu, et al. 2013)
carbamazepine	Southeast coast	South Tiaoxi River	median water season	1.44	(Zhu, et al. 2013)
carbamazepine	Southeast coast	South Tiaoxi River	wet season	2.40	(Zhu, et al. 2013)
carbamazepine	Yangtze River	Caojia River	July 2008	0	(Zhou, et al. 2011 b)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
carbamazepine	Yangtze River	Central and lower reaches	January and March 2013	0.60	(Wu, et al. 2014)
carbamazepine	Yangtze River	Chao lake	January and March 2013	2.70	(Wu, et al. 2014)
carbamazepine	Yangtze River	Dongting lake	January and March 2013	2.30	(Wu, et al. 2014)
carbamazepine	Yangtze River	Huangpu River	May 2012	28.0	(Wang, et al. 2013)
carbamazepine	Yangtze River	Huangpu River	July 2008	530	(Zhou, et al. 2011 b)
carbamazepine	Yangtze River	Nanhengyin River	July 2008	0	(Zhou, et al. 2011 b)
carbamazepine	Yangtze River	Nanjing	October 2013	2.00	(Liu, et al. 2015)
carbamazepine	Yangtze River	Poyang lake	January and March 2013	2.60	(Wu, et al. 2014)
carbamazepine	Yangtze River	Suzhou River	July 2008	1090	(Zhou, et al. 2011 b)
carbamazepine	Yangtze River	Tai lake	May 2016	1.18	(Liu, et al. 2017 b)
carbamazepine	Yangtze River	Tai lake	January and March 2013	1.30	(Wu, et al. 2014)
carbamazepine	Yangtze River	Tongji University Intramural River	July 2008	190	(Zhou, et al. 2011 b)
carbamazepine	Yangtze River	urban Rivers in Shanghai	2014-2015	13.0	(Zhou, et al. 2016 b)
carbamazepine	Yangtze River	Yangtze River	cold season 2012	0.09	(Sun, et al. 2015)
carbamazepine	Yangtze River	Yangtze River	warm season 2013	0.16	(Sun, et al. 2015)
carbamazepine	Yangtze River	Yangtze River Estuary	November 2009	238	(Yang, et al. 2011)
carbamazepine	Yellow River	Yellow River	cold season 2012	0.33	(Sun, et al. 2015)
carbamazepine	Yellow River	Yellow River	warm season 2013	1.60	(Sun, et al. 2015)
clofibric acid	Hai River	Hai River	July 2008	1.65	(Wang, et al. 2010 a)
clofibric acid	Hai River	Hai River	November 2008	9.60	(Wang, et al. 2010 a)
clofibric acid	Hai River	Rivers in Beijing	July 2008	101	(Zhou, et al. 2010)
clofibric acid	Pearl River	Guangzhou	December 2007	12.0	(Zhao,et al. 2009)
clofibric acid	Pearl River	Guangzhou	/	7.60	(Zhao,et al. 2010 a)
clofibric acid	Pearl River	Liuxi River	December 2007	3.63	(Zhao,et al. 2009)
clofibric acid	Pearl River	Shijing River	December 2007	1.65	(Zhao,et al. 2009)
clofibric acid	Pearl River	Yonghe	/	0.87	(Ding, et al. 2015)
clofibric acid	Songliao River	Liao River, Liaoning	July 2008	1.65	(Wang, et al. 2010 a)
clofibric acid	Songliao River	Liao River, Liaoning	November 2008	19.2	(Wang, et al. 2010 a)
clofibric acid	Yellow River	from the upstream to downstream	July 2008	1.65	(Wang, et al. 2010 a)

Chemical	**Watershed** [a]	**Sampling Location** [b]	**Sampling time**	**Concentration (ng L^{-1})**	**Reference**
clofibric acid	Yellow River	from the upstream to downstream	November 2008	1.65	(Wang, et al. 2010 a)
diclofenac	Hai River	Beiyun River	March 2013	65.3	(Dai, et al. 2015)
diclofenac	Hai River	Hai River	July 2008	25.2	(Wang, et al. 2010 a)
diclofenac	Hai River	Hai River	November 2008	4.60	(Wang, et al. 2010 a)
diclofenac	Hai River	Qing River and Liangshui River	May 2014	71.5	(Dai, et al. 2016)
diclofenac	Hai River	Rivers in Beijing	July 2008	306	(Zhou, et al. 2010)
diclofenac	Pearl River	Guangzhou	December 2007	18.0	(Zhao,et al. 2009)
diclofenac	Pearl River	Guangzhou	/	17.6	(Zhao,et al. 2010 a)
diclofenac	Pearl River	Guangzhou	August 2007, March 2008, May 2008 and November 2008	20.0	(Huang, et al. 2011)
diclofenac	Pearl River	Liuxi River	December 2007	3.37	(Zhao,et al. 2009)
diclofenac	Pearl River	Shijing River	December 2007	107	(Zhao,et al. 2009)
diclofenac	Pearl River	Yonghe	/	13.9	(Ding, et al. 2015)
diclofenac	Songliao River	Liao River, Liaoning	July 2008	52.4	(Wang, et al. 2010 a)
diclofenac	Songliao River	Liao River, Liaoning	November 2008	32.1	(Wang, et al. 2010 a)
diclofenac	Southeast coast	Jinxi River	dry season	9.60	(Zhu, et al. 2013)
diclofenac	Southeast coast	Jinxi River	median water season	5.00	(Zhu, et al. 2013)
diclofenac	Southeast coast	Jinxi River	wet season	5.00	(Zhu, et al. 2013)
diclofenac	Southeast coast	Qingshan Lake	dry season	5.00	(Zhu, et al. 2013)
diclofenac	Southeast coast	Qingshan Lake	median water season	5.00	(Zhu, et al. 2013)
diclofenac	Southeast coast	Qingshan Lake	wet season	5.00	(Zhu, et al. 2013)
diclofenac	Southeast coast	South Tiaoxi River	dry season	13.1	(Zhu, et al. 2013)
diclofenac	Southeast coast	South Tiaoxi River	median water season	5.00	(Zhu, et al. 2013)
diclofenac	Southeast coast	South Tiaoxi River	wet season	5.00	(Zhu, et al. 2013)
diclofenac	Yangtze River	Chongqing	January 2013	0	(Yan, et al. 2013 b)
diclofenac	Yangtze River	Huangpu River	May 2012	12.0	(Wang, et al. 2013)
diclofenac	Yangtze River	Huaxi River	January 2013	1.20	(Yan, et al. 2013 b)
diclofenac	Yangtze River	Huaxi River	January 2013	0	(Yan, et al. 2013 b)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
diclofenac	Yangtze River	Nanjing	October 2013	56.5	(Liu, et al. 2015)
diclofenac	Yangtze River	urban Rivers in Shanghai	2014-2015	20.0	(Zhou, et al. 2016 b)
diclofenac	Yangtze River	Yangtze River Estuary	November 2009	315	(Yang, et al. 2011)
diclofenac	Yellow River	from the upstream to downstream	July 2008	15.4	(Wang, et al. 2010 a)
diclofenac	Yellow River	from the upstream to downstream	November 2008	8.60	(Wang, et al. 2010 a)
gemfibrozil	Hai River	Beiyun River	March 2013	9.10	(Dai, et al. 2015)
gemfibrozil	Hai River	Hai River	July 2008	59.2	(Wang, et al. 2010 a)
gemfibrozil	Hai River	Hai River	November 2008	64.4	(Wang, et al. 2010 a)
gemfibrozil	Hai River	Hai River	November 2008	29.1	(Wang, et al. 2010 a)
gemfibrozil	Hai River	Qing River and Liangshui River	May 2014	15.5	(Dai, et al. 2016)
gemfibrozil	Pearl River	Guangzhou	December 2007	0	(Zhao,et al. 2009)
gemfibrozil	Pearl River	Guangzhou	/	14.9	(Zhao,et al. 2010 a)
gemfibrozil	Pearl River	Liuxi River	December 2007	0	(Zhao,et al. 2009)
gemfibrozil	Pearl River	Shijing River	December 2007	7.95	(Zhao,et al. 2009)
gemfibrozil	Songliao River	Liao River	November 2008	0	(Wang, et al. 2010 a)
gemfibrozil	Songliao River	Liao River, Liaoning	July 2008	0	(Wang, et al. 2010 a)
gemfibrozil	Songliao River	Liao River, Liaoning	November 2008	0	(Wang, et al. 2010 a)
gemfibrozil	Yangtze River	Chongqing	January 2013	0	(Yan, et al. 2013 b)
gemfibrozil	Yangtze River	Huangpu River	May 2012	4.00	(Wang, et al. 2013)
gemfibrozil	Yangtze River	Huaxi River	January 2013	0.93	(Yan, et al. 2013 b)
gemfibrozil	Yangtze River	Huaxi River	January 2013	0	(Yan, et al. 2013 b)
gemfibrozil	Yangtze River	Yangtze Estuary	Autumn-2013	0.30	(Zhao, et al. 2017)
gemfibrozil	Yangtze River	Yangtze Estuary	Spring-2014	0.40	(Zhao, et al. 2017)
gemfibrozil	Yangtze River	Yangtze Estuary	Summer-2013	0.15	(Zhao, et al. 2017)
gemfibrozil	Yangtze River	Yangtze Estuary	Winter-2013	0.35	(Zhao, et al. 2017)
gemfibrozil	Yellow River	from the upstream to downstream	July 2008	3.05	(Wang, et al. 2010 a)
gemfibrozil	Yellow River	from the upstream to	November 2008	3.05	(Wang, et al. 2010 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
gemfibrozil	Yellow River	downstream from the upstream to downstream	November 2008	9.00	(Wang, et al. 2010 a)
ibuprofen	Hai River	Hai River	July 2008	75.2	(Wang, et al. 2010 a)
ibuprofen	Hai River	Hai River	November 2008	54.2	(Wang, et al. 2010 a)
ibuprofen	Hai River	Zhangweinanyun River	September 2008 and January 2009	1.99	(Cao, et al. 2010)
ibuprofen	Pearl River	Guangzhou	December 2007	15.5	(Zhao,et al. 2009)
ibuprofen	Pearl River	Guangzhou	/	17.5	(Zhao,et al. 2010 a)
ibuprofen	Pearl River	Guangzhou	August 2007, March 2008, May 2008 and November 2008	80.0	(Huang, et al. 2011)
ibuprofen	Pearl River	Guangzhou	High flow season 2006	59.0	(Peng, et al. 2008)
ibuprofen	Pearl River	Guangzhou	Low flow season 2006	360	(Peng, et al. 2008)
ibuprofen	Pearl River	Liuxi River	December 2007	3.93	(Zhao,et al. 2009)
ibuprofen	Pearl River	Shijing River	December 2007	358	(Zhao,et al. 2009)
ibuprofen	Pearl River	urban canals in Guangzhou	August 2007, March 2008, May 2008 and November 2008	204	(Huang, et al. 2011)
ibuprofen	Songliao River	Liao River, Liaoning	July 2008	7.10	(Wang, et al. 2010 a)
ibuprofen	Songliao River	Liao River, Liaoning	November 2008	61.9	(Wang, et al. 2010 a)
ibuprofen	Southeast coast	Jinxi River	dry season	37.8	(Zhu, et al. 2013)
ibuprofen	Southeast coast	Jinxi River	median water season	34.8	(Zhu, et al. 2013)
ibuprofen	Southeast coast	Jinxi River	wet season	46.3	(Zhu, et al. 2013)
ibuprofen	Southeast coast	Qiantang River	October 2010	3.10	(Chen, et al. 2012)
ibuprofen	Southeast coast	Qingshan Lake	dry season	5.00	(Zhu, et al. 2013)
ibuprofen	Southeast coast	Qingshan Lake	median water season	5.00	(Zhu, et al. 2013)
ibuprofen	Southeast coast	Qingshan Lake	wet season	5.00	(Zhu, et al. 2013)
ibuprofen	Southeast coast	South Tiaoxi River	dry season	36.7	(Zhu, et al. 2013)
ibuprofen	Southeast coast	South Tiaoxi River	median water season	5.00	(Zhu, et al. 2013)
ibuprofen	Southeast coast	South Tiaoxi River	wet season	5.00	(Zhu, et al. 2013)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
ibuprofen	Yangtze River	Central and lower reaches	January and March 2013	11.3	(Wu, et al. 2014)
ibuprofen	Yangtze River	Chao lake	January and March 2013	0	(Wu, et al. 2014)
ibuprofen	Yangtze River	Chongqing	January 2013	1.63	(Yan, et al. 2013 b)
ibuprofen	Yangtze River	Dongting lake	January and March 2013	0	(Wu, et al. 2014)
ibuprofen	Yangtze River	Huaxi River	January 2013	71.9	(Yan, et al. 2013 b)
ibuprofen	Yangtze River	Huaxi River	January 2013	1.50	(Yan, et al. 2013 b)
ibuprofen	Yangtze River	Nanjing	October 2013	18.6	(Liu, et al. 2015)
ibuprofen	Yangtze River	Poyang lake	January and March 2013	0	(Wu, et al. 2014)
ibuprofen	Yangtze River	Tai lake	May 2016	0.62	(Liu, et al. 2017 b)
ibuprofen	Yangtze River	Tai lake	January and March 2013	0	(Wu, et al. 2014)
ibuprofen	Yangtze River	urban Rivers in Shanghai	2014-2015	61.0	(Zhou, et al. 2016 b)
ibuprofen	Yellow River	from the upstream to downstream	July 2008	40.8	(Wang, et al. 2010 a)
ibuprofen	Yellow River	from the upstream to downstream	November 2008	11.3	(Wang, et al. 2010 a)
indomethacin	Hai River	Beiyun River	March 2013	32.6	(Dai, et al. 2015)
indomethacin	Hai River	Qing River and Liangshui River	May 2014	42.3	(Dai, et al. 2016)
indomethacin	Pearl River	Guangzhou	August 2007, March 2008, May 2008 and November 2008	1.11	(Huang, et al. 2011)
indomethacin	Pearl River	Yonghe	/	0.96	(Ding, et al. 2015)
indomethacin	Yangtze River	Yangtze Estuary	Autumn-2013	2.20	(Zhao, et al. 2017)
indomethacin	Yangtze River	Yangtze Estuary	Spring-2014	1.00	(Zhao, et al. 2017)
indomethacin	Yangtze River	Yangtze Estuary	Summer-2013	0.90	(Zhao, et al. 2017)
indomethacin	Yangtze River	Yangtze Estuary	Winter-2013	1.30	(Zhao, et al. 2017)
indomethacin	Yangtze River	Yangtze River Estuary	November 2009	479	(Yang, et al. 2011)
iopromide	Pearl River	Guangzhou	May 2008	211	(Yu, et al. 2011)
iopromide	Yangtze River	Dingshan lake	/	20400	(Zhao,et al. 2012)
iopromide	Yangtze River	Wusongkou wharf	/	0	(Zhao,et al. 2012)
iopromide	Yangtze River	Xupu bridge	/	26000	(Zhao,et al. 2012)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
naproxen	Hai River	Hai River	July 2008	0	(Wang, et al. 2010 a)
naproxen	Hai River	Hai River	November 2008	0	(Wang, et al. 2010 a)
naproxen	Pearl River	Guangzhou	December 2007	0	(Zhao,et al. 2009)
naproxen	Pearl River	Guangzhou	/	20.9	(Zhao,et al. 2010 a)
naproxen	Pearl River	Liuxi River	December 2007	0	(Zhao,et al. 2009)
naproxen	Pearl River	Shijing River	December 2007	60.2	(Zhao,et al. 2009)
naproxen	Songliao River	Liao River, Liaoning	July 2008	2.40	(Wang, et al. 2010 a)
naproxen	Songliao River	Liao River, Liaoning	November 2008	5.70	(Wang, et al. 2010 a)
naproxen	Southeast coast	Jinxi River	dry season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	Jinxi River	median water season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	Jinxi River	wet season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	Qingshan Lake	dry season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	Qingshan Lake	median water season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	Qingshan Lake	wet season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	South Tiaoxi River	dry season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	South Tiaoxi River	median water season	20.0	(Zhu, et al. 2013)
naproxen	Southeast coast	South Tiaoxi River	wet season	20.0	(Zhu, et al. 2013)
naproxen	Yellow River	from the upstream to downstream	July 2008	6.10	(Wang, et al. 2010 a)
naproxen	Yellow River	from the upstream to downstream	November 2008	4.60	(Wang, et al. 2010 a)
propranolol	Hai River	Beiyun River	March 2013	3.50	(Dai, et al. 2015)
propranolol	Hai River	Qing River and Liangshui River	May 2014	0	(Dai, et al. 2016)
propranolol	Pearl River	Guangzhou	May 2008	0	(Yu, et al. 2011)
propranolol	Pearl River	Yonghe	/	0	(Ding, et al. 2015)
propranolol	Yangtze River	Nanjing	October 2013	0.15	(Liu, et al. 2015)
propranolol	Yangtze River	urban Rivers in Shanghai	2014-2015	1.00	(Zhou, et al. 2016 b)
propranolol	Yangtze River	Yangtze River Estuary	November 2009	41.6	(Yang, et al. 2011)
salicylic acid	Hai River	Hai River	July 2008	27.7	(Wang, et al. 2010 a)
salicylic acid	Hai River	Hai River	November 2008	26.3	(Wang, et al. 2010 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
salicylic acid	Pearl River	Guangzhou	/	66.0	(Zhao,et al. 2010 a)
salicylic acid	Pearl River	Guangzhou	August 2007, March 2008, May 2008 and November 2008	109	(Huang, et al. 2011)
salicylic acid	Songliao River	Liao River, Liaoning	July 2008	79.2	(Wang, et al. 2010 a)
salicylic acid	Songliao River	Liao River, Liaoning	November 2008	60.7	(Wang, et al. 2010 a)
salicylic acid	Yellow River	from the upstream to downstream	July 2008	15.6	(Wang, et al. 2010 a)
salicylic acid	Yellow River	from the upstream to downstream	November 2008	47.1	(Wang, et al. 2010 a)
PCPs					
bisphenol A	Hai River	Reservoir	March and July 2010	7.61	(Jiang, et al. 2012)
bisphenol A	Huai River	Loma Lake region	April 2016	86.4	(Liu, et al. 2017 a)
bisphenol A	Pearl River	Dongjiang River	August 2011	109	(Yang, et al. 2014)
bisphenol A	Pearl River	Guangdong	June 2009 and January 2010	429	(Xu, et al. 2014)
bisphenol A	Pearl River	Guangzhou	December 2006	193	(Gong, et al. 2008)
bisphenol A	Pearl River	Guangzhou	December 2007	143	(Zhao,et al. 2010 b)
bisphenol A	Pearl River	Guangzhou	May 2008	672	(Yu, et al. 2011)
bisphenol A	Pearl River	Guangzhou	August 2011	17.0	(Yang, et al. 2014)
bisphenol A	Pearl River	Guangzhou	High flow season	36.0	(Peng, et al. 2008)
bisphenol A	Pearl River	Guangzhou	Low flow season	106	(Peng, et al. 2008)
bisphenol A	Pearl River	Liuxi River	December 2007	18.0	(Zhao,et al. 2010 b)
bisphenol A	Pearl River	Park-lake	August 2011	16.2	(Yang, et al. 2014)
bisphenol A	Pearl River	Pearl River Estuary	August 2015	29.4	(Diao, et al. 2017)
bisphenol A	Pearl River	Reservoirs, Guangzhou	August 2011	11.0	(Yang, et al. 2014)
bisphenol A	Pearl River	River	March and July 2010	28.1	(Jiang, et al. 2012)
bisphenol A	Pearl River	Rivers in Guangzhou	August 2011	47.3	(Yang, et al. 2014)
bisphenol A	Pearl River	Shijing River	December 2007	771	(Zhao,et al. 2010 b)
bisphenol A	Songliao River	Heilongjiang	April 2009	52.0	(Zhang, et al. 2014 c)
bisphenol A	Songliao River	Liao River	July 2008	37.0	(Li, et al. 2011)
bisphenol A	Songliao River	Liao River	November 2008	263	(Li, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
bisphenol A	Songliao River	Reservoir	March and July 2010	15.2	(Jiang, et al. 2012)
bisphenol A	Songliao River	Songhua River Downstream	March 2009	62.4	(Zhang, et al. 2011 c)
bisphenol A	Songliao River	Songhua River Midstream	March 2009	34.3	(Zhang, et al. 2011 c)
bisphenol A	Songliao River	Songhua River Upstream	March 2009	110	(Zhang, et al. 2011 c)
bisphenol A	Southeast coast	Fenghua River	February 2014	11.4	(Wang, et al. 2015)
bisphenol A	Southeast coast	Jiulong River	August 2010 and January 2011	611	(Xian, et al. 2012)
bisphenol A	Southeast coast	Panlong River	December 2014	46.0	(Wang, et al. 2016)
bisphenol A	Southeast coast	Yao River	February 2014	1607	(Wang, et al. 2015)
bisphenol A	Southeast coast	Yong River	February 2014	16.6	(Wang, et al. 2015)
bisphenol A	Southeast coast	Yundang Lagoon	Apirl 2008	23.9	(Zhang, et al. 2011 b)
bisphenol A	Yangtze River	Huangpu River	July 2010	28.6	(Wu, et al. 2013)
bisphenol A	Yangtze River	Huangpu River	October 2010	34.5	(Zhang, et al. 2014 a)
bisphenol A	Yangtze River	Huangpu River	November 2010	52.0	(Wu, et al. 2013)
bisphenol A	Yangtze River	Huangpu River	February 2012	93.3	(Zhang, et al. 2014 a)
bisphenol A	Yangtze River	Huangpu River	April 2012	51.7	(Zhang, et al. 2014 a)
bisphenol A	Yangtze River	Huangpu River	June 2012	25.3	(Zhang, et al. 2014 a)
bisphenol A	Yangtze River	Huangpu River	December 2012	272	(Zhang, et al. 2014 a)
bisphenol A	Yangtze River	Huangpu River	August 2010 and February 2011	10.6	(Shi, et al. 2014 a)
bisphenol A	Yangtze River	Lake	March and July 2010	148	(Jiang, et al. 2012)
bisphenol A	Yangtze River	Nanjing	April 2014	10.0	(Liu, et al. 2017 c)
bisphenol A	Yangtze River	Nanjing	August 2014	0	(Liu, et al. 2017 c)
bisphenol A	Yangtze River	Nanjing	December 2014	347	(Liu, et al. 2017 c)
bisphenol A	Yangtze River	Reservoir	March and July 2010	273	(Jiang, et al. 2012)
bisphenol A	Yangtze River	southern Jiangsu	October 2012	143	(Yuan, et al. 2014)
bisphenol A	Yangtze River	Suzhou River	July 2010	40.3	(Wu, et al. 2013)
bisphenol A	Yangtze River	Suzhou River	November 2010	25.3	(Wu, et al. 2013)
bisphenol A	Yangtze River	Taihu Lake and its tributaries	November 2015	92.6	(Dan, et al. 2016)
bisphenol A	Yangtze River	Tributary	March and July 2010	194	(Jiang, et al. 2012)
bisphenol A	Yangtze River	Yangtze Estuary	July and October 2013	1.00	(Shi, et al. 2014 b)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
bisphenol A	Yangtze River	Yunzao Brook	July 2010	22.4	(Wu, et al. 2013)
bisphenol A	Yangtze River	Yunzao Brook	November 2010	21.6	(Wu, et al. 2013)
di(2-ethylhexyl) phthalate	Hai River	Guanting Reservoir	April to May 2012	87.0	(Zheng, et al. 2014)
di(2-ethylhexyl) phthalate	Hai River	Hai River	May 2008	21720	(Chi, et al. 2009)
di(2-ethylhexyl) phthalate	Hai River	Shichahai	April to May 2012	239	(Zheng, et al. 2014)
di(2-ethylhexyl) phthalate	Hai River	Summer Palace	April to May 2012	250	(Zheng, et al. 2014)
di(2-ethylhexyl) phthalate	Huai River	Shayinghe River	2011	19280	(Li, et al. 2013 a)
di(2-ethylhexyl) phthalate	Pearl River	Guangzhou	April 2006	218	(Zeng, et al. 2009)
di(2-ethylhexyl) phthalate	Pearl River	Guangzhou	August 2006	427	(Zeng, et al. 2009)
di(2-ethylhexyl) phthalate	Pearl River	Guangzhou	December 2006	183	(Zeng, et al. 2009)
di(2-ethylhexyl) phthalate	Pearl River	Pearl River Estuary	2013	2700	(Li, et al. 2014 b)
di(2-ethylhexyl) phthalate	Songliao River	Pu River	May 2013	4360	(Li, et al. 2015 a)
di(2-ethylhexyl) phthalate	Songliao River	Pu River	August 2013	7080	(Li, et al. 2015 a)
di(2-ethylhexyl) phthalate	Songliao River	Pu River	October 2013	1030	(Li, et al. 2015 a)
di(2-ethylhexyl) phthalate	Songliao River	Rivers in Anshan	/	2634410	(Yao, et al. 2011)
di(2-ethylhexyl) phthalate	Songliao River	Songhua River, Haerbin	December 2012	23960	(Song, 2014)
di(2-ethylhexyl) phthalate	Songliao River	Songyuan	December 2012	78870	(Song, 2014)
di(2-ethylhexyl) phthalate	Songliao River	Tongjiang	December 2012	7840	(Song, 2014)
di(2-ethylhexyl) phthalate	Songliao River	Xi River	May 2013	456	(Li, et al. 2015 a)
di(2-ethylhexyl) phthalate	Songliao River	Xi River	August 2013	2510	(Li, et al. 2015 a)
di(2-ethylhexyl) phthalate	Songliao River	Xi River	October 2013	695	(Li, et al. 2015 a)
di(2-ethylhexyl) phthalate	Yangtze River	Chao Lake	April 2011	197	(He, et al. 2013)
di(2-ethylhexyl) phthalate	Yangtze River	Chongqing	/	16000	(Luo, et al. 2011 b)
di(2-ethylhexyl) phthalate	Yangtze River	Dafangying Reservoir	2012	1840	(Lu, 2013)
di(2-ethylhexyl) phthalate	Yangtze River	Dongpu Reservoir	2012	1780	(Lu, 2013)
di(2-ethylhexyl) phthalate	Yangtze River	Grand Canal, Suzhou	June 2010	637	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Grand Canal, Wuxi	June 2010	1105	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Nantong	June 2010	289	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Nantong to Suzhou	June 2010	690	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Suzhou	June 2010	926	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Taihu Lake, Suzhou	June 2010	341	(Zhang, et al. 2012 c)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
di(2-ethylhexyl) phthalate	Yangtze River	Taihu Lake, Wuxi	June 2010	28403	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	the entrance to Jiangsu	January 2005	770	(He, et al. 2011)
di(2-ethylhexyl) phthalate	Yangtze River	the lower reaches of Jiangsu	January 2005	5.00	(He, et al. 2011)
di(2-ethylhexyl) phthalate	Yangtze River	the middle reaches of Jiangsu	January 2005	5.00	(He, et al. 2011)
di(2-ethylhexyl) phthalate	Yangtze River	the middle reach in Nanjing	January 2005	1120	(He, et al. 2011)
di(2-ethylhexyl) phthalate	Yangtze River	the outlet from Nanjing	January 2005	840	(He, et al. 2011)
di(2-ethylhexyl) phthalate	Yangtze River	Three Gorges	2005	1780	(Chuan, et al. 2007)
di(2-ethylhexyl) phthalate	Yangtze River	Wuhan	December 2009	1437	(Zhang, et al. 2011 d)
di(2-ethylhexyl) phthalate	Yangtze River	Wuxi	June 2010	823	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Xuanwu lake	April 2010	731100	(Shen, et al. 2010)
di(2-ethylhexyl) phthalate	Yangtze River	Yangchenghu Lake	June 2010	8805	(Zhang, et al. 2012 c)
di(2-ethylhexyl) phthalate	Yangtze River	Zhejiang	November 2007	1570	(Wang, et al. 2010 b)
di(2-ethylhexyl) phthalate	Yangtze River	Zhejiang	November 2007	3140	(Wang, et al. 2010 b)
di(2-ethylhexyl) phthalate	Yellow River	Lanzhou	March to Apirl 2005	37120	(Niu, et al. 2006)
di(2-ethylhexyl) phthalate	Yellow River	Middle and lower part	June 2004	12100	(Sha, et al. 2007)
di(2-ethylhexyl) phthalate	Yellow River	Tributaries	June 2004	17100	(Sha, et al. 2007)
dibutyl phthalate	Hai River	Guanting Reservoir	April to May 2012	305	(Zheng, et al. 2014)
dibutyl phthalate	Hai River	Hai River	May 2008	7320	(Chi, et al. 2009)
dibutyl phthalate	Hai River	Lakes Shichahai	April to May 2012	66.0	(Zheng, et al. 2014)
dibutyl phthalate	Hai River	Summer Palace	April to May 2012	335	(Zheng, et al. 2014)
dibutyl phthalate	Huai River	Shayinghe River	2011	11137	(Li, et al. 2013 a)
dibutyl phthalate	Pearl River	Guangzhou	April 2006	397	(Zeng, et al. 2009)
dibutyl phthalate	Pearl River	Guangzhou	August 2006	1180	(Zeng, et al. 2009)
dibutyl phthalate	Pearl River	Guangzhou	December 2006	237	(Zeng, et al. 2009)
dibutyl phthalate	Pearl River	Pearl River Estuary	2013	3398	(Li, et al. 2014 b)
dibutyl phthalate	Songliao River	Pu River	May 2013	11800	(Li, et al. 2015 a)
dibutyl phthalate	Songliao River	Pu River	August 2013	2110	(Li, et al. 2015 a)
dibutyl phthalate	Songliao River	Pu River	October 2013	1170	(Li, et al. 2015 a)
dibutyl phthalate	Songliao River	Rivers in Anshan	/	1675200	(Yao, et al. 2011)
dibutyl phthalate	Songliao River	Songhua River, Haerbin	December 2012	0	(Song, 2014)
dibutyl phthalate	Songliao River	Songhua River, Jilin	March 2008	6216	(Wei, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
dibutyl phthalate	Songliao River	Songyuan	December 2012	3510	(Song, 2014)
dibutyl phthalate	Songliao River	Tongjiang	December 2012	15093	(Song, 2014)
dibutyl phthalate	Songliao River	Xi River	May 2013	4700	(Li, et al. 2015 a)
dibutyl phthalate	Songliao River	Xi River	August 2013	2670	(Li, et al. 2015 a)
dibutyl phthalate	Songliao River	Xi River	October 2013	2150	(Li, et al. 2015 a)
dibutyl phthalate	Yangtze River	Chao Lake	April 2011	3226	(He, et al. 2013)
dibutyl phthalate	Yangtze River	Chongqing	/	61660	(Luo, et al. 2011 b)
dibutyl phthalate	Yangtze River	Dafangying Reservoir	2012	1870	(Lu, 2013)
dibutyl phthalate	Yangtze River	Dongpu Reservoir	2012	700	(Lu, 2013)
dibutyl phthalate	Yangtze River	Grand Canal, Suzhou	June 2010	0	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Grand Canal, Wuxi	June 2010	0	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Nantong	June 2010	0	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Nantong to Suzhou	June 2010	24.7	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Suzhou	June 2010	267	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Taihu Lake, Suzhou	June 2010	64.0	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Taihu Lake, Wuxi	June 2010	0	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	the entrance to Jiangsu	January 2005	249	(He, et al. 2011)
dibutyl phthalate	Yangtze River	the lower reaches of Jiangsu	January 2005	105	(He, et al. 2011)
dibutyl phthalate	Yangtze River	the middle reaches of Jiangsu	January 2005	210	(He, et al. 2011)
dibutyl phthalate	Yangtze River	the middle reach in Nanjing	January 2005	186	(He, et al. 2011)
dibutyl phthalate	Yangtze River	the outlet from Nanjing	January 2005	286	(He, et al. 2011)
dibutyl phthalate	Yangtze River	Three Gorges	2005	1620	(Chuan, et al. 2007)
dibutyl phthalate	Yangtze River	Wuhan	December 2009	1383	(Zhang, et al. 2011 d)
dibutyl phthalate	Yangtze River	Wuxi	June 2010	0	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Xuanwu lake	April 2010	488693	(Shen, et al. 2010)
dibutyl phthalate	Yangtze River	Yangchenghu Lake	June 2010	3670	(Zhang, et al. 2012 c)
dibutyl phthalate	Yangtze River	Zhejiang	November 2007	790	(Wang, et al. 2010 b)
dibutyl phthalate	Yangtze River	Zhejiang	November 2007	1100	(Wang, et al. 2010 b)
dibutyl phthalate	Yellow River	Lanzhou	March to Apirl 2005	5688	(Niu, et al. 2006)
dibutyl phthalate	Yellow River	Middle and lower part	June 2004	4213	(Sha, et al. 2007)
dibutyl phthalate	Yellow River	Tributaries	June 2004	14040	(Sha, et al. 2007)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
diethyl phthalate	Hai River	Guanting Reservoir	April to May 2012	0	(Zheng, et al. 2014)
diethyl phthalate	Hai River	Lakes Shichahai	April to May 2012	9.00	(Zheng, et al. 2014)
diethyl phthalate	Hai River	Summer Palace	April to May 2012	6.00	(Zheng, et al. 2014)
diethyl phthalate	Huai River	Shayinghe River	2011	81250	(Li, et al. 2013 a)
diethyl phthalate	Pearl River	Guangzhou	April 2006	64.0	(Zeng, et al. 2009)
diethyl phthalate	Pearl River	Guangzhou	August 2006	77.0	(Zeng, et al. 2009)
diethyl phthalate	Pearl River	Guangzhou	December 2006	28.0	(Zeng, et al. 2009)
diethyl phthalate	Pearl River	Pearl River Estuary	2013	229	(Li, et al. 2014 b)
diethyl phthalate	Songliao River	Pu River	May 2013	447	(Li, et al. 2015 a)
diethyl phthalate	Songliao River	Pu River	August 2013	401	(Li, et al. 2015 a)
diethyl phthalate	Songliao River	Pu River	October 2013	157	(Li, et al. 2015 a)
diethyl phthalate	Songliao River	Rivers in Anshan	/	0	(Yao, et al. 2011)
diethyl phthalate	Songliao River	Songhua River, Haerbin	December 2012	0	(Song, 2014)
diethyl phthalate	Songliao River	Songhua River, Jilin	March 2008	516	(Wei, et al. 2011)
diethyl phthalate	Songliao River	Songyuan	December 2012	0	(Song, 2014)
diethyl phthalate	Songliao River	Tongjiang	December 2012	2463	(Song, 2014)
diethyl phthalate	Songliao River	Xi River	May 2013	896	(Li, et al. 2015 a)
diethyl phthalate	Songliao River	Xi River	August 2013	729	(Li, et al. 2015 a)
diethyl phthalate	Songliao River	Xi River	October 2013	490	(Li, et al. 2015 a)
diethyl phthalate	Yangtze River	Chao Lake	April 2011	142	(He, et al. 2013)
diethyl phthalate	Yangtze River	Chongqing	/	372	(Luo, et al. 2011 b)
diethyl phthalate	Yangtze River	Dafangying Reservoir	2012	430	(Lu, 2013)
diethyl phthalate	Yangtze River	Dongpu Reservoir	2012	450	(Lu, 2013)
diethyl phthalate	Yangtze River	Grand Canal, Suzhou	June 2010	38.5	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Grand Canal, Wuxi	June 2010	3.00	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Nantong	June 2010	15.0	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Nantong to Suzhou	June 2010	16.3	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Suzhou	June 2010	37.0	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Taihu Lake, Suzhou	June 2010	7.00	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Taihu Lake, Wuxi	June 2010	50.0	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	the entrance to Jiangsu	January 2005	194	(He, et al. 2011)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
diethyl phthalate	Yangtze River	the lower reaches of Jiangsu	January 2005	60.0	(He, et al. 2011)
diethyl phthalate	Yangtze River	the middle reaches of Jiangsu	January 2005	57.0	(He, et al. 2011)
diethyl phthalate	Yangtze River	the middle reach in Nanjing	January 2005	145	(He, et al. 2011)
diethyl phthalate	Yangtze River	the outlet from Nanjing	January 2005	211	(He, et al. 2011)
diethyl phthalate	Yangtze River	Three Gorges	2005	113	(Chuan, et al. 2007)
diethyl phthalate	Yangtze River	Wuhan	December 2009	1026	(Zhang, et al. 2011 d)
diethyl phthalate	Yangtze River	Wuxi	June 2010	4.00	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Xuanwu lake	April 2010	57145	(Shen, et al. 2010)
diethyl phthalate	Yangtze River	Yangchenghu Lake	June 2010	51.5	(Zhang, et al. 2012 c)
diethyl phthalate	Yangtze River	Zhejiang	November 2007	0	(Wang, et al. 2010 b)
diethyl phthalate	Yangtze River	Zhejiang	November 2007	0	(Wang, et al. 2010 b)
diethyl phthalate	Yellow River	Middle and lower part	June 2004	313	(Sha, et al. 2007)
diethyl phthalate	Yellow River	Tributaries	June 2004	361	(Sha, et al. 2007)
dimethyl phthalate	Hai River	Guanting Reservoir	April to May 2012	56.0	(Zheng, et al. 2014)
dimethyl phthalate	Hai River	Lakes Shichahai	April to May 2012	81.0	(Zheng, et al. 2014)
dimethyl phthalate	Hai River	Summer Palace	April to May 2012	62.0	(Zheng, et al. 2014)
dimethyl phthalate	Huai River	Shayinghe River	2011	73013	(Li, et al. 2013 a)
dimethyl phthalate	Pearl River	Guangzhou	April 2006	11.0	(Zeng, et al. 2009)
dimethyl phthalate	Pearl River	Guangzhou	August 2006	17.0	(Zeng, et al. 2009)
dimethyl phthalate	Pearl River	Guangzhou	December 2006	8.00	(Zeng, et al. 2009)
dimethyl phthalate	Pearl River	Pearl River Estuary	2013	908	(Li, et al. 2014 b)
dimethyl phthalate	Songliao River	Pu River	May 2013	2190	(Li, et al. 2015 a)
dimethyl phthalate	Songliao River	Pu River	August 2013	3680	(Li, et al. 2015 a)
dimethyl phthalate	Songliao River	Pu River	October 2013	655	(Li, et al. 2015 a)
dimethyl phthalate	Songliao River	Rivers in Anshan	/	50330	(Yao, et al. 2011)
dimethyl phthalate	Songliao River	Songhua River, Haerbin	December 2012	0	(Song, 2014)
dimethyl phthalate	Songliao River	Songhua River, Jilin	March 2008	87.0	(Wei, et al. 2011)
dimethyl phthalate	Songliao River	Songyuan	December 2012	0	(Song, 2014)
dimethyl phthalate	Songliao River	Tongjiang	December 2012	0	(Song, 2014)
dimethyl phthalate	Songliao River	Xi River	May 2013	5120	(Li, et al. 2015 a)
dimethyl phthalate	Songliao River	Xi River	August 2013	7040	(Li, et al. 2015 a)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
dimethyl phthalate	Songliao River	Xi River	October 2013	461	(Li, et al. 2015 a)
dimethyl phthalate	Yangtze River	Chao Lake	April 2011	425	(He, et al. 2013)
dimethyl phthalate	Yangtze River	Chongqing	/	145	(Luo, et al. 2011 b)
dimethyl phthalate	Yangtze River	Dafangying Reservoir	2012	160	(Lu, 2013)
dimethyl phthalate	Yangtze River	Dongpu Reservoir	2012	120	(Lu, 2013)
dimethyl phthalate	Yangtze River	Grand Canal, Suzhou	June 2010	59.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Grand Canal, Wuxi	June 2010	18.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Nantong	June 2010	19.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Nantong to Suzhou	June 2010	31.3	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Suzhou	June 2010	53.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Taihu Lake, Suzhou	June 2010	31.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Taihu Lake, Wuxi	June 2010	97.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	the entrance to Jiangsu	January 2005	0	(He, et al. 2011)
dimethyl phthalate	Yangtze River	the lower reaches of Jiangsu	January 2005	13.0	(He, et al. 2011)
dimethyl phthalate	Yangtze River	the middle reaches of Jiangsu	January 2005	25.0	(He, et al. 2011)
dimethyl phthalate	Yangtze River	the middle reach in Nanjing	January 2005	0	(He, et al. 2011)
dimethyl phthalate	Yangtze River	the outlet from Nanjing	January 2005	0	(He, et al. 2011)
dimethyl phthalate	Yangtze River	Wuhan	December 2009	844	(Zhang, et al. 2011 d)
dimethyl phthalate	Yangtze River	Wuxi	June 2010	20.0	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Xuanwu lake	April 2010	29145	(Shen, et al. 2010)
dimethyl phthalate	Yangtze River	Yangchenghu Lake	June 2010	83.5	(Zhang, et al. 2012 c)
dimethyl phthalate	Yangtze River	Zhejiang	November 2007	0	(Wang, et al. 2010 b)
dimethyl phthalate	Yangtze River	Zhejiang	November 2007	0	(Wang, et al. 2010 b)
dimethyl phthalate	Yellow River	Middle and lower part	June 2004	170	(Sha, et al. 2007)
dimethyl phthalate	Yellow River	Tributaries	June 2004	236	(Sha, et al. 2007)
di-n-octyl phthalate	Hai River	Guanting Reservoir	April to May 2012	17.0	(Zheng, et al. 2014)
di-n-octyl phthalate	Hai River	Shichahai	April to May 2012	19.0	(Zheng, et al. 2014)
di-n-octyl phthalate	Hai River	Summer Palace	April to May 2012	19.0	(Zheng, et al. 2014)
di-n-octyl phthalate	Pearl River	Guangzhou	April 2006	0	(Zeng, et al. 2009)
di-n-octyl phthalate	Pearl River	Guangzhou	August 2006	3.00	(Zeng, et al. 2009)
di-n-octyl phthalate	Pearl River	Guangzhou	December 2006	5.00	(Zeng, et al. 2009)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
di-n-octyl phthalate	Pearl River	Pearl River Estuary	2013	275	(Li, et al. 2014 b)
di-n-octyl phthalate	Songliao River	Pu River	May 2013	0	(Li, et al. 2015 a)
di-n-octyl phthalate	Songliao River	Pu River	August 2013	0	(Li, et al. 2015 a)
di-n-octyl phthalate	Songliao River	Pu River	October 2013	0	(Li, et al. 2015 a)
di-n-octyl phthalate	Songliao River	Rivers in Anshan	/	14718411	(Yao, et al. 2011)
di-n-octyl phthalate	Songliao River	Songhua River, Haerbin	December 2012	0	(Song, 2014)
di-n-octyl phthalate	Songliao River	Songhua River, Jilin	March 2008	8965	(Wei, et al. 2011)
di-n-octyl phthalate	Songliao River	Songyuan	December 2012	34830	(Song, 2014)
di-n-octyl phthalate	Songliao River	Tongjiang	December 2012	0	(Song, 2014)
di-n-octyl phthalate	Songliao River	Xi River	May 2013	0	(Li, et al. 2015 a)
di-n-octyl phthalate	Songliao River	Xi River	August 2013	0	(Li, et al. 2015 a)
di-n-octyl phthalate	Songliao River	Xi River	October 2013	0	(Li, et al. 2015 a)
di-n-octyl phthalate	Yangtze River	Chao Lake	April 2011	35.0	(He, et al. 2013)
di-n-octyl phthalate	Yangtze River	Grand Canal, Suzhou	June 2010	28.5	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Grand Canal, Wuxi	June 2010	0	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Nantong	June 2010	7.00	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Nantong to Suzhou	June 2010	9.67	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Suzhou	June 2010	22.0	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Taihu Lake, Suzhou	June 2010	3.00	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Taihu Lake, Wuxi	June 2010	0	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	the entrance to Jiangsu	January 2005	5.00	(He, et al. 2011)
di-n-octyl phthalate	Yangtze River	the lower reaches of Jiangsu	January 2005	5.00	(He, et al. 2011)
di-n-octyl phthalate	Yangtze River	the middle reaches of Jiangsu	January 2005	5.00	(He, et al. 2011)
di-n-octyl phthalate	Yangtze River	the middle reach in Nanjing	January 2005	20.0	(He, et al. 2011)
di-n-octyl phthalate	Yangtze River	the outlet from Nanjing	January 2005	5.00	(He, et al. 2011)
di-n-octyl phthalate	Yangtze River	Wuhan	December 2009	1282	(Zhang, et al. 2011 d)
di-n-octyl phthalate	Yangtze River	Wuxi	June 2010	25.0	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Xuanwu lake	April 2010	33353	(Shen, et al. 2010)
di-n-octyl phthalate	Yangtze River	Yangchenghu Lake	June 2010	174	(Zhang, et al. 2012 c)
di-n-octyl phthalate	Yangtze River	Zhejiang	November 2007	0	(Wang, et al. 2010 b)
di-n-octyl phthalate	Yangtze River	Zhejiang	November 2007	0	(Wang, et al. 2010 b)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
di-n-octyl phthalate	Yellow River	Middle and lower part	June 2004	420	(Sha, et al. 2007)
di-n-octyl phthalate	Yellow River	Tributaries	June 2004	1880	(Sha, et al. 2007)
galaxolide	Hai River	Chentaizi Drainage River	Decembe 2008	23.2	(Hu, 2011 b)
galaxolide	Hai River	Dagu Drainage River	Decembe 2008	18.1	(Hu, 2011 b)
galaxolide	Hai River	Hai River	Decembe 2008	12.5	(Hu, 2011 b)
galaxolide	Yangtze River	Suzhou Creek	April 2007	60.0	(Zhang, et al. 2008)
musk ketone	Hai River	Chentaizi Drainage River	Decembe 2008	6.35	(Hu, 2011 b)
musk ketone	Hai River	Dagu Drainage River	Decembe 2008	2.44	(Hu, 2011 b)
musk ketone	Hai River	Hai River	Decembe 2008	4.51	(Hu, 2011 b)
musk ketone	Yangtze River	Suzhou Creek	April 2007	0	(Zhang, et al. 2008)
nonylphenol	Hai River	Hai River	July 2010	109	(Jin, et al. 2014)
nonylphenol	Huai River	Loma Lake region	April 2016	770	(Liu, et al. 2017 a)
nonylphenol	Pearl River	Dongjiang River	August 2011	568	(Yang, et al. 2014)
nonylphenol	Pearl River	Guangdong	June 2009 and January 2010	374	(Xu, et al. 2014)
nonylphenol	Pearl River	Guangzhou	December 2007	269	(Zhao,et al. 2010 b)
nonylphenol	Pearl River	Guangzhou	August 2011	454	(Yang, et al. 2014)
nonylphenol	Pearl River	Guangzhou	High flow season	1284	(Peng, et al. 2008)
nonylphenol	Pearl River	Guangzhou	Low flow season	2516	(Peng, et al. 2008)
nonylphenol	Pearl River	Liuxi River	December 2007	93.3	(Zhao,et al. 2010 b)
nonylphenol	Pearl River	Park-lake	August 2011	582	(Yang, et al. 2014)
nonylphenol	Pearl River	Pearl River Estuary	August 2015	1296	(Diao, et al. 2017)
nonylphenol	Pearl River	Pearl River Estuary	April 2013	112	(Chen, et al. 2014)
nonylphenol	Pearl River	Pearl River Estuary	January 2013	2084	(Chen, et al. 2014)
nonylphenol	Pearl River	Reservoir	July 2010	72.0	(Jin, et al. 2014)
nonylphenol	Pearl River	Reservoirs, Guangzhou	August 2011	384	(Yang, et al. 2014)
nonylphenol	Pearl River	Rivers in Guangzhou	August 2011	555	(Yang, et al. 2014)
nonylphenol	Pearl River	Shijing River	December 2007	4628	(Zhao,et al. 2010 b)
nonylphenol	Songliao River	Daliao River	May 2009	223	(Li, et al. 2013 b)
nonylphenol	Songliao River	Daliao River	June 2010	196	(Li, et al. 2013 b)
nonylphenol	Songliao River	Daliao River	August 2010	622	(Li, et al. 2013 b)
nonylphenol	Songliao River	Heilongjiang	April 2009	189	(Zhang, et al. 2014 c)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
nonylphenol	Songliao River	Liao River	July 2008	264	(Li, et al. 2011)
nonylphenol	Songliao River	Liao River	November 2008	809	(Li, et al. 2011)
nonylphenol	Songliao River	Reservoir	July 2010	42.4	(Jin, et al. 2014)
nonylphenol	Songliao River	Songhua River Downstream	March 2009	790	(Zhang, et al. 2011 c)
nonylphenol	Songliao River	Songhua River Midstream	March 2009	2036	(Zhang, et al. 2011 c)
nonylphenol	Songliao River	Songhua River Upstream	March 2009	712	(Zhang, et al. 2011 c)
nonylphenol	Southeast coast	Fenghua River	February 2014	10.1	(Wang, et al. 2015)
nonylphenol	Southeast coast	Jiulong River	August 2010 and January 2011	156	(Xian, et al. 2012)
nonylphenol	Southeast coast	Panlong River	December 2014	11.0	(Wang, et al. 2016)
nonylphenol	Southeast coast	Yao River	February 2014	5.93	(Wang, et al. 2015)
nonylphenol	Southeast coast	Yong River	February 2014	9.43	(Wang, et al. 2015)
nonylphenol	Southeast coast	Yundang Lagoon	Apirl 2008	537	(Zhang, et al. 2011 b)
nonylphenol	Yangtze River	Huangpu River	July 2010	70.0	(Wu, et al. 2013)
nonylphenol	Yangtze River	Huangpu River	October 2010	352	(Zhang, et al. 2014 a)
nonylphenol	Yangtze River	Huangpu River	November 2010	6.04	(Wu, et al. 2013)
nonylphenol	Yangtze River	Huangpu River	February 2012	159	(Zhang, et al. 2014 a)
nonylphenol	Yangtze River	Huangpu River	April 2012	60.2	(Zhang, et al. 2014 a)
nonylphenol	Yangtze River	Huangpu River	June 2012	65.3	(Zhang, et al. 2014 a)
nonylphenol	Yangtze River	Huangpu River	December 2012	661	(Zhang, et al. 2014 a)
nonylphenol	Yangtze River	Lake	July 2010	227	(Jin, et al. 2014)
nonylphenol	Yangtze River	Nanjing	April 2014	3.20	(Liu, et al. 2017 c)
nonylphenol	Yangtze River	Nanjing	August 2014	40.9	(Liu, et al. 2017 c)
nonylphenol	Yangtze River	Nanjing	December 2014	553	(Liu, et al. 2017 c)
nonylphenol	Yangtze River	Nanming River	December 2008, September 2009 and 2010	663	(Tao, et al. 2011)
nonylphenol	Yangtze River	Reservoir	July 2010	227	(Jin, et al. 2014)
nonylphenol	Yangtze River	Suzhou River	July 2010	84.6	(Wu, et al. 2013)
nonylphenol	Yangtze River	Suzhou River	November 2010	178	(Wu, et al. 2013)
nonylphenol	Yangtze River	Taihu Lake and its tributaries	November 2015	157	(Dan, et al. 2016)
nonylphenol	Yangtze River	Tributary	July 2010	205	(Jin, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
nonylphenol	Yangtze River	Yunzao Brook	July 2010	73.8	(Wu, et al. 2013)
nonylphenol	Yangtze River	Yunzao Brook	November 2010	51.3	(Wu, et al. 2013)
phantolide	Hai River	Chentaizi Drainage River	Decembe 2008	0	(Hu, 2011 b)
phantolide	Hai River	Dagu Drainage River	Decembe 2008	0	(Hu, 2011 b)
phantolide	Hai River	Hai River	Decembe 2008	3.94	(Hu, 2011 b)
phantolide	Yangtze River	Suzhou Creek	April 2007	0	(Zhang, et al. 2008)
tonalide	Hai River	Chentaizi Drainage River	Decembe 2008	12.4	(Hu, 2011 b)
tonalide	Hai River	Dagu Drainage River	Decembe 2008	9.92	(Hu, 2011 b)
tonalide	Hai River	Hai River	Decembe 2008	12.4	(Hu, 2011 b)
tonalide	Yangtze River	Suzhou Creek	April 2007	14.0	(Zhang, et al. 2008)
traseolide	Hai River	Chentaizi Drainage River	Decembe 2008	0.31	(Hu, 2011 b)
traseolide	Hai River	Dagu Drainage River	Decembe 2008	0	(Hu, 2011 b)
traseolide	Hai River	Hai River	Decembe 2008	0.29	(Hu, 2011 b)
traseolide	Yangtze River	Suzhou Creek	April 2007	0	(Zhang, et al. 2008)
triclocarban	Pearl River	Guangzhou	December 2007	19.9	(Zhao,et al. 2010 b)
triclocarban	Pearl River	Guangzhou	May 2008	46.2	(Yu, et al. 2011)
triclocarban	Pearl River	Liuxi River	December 2007	7.40	(Zhao,et al. 2010 b)
triclocarban	Pearl River	Shijing River	December 2007	158	(Zhao,et al. 2010 b)
triclocarban	Southeast coast	Jinxi River	dry season	6.70	(Zhu, et al. 2013)
triclocarban	Southeast coast	Jinxi River	median water season	4.70	(Zhu, et al. 2013)
triclocarban	Southeast coast	Jinxi River	wet season	1.90	(Zhu, et al. 2013)
triclocarban	Southeast coast	Qingshan Lake	dry season	1.00	(Zhu, et al. 2013)
triclocarban	Southeast coast	Qingshan Lake	median water season	62.2	(Zhu, et al. 2013)
triclocarban	Southeast coast	Qingshan Lake	wet season	0.80	(Zhu, et al. 2013)
triclocarban	Southeast coast	South Tiaoxi River	dry season	7.30	(Zhu, et al. 2013)
triclocarban	Southeast coast	South Tiaoxi River	median water season	4.00	(Zhu, et al. 2013)
triclocarban	Southeast coast	South Tiaoxi River	wet season	42.2	(Zhu, et al. 2013)
triclocarban	Yangtze River	Central and lower reaches	January and March 2013	5.60	(Wu, et al. 2014)
triclocarban	Yangtze River	Chao Lake	January and March 2013	13.3	(Wu, et al. 2014)
triclocarban	Yangtze River	Dongting lake	January and March 2013	17.2	(Wu, et al. 2014)
triclocarban	Yangtze River	Poyang lake	January and March 2013	13.7	(Wu, et al. 2014)

Chemical	Watershed [a]	Sampling Location [b]	Sampling time	Concentration (ng L^{-1})	Reference
triclocarban	Yangtze River	Tai lake	January and March 2013	10.3	(Wu, et al. 2014)
triclosan	Pearl River	Guangzhou	March 2006	31.6	(Wu, et al. 2007)
triclosan	Pearl River	Guangzhou	December 2007	14.9	(Zhao,et al. 2010 b)
triclosan	Pearl River	Guangzhou	December 2007	16.8	(Zhao,et al. 2010 b)
triclosan	Pearl River	Guangzhou	May 2008	55.1	(Yu, et al. 2011)
triclosan	Pearl River	Guangzhou	High flow season	77.0	(Peng, et al. 2008)
triclosan	Pearl River	Guangzhou	Low flow season	405	(Peng, et al. 2008)
triclosan	Pearl River	Liuxi River	December 2007	5.60	(Zhao,et al. 2010 b)
triclosan	Pearl River	Liuxi River	December 2007	13.7	(Zhao,et al. 2010 b)
triclosan	Pearl River	Shijing River	December 2007	242	(Zhao,et al. 2010 b)
triclosan	Pearl River	Shijing River	December 2007	237	(Zhao,et al. 2010 b)
triclosan	Pearl River	Victoria Harbour	March 2006	65.6	(Wu, et al. 2007)
triclosan	Songliao River	Liao River	July 2008	31.0	(Li, et al. 2011)
triclosan	Songliao River	Liao River	November 2008	25.9	(Li, et al. 2011)
triclosan	Southeast coast	Jinxi River	dry season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	Jinxi River	median water season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	Jinxi River	wet season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	Qingshan Lake	dry season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	Qingshan Lake	median water season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	Qingshan Lake	wet season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	South Tiaoxi River	dry season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	South Tiaoxi River	median water season	50.0	(Zhu, et al. 2013)
triclosan	Southeast coast	South Tiaoxi River	wet season	50.0	(Zhu, et al. 2013)

Note: a. Watershed was classed according to Code for China river (SL 249-2012); b. Sampling Location was the city of trunk river or name of tributary, canal, lake, reservoir located in a watershed.

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Table S2 Toxicity values for the 12 PPCPs in aquatic organisms

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
bisphenol A	Fish	*Oryzias latipes*	Hatch	4	NOEC	100	1
bisphenol A	Insects	*Chironomus riparius*	Morphology	/	NOEC	100	1
bisphenol A	Fish	*Carassius auratus*	Reproduction	700	NOEC	200	1
bisphenol A	Fish	*Xiphophorus helleri*	Growth	60	NOEC	200	1
bisphenol A	Crustacean	*Daphnia magna*	Genetics	1	NOEC	300	1
bisphenol A	Fish	*Acipenser ruthenus*	Reproduction	1	NOEC	500	1
bisphenol A	Fish	*Pimephales promelas*	Biochemistry	4	NOEC	970	1
bisphenol A	Molluscs	*Potamopyrgus antipodarum*	Reproduction	28	NOEC	1400	1
bisphenol A	Fish	*Salmo trutta ssp. fario*	Reproduction	60.88	NOEC	1750	1
bisphenol A	Fish	*Gambusia holbrooki*	Genetics	7	NOEC	2295	1
bisphenol A	Fish	*Gobiocypris rarus*	Genetics	35	NOEC	5000	1
bisphenol A	Oligochaete	*Lumbriculus variegatus*	Growth	103	NOEC	5000	1
bisphenol A	Crustacean	*Gammarus pseudolimnaeus*	Hormone	9	NOEC	10000	1
bisphenol A	Molluscs	*Valvata piscinalis*	Biochemistry	28	NOEC	10000	1
bisphenol A	Crustacean	*Asellus aquaticus*	Development	21	NOEC	50000	1
bisphenol A	Worms	*Dugesia japonica*	Growth	7	NOEC	50000	1
bisphenol A	Fish	*Oncorhynchus mykiss*	Biochemistry	6	NOEC	100000	1
bisphenol A	Fish	*Misgurnus anguillicaudatus*	Biochemistry	7	NOEC	100000	1
bisphenol A	Molluscs	*Marisa cornuarietis*	Hatch	13	NOEC	100000	1
bisphenol A	Amphibians	*Pelophylax nigromaculatus*	Hormone	15	NOEC	200000	1
bisphenol A	Crustacean	*Hyalella azteca*	Reproduction	42	NOEC	490000	1
bisphenol A	Crustacean	*Gammarus fossarum*	Reproduction	103	NOEC	500000	1
bisphenol A	Fish	*Poecilia reticulata*	Morphology	21	NOEC	549000	1

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
bisphenol A	Crustacean	*Ceriodaphnia dubia*	Reproduction	6	NOEC	940000	1
bisphenol A	Algae	*Scenedesmus acutus var. acutus*	Enzyme	15	NOEC	1000000	1
bisphenol A	Rotifera	*Brachionus calyciflorus*	Population	2	NOEC	1800000	1
bisphenol A	Algae	*Chlorolobion braunii*	Population	4	NOEC	2000000	1
bisphenol A	Plant	*Lemna minor*	Biochemistry	7	NOEC	3125000	1
bisphenol A	Plant	*Lemna gibba*	Population	7	NOEC	7800000	1
caffeine	Fish	*Salmo salar*	Growth	5	NOEC	10	1
caffeine	Amphibians	*Xenopus laevis*	Growth	4	LOEC	50	2
caffeine	Molluscs	*Corbicula manilensis*	Enzyme	21	NOEC	100	1
caffeine	Molluscs	*Ruditapes philippinarum*	Physiology	21	NOEC	100	1
caffeine	Worms	*Diopatra neapolitana*	Growth	25	NOEC	500	1
caffeine	Amphibian	*Lithobates pipiens*	Growth	28	NOEC	600	1
caffeine	Fish	*Carassius auratus*	Enzyme	1~7	NOEC	3200	1
caffeine	Algae	*Cyanophyceae*	Population	56	NOEC	5000	1
caffeine	Molluscs	*Carcinus maenas*	Physiology	28	NOEC	5000	1
caffeine	Worms	*Animalia*	Population	7~56	NR	5000	1
caffeine	Worms	*Protozoa*	Population	7~56	NR	5000	1
caffeine	Crustaceans	*Daphnia magna*	Population	21	LOEC	120000	2
caffeine	Insects	*Chironomus tentans*	Behavior	2	NOEC	1000000	1
caffeine	Plant	*Lemna gibba*	Injury	7	NOEC	1000000	1
caffeine	Fish	*Danio rerio*	Enzyme	4	NOEC	6050000	1
caffeine	Fish	*Pimephales promelas*	Growth	5	LOEC	20000000	2
caffeine	Rotifera	*Plationus patulus*	Population	6	NOEC	100000000	1
carbamazepine	Crustaceans	*Gammarus pulex*	Behavior	0.0833	NOEC	10	1
carbamazepine	Molluscs	*Dreissena polymorpha*	Genetics	7	LOEC	55.5241785	2
carbamazepine	Insects	*Stenonema sp.*	Development	9	NOEC	200	1

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
carbamazepine	Molluscs	*Corbicula manilensis*	Enzyme(s)	30	LOEC	450	2
carbamazepine	Crustaceans	*Daphnia magna*	Reproduction	6	LOEC	500	2
carbamazepine	Fish	*Cyprinus carpio*	Histology	28	LOEC	1000	2
carbamazepine	Fish	*Oncorhynchus mykiss*	Enzyme(s)	42	NOEC	890	1
carbamazepine	Fish	*Salmo salar*	Genetics	5	LOEC	7850	2
carbamazepine	Algae	*Neochloris pseudoalveolaris*	Biochemistry	3	LOEC	10000	2
carbamazepine	Algae	*Parachlorella kessleri*	Biochemistry	3	LOEC	10000	2
carbamazepine	Algae	*Monera*	Population	56	LOEC	10000	2
carbamazepine	Algae	*Algae*	Population	56	NOEC	10000	1
carbamazepine	Amphibians	*Limnodynastes peronii*	Growth	NR	NOEC	10000	1
carbamazepine	Fish	*Danio rerio*	Reproduction	NR	NOEC	10000	1
carbamazepine	Fish	*Pimephales promelas*	Behavior	14	LOEC	100000	2
carbamazepine	Fish	*Lepomis gibbosus*	Enzyme(s)	4	NOEC	125000	1
carbamazepine	Insects	*Chironomus riparius*	Development	28	NOEC	164000	1
carbamazepine	Plant	*Typha sp.*	Enzyme(s)	14	LOEC	500000	2
carbamazepine	Molluscs	*Potamopyrgus antipodarum*	Reproduction	21	NOEC	250000	1
carbamazepine	Invertebrates	*Brachionus calyciflorus*	Mortality	2	NOEC	377000	1
carbamazepine	Plant	*Lemna gibba*	Injury	7	NOEC	1000000	1
carbamazepine	Invertebrates	*Hydra vulgaris*	Morphology	4	NOEC	1000000	1
carbamazepine	Fish	*Oryzias latipes*	Behavior	8	LOEC	6150000	2
carbamazepine	Molluscs	*Elliptio complanata*	Biochemistry	2	NOEC	18901848	1
dibutyl phthalate	Fish	*Danio rerio*	Genetics	3.8	NOEC	4300	1
dibutyl phthalate	Plant	*Lemna minor*	Physiology	7	LOEC	5000	2
dibutyl phthalate	Fish	*Melanotaenia fluviatilis*	Reproduction	7	LOEC	14000	2
dibutyl phthalate	Molluscs	*Haliotis diversicolor*	Development	4	NOEC	20700	1
dibutyl phthalate	Plant	*Spirodela polyrrhiza*	Physiology	7	LOEC	50000	2

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
dibutyl phthalate	Amphibians	*Xenopus laevis*	Growth	4	LOEC	100000	2
dibutyl phthalate	Crustacean	*Daphnia magna*	Population	6	NOEL	100000	1
dibutyl phthalate	Crustacean	*Gammarus pulex*	Behavior	10	NR	100000	1
dibutyl phthalate	Fish	*Oncorhynchus mykiss*	Growth	99	NOEC	100000	1
dibutyl phthalate	Algae	*Pseudokirchneriella subcapitata*	Population	4	NOEC	210000	1
dibutyl phthalate	Crustaceans	*Americamysis bahia*	Morphology	4	NOEC	260000	1
dibutyl phthalate	Algae	*Chlorella vulgaris*	Population	6	NR	273000	1
dibutyl phthalate	Insects	*Chironomus plumosus*	Development	30	NR	560000	1
dibutyl phthalate	Fish	*Sander lucioperca*	Reproduction	1	NOEC	1000000	1
di(10-ethylhexyl) phthalate	Fish	*Oryzias latipes*	Reproduction	91.32	LOEC	1000	2
di(10-ethylhexyl) phthalate	Fish	*Danio rerio*	Biochemistry	4	NR	2700	1
di(10-ethylhexyl) phthalate	Fish	*Salvelinus fontinalis*	Reproduction	150	NOEC	3700	1
di(10-ethylhexyl) phthalate	Fish	*Oncorhynchus mykiss*	Reproduction	102	NOEC	5000	1
di(10-ethylhexyl) phthalate	Insects	*Chironomus riparius*	Genetics	4	NOEC	10000	1
di(10-ethylhexyl) phthalate	Fish	*Pimephales promelas*	Collagen synthesis	127	LOEC	11000	2
di(10-ethylhexyl) phthalate	Fish	*Oncorhynchus mykiss*	Collagen synthesis	90	NOEC	14000	1
di(10-ethylhexyl) phthalate	Molluscs	*Haliotis diversicolor*	Reproduction	4	NOEC	20000	1
di(10-ethylhexyl) phthalate	Amphibians	*Bufo fowleri*	Mortality	7	NOEC	60000	1
di(10-ethylhexyl) phthalate	Crustacean	*Palaemonetes pugio*	Development	28	LOEC	100000	2
di(10-ethylhexyl) phthalate	Crustacean	*Eurytemora affinis*	Reproduction	21	NOEC	109000	1
di(10-ethylhexyl) phthalate	Crustacean	*Daphnia magna*	Reproduction	21	NOEC	136000	1
di(10-ethylhexyl) phthalate	Amphibians	*Rana pipiens*	Mortality	7	NOEC	180000	1
di(10-ethylhexyl) phthalate	Fish	*Gasterosteus aculeatus*	Growth	28	NOEC	320000	1
di(10-ethylhexyl) phthalate	Fish	*Jordanella floridae*	Growth	28	NOEC	320000	1
di(10-ethylhexyl) phthalate	Fish	*Poecilia reticulata*	Growth	28	NOEC	320000	1
di(10-ethylhexyl) phthalate	Insects	*Chironomus plumosus*	Reproduction	30	NR	560000	1

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
di(10-ethylhexyl) phthalate	Amphibians	*Xenopus laevis*	Development	56	LOEC	2000000	2
estrone	Fish	*Oncorhynchus mykiss*	Reproduction	14	NOEC	0.74	1
estrone	Fish	*Oryzias latipes*	Histology	90	LOEC	5	2
estrone	Fish	*Danio rerio*	Reproduction	18	LOEC	14	2
estrone	Fish	*Fathead Minnow, Pimephales promelas*	Reproduction	4	NOEC	34	1
estrone	Fish	*Salmo trutta*	Reproduction	10	EC10	47	1
estrone	Crustaceans	*Neomysis integer*	Reproduction	4	NOEC	100	1
estrone	Fish	*Tautogolabrus adspersus*	Reproduction	2	NOEC	100	1
estrone	Fish	*Oryzias javanicus*	Reproduction	239 dph	NOEC	198	1
estrone	Fish	*Melanotaenia fluviatilis*	Reproduction	7	LOEC	312	2
estrone	Crustacean	*Acartia tonsa*	Development	5	EC50	410000	10
estrone	Molluscs	*Strongylocentrotus purpuratus*	Development	4	EC50	604400	10
17β-estradiol	Fish	*Oncorhynchus mykiss*	Reproduction	50	NOEC	0.42	1
17β-estradiol	Fish	*Gasterosteus aculeatus*	Genetics	7	NOEC	1	1
17β-estradiol	Fish	*Thymallus thymallus*	Reproduction	50	NOEC	1.07	1
17β-estradiol	Fish	*Oryzias latipes*	Genetics	100	NOEC	2.86	1
17β-estradiol	Fish	*Danio rerio*	Reproduction	40	NOEC	4.8	1
17β-estradiol	Fish	*Melanotaenia fluviatilis*	Biochemistry	7	NOEC	5	1
17β-estradiol	Fish	*Betta splendens*	Physiology	28	NOEC	10	1
17β-estradiol	Fish	*Pimephales promelas*	Biochemistry	4	NOEC	13	1
17β-estradiol	Fish	*Pomatoschistus minutus*	Genetics Morphology	246	NOEC	17	1
17β-estradiol	Fish	*Acanthogobius flavimanus*	Genetics	21	NOEC	20	1
17β-estradiol	Fish	*Gambusia holbrooki*	Reproduction	84	NOEC	20	1
17β-estradiol	Fish	*Poecilia reticulata*	Development /Reproduction	120	NOEC	50	1
17β-estradiol	Fish	*Carassius auratus*	Enzyme	7	NOEC	76	1

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
17β-estradiol	Amphibians	*Xenopus laevis*	Morphology	49	NOEC	100	1
17β-estradiol	Fish	*Rivulus marmoratus*	Genetics	4	NOEC	100	1
17β-estradiol	Fish	*Gobiocypris rarus*	Morphology	21	NOEC	100	1
17β-estradiol	Fish	*Jenynsia multidentata*	Morphology	28	NOEC	250	1
17β-estradiol	Fish	*Misgurnus anguillicaudatus*	Biochemistry	28	NOEC	1000	1
17β-estradiol	Invertebrates	*Brachionus calyciflorus*	Reproduction	10	NOEC	1000	1
17β-estradiol	Fish	*Eurytemora affinis*	Population	30	NOEC	6000	1
17β-estradiol	Fish	*Melosira varians*	Biochemical	10	NOEC	8000	1
17β-estradiol	Fish	*Betta splendens*	Biochemistry	28	NOEC	10000	1
17β-estradiol	Amphibian	*Lithobates sphenocephalus*	Development	42	NOEC	27238	1
17β-estradiol	Amphibian	*Lithobates pipiens*	Growth	72	NOEC	50000	1
17β-estradiol	Crustacean	*Daphnia magna*	Reproduction	6	NOEC	100000	1
17β-estradiol	Crustaceans	*Neocaridina denticulata*	Biochemical	14	NOEC	100000	1
17β-estradiol	Worms	*Dugesia japonica*	Growth	7	NOEC	1000000	1
17β-Ethynyl estradiol	Fish	*Oryzias latipes*	Morphology	85~100	NOEC	0.03	1
17β-Ethynyl estradiol	Fish	*Rutilus rutilus*	Growth	518	NOEC	0.04	1
17β-Ethynyl estradiol	Fish	*Danio rerio*	Genetics	56	NOEC	0.05	1
17β-Ethynyl estradiol	Crustacean	*Daphnia magna*	Reproduction/Growth	1 Generation	NOEC	0.1	1
17β-Ethynyl estradiol	Fish	*Oncorhynchus mykiss*	Biochemistry	196	NOEC	0.1	1
17β-Ethynyl estradiol	Fish	*Pimephales promelas*	Development	21	NOEC	0.1	1
17β-Ethynyl estradiol	Fish	*Oreochromis niloticus*	Genetics	94	NOEC	0.1	1
17β-Ethynyl estradiol	Fish	*Gobiocypris rarus*	Morphology	420	NOEC	0.18	1
17β-Ethynyl estradiol	Fish	*Cyprinus carpio*	Biochemistry	10	NOEC	1	1
17β-Ethynyl estradiol	Fish	*Melanotaenia fluviatilis*	Genetics	7	NOEC	1	1
17β-Ethynyl estradiol	Fish	*Salmo trutta*	Growth	21	NOEC	2.08	1
17β-Ethynyl estradiol	Fish	*Carassius auratus*	Genetics /Biochemistry	14	NOEC	2.3	1

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
17β-Ethynyl estradiol	Fish	*Salmo salar*	Genetics	7	NOEC	5	1
17β-Ethynyl estradiol	Mollusc	*Potamopyrgus antipodarum*	Reproduction	63	NOEC	5	1
17β-Ethynyl estradiol	Amphibian	*Rana temporaria*	Biochemistry	42	NOEC	6	1
17β-Ethynyl estradiol	Fish	*Gasterosteus aculeatus*	Biochemistry	21	NOEC	6.1	1
17β-Ethynyl estradiol	Amphibian	*Silurana tropicalis*	Histology	98	NOEC	10	1
17β-Ethynyl estradiol	Fish	*Alburnus tarichi*	Reproduction	32	NOEC	10	1
17β-Ethynyl estradiol	Fish	*Salvelinus namaycush*	Biochemistry	21	NOEC	15	1
17β-Ethynyl estradiol	Fish	*Etheostoma caeruleum*	Morphology	21	NOEC	20	1
17β-Ethynyl estradiol	Fish	*Fundulus heteroclitus*	Growth	14	NOEC	25	1
17β-Ethynyl estradiol	Amphibian	*Rana catesbeiana*	Growth	2	NOEC	50	1
17β-Ethynyl estradiol	Crustacean	*Hyalella azteca*	Cell	273	NOEC	100	1
17β-Ethynyl estradiol	Insect	*Chironomus tentans*	Growth	2	NOEC	100	1
17β-Ethynyl estradiol	Crustacean	*Cladocera*	Population	45	NOEC	190	1
17β-Ethynyl estradiol	Worm	*Caenorhabditis elegans*	Growth /Reproduction	3	NOEC	250	1
17β-Ethynyl estradiol	Crustacean	*Gammarus pulex*	Reproduction	1	NOEC	350	1
17β-Ethynyl estradiol	Mollusc	*Marisa cornuarietis*	Reproduction	274	NOEC	500	1
17β-Ethynyl estradiol	Amphibian	*Lithobates sylvaticus*	Growth /Reproduction	47	NOEC	1000	1
17β-Ethynyl estradiol	Amphibian	*Xenopus laevis*	Genetics	28	NOEC	2964	1
17β-Ethynyl estradiol	Mollusc	*Radix balthica*	Population	100	NOEC	5130	1
17β-Ethynyl estradiol	Mollusc	*Haitia pomilia*	Growth /Reproduction	14	NOEC	10000	1
17β-Ethynyl estradiol	Mollusc	*Bithynia tentaculata*	Growth /Reproduction	200	NOEC	44950	1
17β-Ethynyl estradiol	Algae	*Scenedesmus subspicatus*	Population	3	EC10	54000	1
17β-Ethynyl estradiol	Worm	*Dugesia japonica*	Growth	3	NOEC	500000	1
ibuprofen	Crustaceans	*Gammarus pulex*	Behavior	0.0833	LOEC	10	2
ibuprofen	Fish	*Oryzias latipes*	Mortality	NR	NOEC	10	1
ibuprofen	Fish	*Danio rerio*	Genetics	28	LOEC	66.4	2

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
ibuprofen	Molluscs	*Dreissena polymorpha*	Enzyme(s)	4	LOEC	200	2
ibuprofen	Fish	*Oncorhynchus mykiss*	Biochemistry	4	LOEC	1000	2
ibuprofen	Fish	*Pimephales notatus*	Biochemistry	2	NOEC	5000	1
ibuprofen	Algae	*Monera*	Population	56	LOEC	10000	2
ibuprofen	Algae	*Algae*	Population	56	NOEC	10000	1
ibuprofen	Algae	*Pseudokirchneriella subcapitata*	Population	3	NOEC	10000	1
ibuprofen	Invertebrates	*Hydra vulgaris*	Intoxication	7	LOEC	10000	2
ibuprofen	Fish	*Pimephales promelas*	Growth	28	NOEC	152600	1
ibuprofen	Algae	*Microcystis aeruginosa*	Population	4	NOEC	200000	1
ibuprofen	Fish	*Ictalurus punctatus*	Growth	7	NOEC	223900	1
ibuprofen	Plant	*Typha sp.*	Enzyme(s)	21	LOEC	500000	2
ibuprofen	Plant	*Lemna gibba*	Population	7	NOEC	1000000	1
ibuprofen	Molluscs	*Planorbis carinatus*	Growth	21	NOEC	1020000	1
ibuprofen	Crustaceans	*Daphnia magna*	Reproduction	21	LOEC	1230000	2
ibuprofen	Fish	*Poeciliopsis lucida*	Enzyme(s)	0.5	NOEC	2062847	1
ibuprofen	Molluscs	*Elliptio complanata*	Enzyme(s)	1	NOEC	10314235	1
ibuprofen	Fish	*Cirrhinus mrigala*	Enzyme(s)	35	LOEC	14200000	2
ibuprofen	Amphibians	*Xenopus laevis*	Growth	4	NOEC	20000000	1
ibuprofen	Fish	*Cyprinus carpio*	Enzyme(s)	0.0208	NOEC	20628470	1
ibuprofen	Crustaceans	*Moina macrocopa*	Reproduction	NR	NOEC	25000000	1
ibuprofen	Algae	*Chlorella vulgaris*	Population	3	NOEC	35000000	1
ibuprofen	Insects	*Diamesa zernyi*	Behavior	4	LOEC	100000000	2
nonylphenol	Fish	*Danio rerio*	Genetics	3	LOEC	2.2	2
nonylphenol	Fish	*Oryzias latipes*	Reproduction	100	LOEC	100	2
nonylphenol	Fish	*Xiphophorus helleri*	Growth	60	NOEC	200	1
nonylphenol	Crustaceans	*Daphnia magna*	Reproduction	21	LOEC	300	2

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
nonylphenol	Crustaceans	*Neomysis integer*	Reproduction	4	NOEC	1000	1
nonylphenol	Insects	*Chironomus riparius*	Enzyme	1	LOEC	1000	2
nonylphenol	Insects	*Chironomus tentans*	Genetics	1	LOEC	1000	2
nonylphenol	Fish	*Pimephales promelas*	Reproduction	42	NOEC	1600	1
nonylphenol	Amphibians	*Xenopus laevis*	Population	84	NOEC	2202.4	1
nonylphenol	Algae	*Scenedesmus subspicatus*	Population	3	EC10	3000	1
nonylphenol	Fish	*Oncorhynchus mykiss*	Reproduction	94	NOEC	3400	1
nonylphenol	Fish	*Cyprinus carpio*	Cell	70	NOEC	4730	1
nonylphenol	Invertebrates	*Brachionus calyciflorus*	Reproduction	4	NOEC	5000	1
nonylphenol	Fish	*Salmo salar*	Genetics	7	LOEC	15000	2
nonylphenol	Amphibians	*Triturus carnifex*	Histology	33	LOEC	19000	2
nonylphenol	Fish	*Gadus morhua*	Biochemistry	21	LOEC	29000	2
nonylphenol	Fish	*Gobius niger*	Genetics	3	LOEC	50000	2
nonylphenol	Crustaceans	*Ceriodaphnia dubia*	Reproduction	7	NOEC	125000	1
nonylphenol	Amphibians	*Pelophylax nigromaculatus*	Biochemistry	45	NOEC	200000	1
nonylphenol	Worms	*Lumbriculus variegatus*	Behavior	4	EC50	268000	10
nonylphenol	Algae	*Rivulus marmoratus*	Genetics	4	NOEC	300000	1
nonylphenol	Molluscs	*Physa virgata*	Behavior	4	EC50	387000	10
nonylphenol	Algae	*Pseudokirchneriella subcapitata*	Population	4	NOEC	694000	1
nonylphenol	Plant	*Lemna minor*	Growth	4	NOEC	901000	1
sulfamethoxazole	Worm	*Caenorhabditis elegans*	Behavior	4	EC10	0.1	1
sulfamethoxazole	Plant	*Lemna gibba*	Biochemical	7	EC10	655	1
sulfamethoxazole	Algae	*vacuolata*	Population	1	EC50	1540	10
sulfamethoxazole	Worm	*Hydra*	/	4	NOEC	5000	1
sulfamethoxazole	Rotifera	*Brachionus calyciflorus*	Reproduction	2	EC50	6930	10
sulfamethoxazole	Amphibians	*Limnodynastes peronii*	Growth	21	NOEC	10000	1

Chemicals	Species Group	Species	Effect Measurement	Duration (days)	Endpoint	Concentration (ng L^{-1})	Assessment Factor
sulfamethoxazole	fish	*Carassius auratus*	Enzyme	1	LOEC	16000	2
sulfamethoxazole	Crustaceans	*Daphnia magna*	Reproduction	21	LEOC	120000	2
sulfamethoxazole	Fish	*Danio rerio*	Reproduction	21	NOEC	533000	1
tetracycline	Algae	*Cyanophyceae*	Population	21	NOEC	5	1
tetracycline	Fish	*Gambusia holbrooki*	Biochemical	4	LOEC	5	2
tetracycline	Crustaceans	*Daphnia magna*	Biochemical	21	NOEC	10000	1
tetracycline	Algae	*Pseudokirchneriella subcapitata*	Population	3	EC10	32000	1
tetracycline	Plant	*Lemna gibba*	Population	7	EC10	47000	1
tetracycline	Fish	*Oryzias latipes*	Biochemical	3	LOEC	1000000	2
tetracycline	Rotifera	*Brachionus plicatilis*	Morphology	0.0417	NOEC	5000000	1
tetracycline	Crustaceans	*Artemia salina*	Morphology	3	LC50	10000000	10
tetracycline	Molluscs	*Lamellidens corrianus*	Biochemical	7	LOEC	73820000	2

Table S3 Parameters of joint probability curves (JPCs) for 12 PPCPs

Chemical	N	Mean (ng L^{-1})	SD	Cv	Shapiro-Wilk test for log-normal distribution
exposure data set					
bisphenol A	50	150	272	1.81	0.437
caffeine	23	616	972	1.58	0.796
carbamazepine	39	69	204	2.94	0.052
diethyl phthalate	40	58476	273302	4.67	0.067
di(2-ethylhexyl) phthalate	45	81694	404100	4.95	0.087
estrone	51	9.8	14	1.43	0.236
17β-estradiol	38	8.5	13	1.53	0.097
17β-ethynyl estradiol	28	4.3	7.5	1.74	0.282
nonylphenol	52	512	797	1.56	0.074
ibuprofen	30	48	73	1.52	0.335
sulfamethoxazole	114	63	131	2.08	0.073
tetracycline	51	127	598	4.71	0.392
toxicity data set					
bisphenol A	30	628064	1513958	2.41	0.114
caffeine	17	6949090	23411509	3.37	0.355
carbamazepine	24	1051828	3858902	3.67	0.879
diethyl phthalate	19	186974	268213	1.43	0.663
di(2-ethylhexyl) phthalate	18	173133	252861	1.46	0.522
estrone	11	9280	19970	2.15	0.184
17β-estradiol	27	48297	188607	3.91	0.194
17β-ethynyl estradiol	35	17706	83512	4.72	0.239
ibuprofen	25	6944108	13123867	1.89	0.073
nonylphenol	24	125481	231550	1.85	0.702
sulfamethoxazole	9	68611	165164	2.41	0.272
tetracycline	9	4833223	11442421	2.37	0.256

Notes: N refers to Number of data. SD refers to standard deviation. Cv refers to coefficient of variation.