Supplementary Information for

Occurrence, distribution and bioaccumulation of antibiotics in the Haihe River in China

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This file contains six tables and detailed description of sample pretreatment and instrumental methods.

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Table S1 Experimental conditions of electrospray ionization tandem mass spectrometry for the determination of 22 antibiotics and 7 surrogates

Groups	Analytes	Parent ion(m/z)	Daughter ion(m/z)	Declustering Potential/V	Entrance Potential/V	Collision cell ent potential/V	Collision Energy/eV	Collision cell exit potential/V
fluoroquinolones	NOR	320.1	276.3	45	8.0	11	23	10.0
			302.2[a]	40	8.0	11	28	10.0
	CIP	332.1	231.1	58	4.5	14	49	9.5
			314.3[a]	55	5.0	11	28	6.0
	DIF	400.0	299.1	60	4.0	13	41	12.0
			356.2[a]	60	4.0	13	28	13.0
	ENR	360.0	245.2	55	5.0	12	39	9.5
			316.2[a]	58	5.0	11	28	11.0
	FLE	370.0	269.2	45	4.5	20	34	10.0
			326.2[a]	45	4.5	12	27	12.0
	OFL	362.2	261.2	55	5.0	24	38	10.0
			318.2[a]	55	5.0	12	27	11.0
	LOM	352.0	265.2[a]	53	5.0	12	34	10.0
			308.2	55	4.0	37	32	12.0
	SAR	386.0	299.2	65	4.5	13	37	6.5
			368.2[a]	60	4.5	14	31	7.0
	NOR-d_5	325.3	281.4	50	8.5	11	23	6.0
			307.3[a]	40	7.5	11	27	6.5
	OFL-d_3	365.2	261.2	55	6.0	12	39	10.0
			321.2[a]	55	6.0	12	28	11.5
	SAR-d_8	394.2	350.3	60	6.0	13	28	12.0
			376.2[a]	59	6.0	12	33	14.0
sulfonamides	ST	256.0	108.0	43	4.5	10	36	4.5
			156.0[a]	42	4.2	10	21	4.5
	SMX	254.0	156.0[a]	45	4.0	9	23	5.2
			160.1	47	4.5	9	27	6.0
	SIA	268.1	108.0	46	4.5	12	37	4.5
			156.0[a]	46	4.5	9	21	5.0
	SPD	250.1	108.0	38	7.0	11	36	4.5
			156.0[a]	41	4.7	9	24	5.5
	SDM	311.2	108.0	55	4.5	12	41	4.5
			156.1[a]	57	4.0	12	30	6.0
	SMZ	279.2	156.0	47	4.5	9	27	6.0
			186.1[a]	49	4.0	10	25	6.5

Table S1 Experimental conditions of electrospray ionization tandem mass spectrometry for the determination of 22 antibiotics and 7 surrogates **(continued)**

Groups	Analytes	Parent ion (m/z)	Daughter ion (m/z)	Declustering Potential/ V	Entrance Potential/ V	Collision cell ent potential/ V	Collision Energy/ eV	Collision cell exit potential/ V
sulfonamides	SD	251.1	108.0	42	4.3	11	35	4.2
			156.0[a]	43	3.5	9	23	5.0
	SMR	265.2	107.9[a]	47	4.5	11	37	4.5
			156.0	48	5.0	10	24	5.5
	SMM	281.2	156.0[a]	50	5.0	10	26	5.5
			215.1	48	5.0	9	25	7.0
	SMZ-d_4	283.1	160.0[a]	48	4.5	10	28	6.0
			186.0	48	4.5	10	26	6.5
	SMX-d_4	257.9	112.0	44	4.5	11	36	4.8
			160.0[a]	44	4.5	9	25	5.5
macrolides	SPI	843.4	174.1[a]	87	10.0	30	50	8.0
			318.3	85	9.5	30	42	8.0
	JOS	828.3	174.2[a]	79	10.0	30	47	7.5
			229.1	77	10.0	28	43	8.5
	TYL	916.3	174.0[a]	83	10.0	33	55	8.0
			772.3	85	9.0	29	43	17.0
	ERY	734.3	158.2[a]	60	4.8	27	41	6.0
			576.3	58	4.8	23	28	12.0
	ROX	837.4	158.1[a]	62	7.0	30	48	7.0
			679.4	62	6.5	26	30	14.0
	SPI I-d_3	846.4	174.1[a]	85	10.0	30	52	8.0
			432.3	30	4.5	27	18	15.0
	ERY-$^{13}C,d_4$	738.0	162.1[a]	55	5.0	25	45	7.0
			580.3	55	5.0	23	28	12.0

[a] quantitative ion.

Table S2 Correlation coefficients (r^2), linear range, method detection limits (LODs, S/N = 3) and recovery rates of 22 antibiotics

Groups	Analytes	Surrogates	r^2	Linearity range (μg/L)	MODs Water (ng/L)	MODs Sediment (μg/kg, dw)	MODs Fish (μg/kg, dw)	Recovery (%) Water	Recovery (%) Sediment	Recovery (%) Fish
fluoroquinolones	NOR	NOR-d_5	0.9995	0.1-500	0.25	0.5	0.1	87.5	87.6	90.8
	CIP	NOR-d_5	0.9969	0.05-500	0.1	0.2	0.1	63.2	64.8	78.2
	DIF	OFL-d_3	0.9939	0.05-500	0.1	0.2	0.1	59.2	55.5	77.9
	ENR	OFL-d_3	0.9975	0.05-500	0.1	0.2	0.2	70.7	84.4	89.1
	FLE	OFL-d_3	0.9980	0.1-500	0.15	0.3	0.2	61.0	108.4	96.2
	OFL	OFL-d_3	0.999	0.1-500	0.2	0.4	0.1	61.7	102.2	90.7
	LOM	OFL-d_3	0.9947	0.05-500	0.1	0.2	0.3	65.4	71.7	79.5
	SAR	SAR-d_8	0.9992	0.05-500	0.1	0.2	0.2	72.4	113.0	91.8
sulfonamides	ST	SMX-d_4	0.9958	0.01-500	0.015	0.03	0.05	84.2	174.0	100.5
	SMX	SMX-d_4	0.9993	0.1-500	0.15	0.3	0.05	117.0	92.2	96.8
	SIA	SMX-d_4	0.9969	0.05-500	0.05	0.1	0.06	88.3	85.3	120.1
	SPD	SDMD-d_4	0.9985	0.05-500	0.045	0.09	0.06	95.3	159.8	99.3
	SDM	SDMD-d_4	0.9992	0.01-500	0.01	0.02	0.06	121.0	59.6	108.7
	SMZ	SDMD-d_4	0.9984	0.01-500	0.02	0.04	0.06	121.0	106.1	104.9
	SD	SDMD-d_4	0.9969	0.1-500	0.15	0.3	0.2	121.0	206.6	92.8
	SMR	SDMD-d_4	0.9993	0.05-500	0.05	0.1	0.1	93.8	147.2	103.6
	SMM	SDMD-d_4	0.9957	0.05-500	0.1	0.2	0.1	124.0	81.8	101.5
macrolides	SPI	SPI I-d_3	0.9972	0.1-500	0.1	0.2	1.0	76.0	91.9	106.3
	JOS	SPI I-d_3	0.9927	0.05-500	0.05	0.1	0.9	126.0	47.1	85.5
	TYL	SPI I-d_3	0.9924	0.05-500	0.05	0.1	1.0	131.0	39.0	85.5
	ROX	SPI I-d_3	0.9996	0.05-500	0.1	0.2	0.3	119.0	36.2	71.8
	ERY	ERY-^{13}C, d_3	0.9810	0.1-500	0.15	0.3	0.1	130.0	89.7	94.8

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Table S3 Concentrations of detectable antibiotics in surface water (ng/L) (2010)

Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SMX	SPD	SMZ	SD	SMR	SMM	SPI	TYL	ROX	ERY
Haihe River, mainstream																			
S5	82.5	8.7	nd[a]	nd	5.7	95.2	nd	nd	nd	137.5	5.4	21.8	31.9	nd	7.3	nd	nd	24.3	9.2
S6	99.4	9.6	nd	nd	1.3	53.7	0.9	nd	nd	137.0	4.4	30.7	38.8	nd	7.9	nd	nd	15.4	10.3
S7	128.9	13.4	nd	1.0	7.3	37.0	nd	nd	nd	137.0	5.5	44.0	52.0	nd	8.9	nd	nd	15.0	10.2
S8	nd	19.7	nd	1.0	nd	22.9	nd	11.9	nd	135.5	3.2	33.6	41.3	nd	8.7	nd	nd	4.7	8.9
S9	35.3	1.1	nd	0.7	1.6	14.9	nd	10.8	nd	136.5	nd	49.6	48.1	nd	14.2	nd	nd	3.8	3.4
S10	58.5	19.2	0.9	nd	nd	9.1	nd	7.5	nd	201.0	nd	53.5	43.2	nd	19.4	nd	nd	5.5	3.1
S11	55.4	14.7	3.4	nd	nd	30.9	nd	nd	nd	54.5	nd	10.0	18.7	nd	15.2	nd	nd	10.0	3.5
S12	117.7	15.3	nd	0.7	3.1	49.4	nd	9.8	nd	63.0	1.3	6.6	17.2	nd	13.7	nd	nd	14.9	5.6
S13	11.6	nd	nd	nd	0.7	14.3	nd	nd	nd	22.1	nd	nd	3.1	nd	2.3	1.0	nd	1.5	4.1
Mean	65.5	11.3	0.5	0.4	2.2	36.4	0.1	4.4	nd	113.8	2.2	27.7	32.7	nd	10.8	0.1	nd	10.5	6.5
Med[b]	58.5	13.4	nd	nd	1.3	30.9	nd	nd	nd	136.5	1.3	30.7	38.8	nd	8.9	nd	nd	10.0	5.6
Freq[c]	8/9	8/9	2/9	4/9	6/9	9/9	1/9	4/9	0/9	9/9	5/9	8/9	9/9	0/9	9/9	1/9	0/9	9/9	9/9
Haihe River, tributaries																			
S1	53.5	7.2	nd[a]	nd	9.8	11.5	nd	10.4	nd	18.6	nd	3.0	5.9	nd	nd	nd	nd	1.9	2.0
S2	94.0	35.4	nd	nd	1.4	14.1	nd	20.2	nd	93.5	3.0	8.7	52.0	nd	6.8	nd	nd	4.4	3.4
S3	28.7	16.0	nd	nd	nd	8.2	nd	nd	nd	32.1	nd	nd	2.5	nd	nd	nd	nd	2.4	1.9
S4	nd	24.1	nd	5.1	5.8	37.0	nd	142.0	nd	211.0	5.4	6.2	71.5	nd	nd	1.2	nd	20.2	10.1
S14	91.3	59.0	nd	nd	2.5	72.3	nd	41.1	nd	102.0	14.0	60.5	41.9	nd	10.0	nd	nd	13.2	8.0
S15	104.9	39.5	nd	2.2	3.6	112.2	nd	22.3	nd	74.5	4.7	49.4	39.7	nd	16.1	nd	nd	128.0	27.6
Mean	62.1	30.2	nd	1.2	3.8	42.5	nd	39.3	nd	88.6	4.5	21.3	35.6	nd	5.5	0.2	nd	28.3	8.8
Med	72.4	29.7	nd	nd	3.0	25.5	nd	21.2	nd	84.0	3.9	7.4	40.8	nd	3.4	nd	nd	8.8	5.7
Freq	5/6	6/6	0/6	2/6	5/6	6/6	0/6	5/6	0/6	6/6	4/6	5/6	6/6	0/6	3/6	1/6	0/6	6/6	6/6
Dagu Drainage River																			
S16	301.0	22.4	nd	nd	nd	529.9	3.9	nd	1.9	660.0	135.5	13.9	82.5	nd	3.2	1.7	nd	333.5	52.0

Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SMX	SPD	SMZ	SD	SMR	SMM	SPI	TYL	ROX	ERY
S17	345.5	66.0	nd	nd	5.2	386.4	5.8	nd	nd	570.0	56.0	12.9	62.5	nd	3.4	nd	nd	965.0	54.0
S18	275.2	69.3	nd	1.2	17.6	216.9	nd	9.3	3.4	550.0	68.0	10.7	72.5	nd	5.8	nd	nd	595.0	77.5
S19	82.9	27.4	nd	nd	7.1	51.2	nd	nd	3.3	346.0	14.4	14.7	44.6	nd	4.6	nd	nd	181.5	32.2
S20	99.6	19.7	nd	nd	nd	22.8	nd	nd	nd	266.5	13.8	37.4	165.5	nd	8.6	nd	nd	494.0	32.0
S21	243.1	37.1	10.1	nd	nd	27.8	nd	68.6	nd	222.0	11.1	34.6	84.5	nd	11.1	nd	nd	253.5	16.2
Mean	224.5	40.3	1.7	0.2	5.0	205.8	1.6	13.0	1.4	435.8	49.8	20.7	85.4	nd	6.1	0.3	nd	470.4	44.0
Med	259.1	32.2	nd	nd	2.6	134.1	nd	nd	1.0	448.0	35.2	14.3	77.5	nd	5.2	nd	nd	413.8	42.1
Freq	6/6	6/6	1/6	1/6	3/6	6/6	2/6	2/6	3/6	6/6	6/6	6/6	6/6	0/6	6/6	1/6	0/6	6/6	6/6
Chentaizi Drainage River																			
S22	463.9	15.6	4.9	3.5	32.8	292.7	39.4	nd	nd	216.0	102.5	5.2	25.8	nd	3.3	nd	75.0	940.0	83.5
S23	650.0	18.6	nd	nd	4.8	301.4	3.2	nd	nd	413.0	37.7	6.0	53.0	2.1	4.3	nd	2.8	1265.0	67.0
S24	405.4	18.2	nd	2.8	nd	332.7	nd	19.1	nd	520.0	29.2	10.8	34.9	3.5	4.3	nd	nd	1095.0	94.8
S25	329.8	32.5	nd	11.2	12.9	176.8	nd	nd	11.2	575.0	26.2	114.5	33.6	nd	4.6	nd	nd	885.0	64.0
Mean	462.3	21.2	1.2	4.4	12.6	275.9	10.7	4.8	2.8	431.0	48.9	34.1	36.8	1.4	4.1	nd	19.4	1046.3	77.3
Med	434.6	18.4	nd	3.1	8.8	297.0	1.6	nd	nd	466.5	33.5	8.4	34.2	1.1	4.3	nd	1.4	1017.5	75.3
Freq	4/4	4/4	1/4	3/4	3/4	4/4	2/4	1/4	1/4	4/4	4/4	4/4	4/4	2/4	4/4	0/4	2/4	4/4	4/4
Duliujian River																			
S26	255.7	11.6	nd	2.0	1.2	89.4	nd	nd	nd	361.0	16.7	111.0	32.9	nd	8.6	nd	nd	473.0	41.5
S27	nd	51.0	nd	6.2	nd	49.2	nd	nd	nd	76.0	nd	10.5	20.2	0.8	12.6	nd	nd	65.5	20.5
Fish ponds																			
F2	32.1	nd	nd	nd	nd	48.4	nd	nd	nd	24.9	nd	nd	3.3	nd	nd	nd	nd	2.5	2.0
F3	236.8	28.8	10.3	nd	nd	34.9	0.9	nd	nd	39.4	nd	6.8	10.8	4.4	nd	nd	nd	2.8	2.5

[a]: not detected;
[b]: median;
[c]: frequency.

Table S4 Concentrations of detectable antibiotics in sediments (μg/kg, dw)

Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SIA	SPD	SDM	SMZ	SD	SMM	SPI	JOS	ROX	ERY
Haihe River, mainstream, 2010																			
S6	125.5	24.7	nd[a]	69.7	nd	33.4	3.8	nd	nd	nd	2.0	nd	3.1	nd	nd	nd	nd	16.8	nd
S8	103.3	11.0	nd	2.7	nd	64.6	2.7	nd	nd	nd	0.6	nd	5.0	nd	nd	nd	nd	40.2	nd
S9	32.3	18.1	6.3	15.5	7.1	26.4	4.0	9.5	nd	nd	nd	nd	1.2	nd	nd	7.0	0.9	8.2	4.4
S10	141.0	88.3	9.7	23.8	24.2	71.3	16.2	35.9	nd	nd	0.6	nd	5.8	nd	0.9	2.4	nd	5.9	nd
S11	56.6	6.5	nd	nd	nd	47.9	nd	nd	nd	nd	nd	nd	1.5	nd	nd	nd	nd	0.7	nd
S12	3.9	nd	2.3	1.0	nd	nd	nd	nd	nd	nd	nd	nd	3.6	nd	nd	nd	nd	1.1	5.8
S13	7.7	13.8	16.9	26.1	5.7	13.8	7.2	16.3	0.2	nd	nd	nd	0.5	nd	nd	4.3	nd	nd	nd
Mean	67.2	23.2	5.0	19.8	5.3	36.8	4.8	8.8	nd	nd	0.5	nd	2.9	nd	0.1	2.0	0.1	10.4	1.5
Med[b]	56.6	13.8	2.3	15.5	nd	33.4	3.8	nd	nd	nd	nd	nd	3.1	nd	nd	nd	nd	5.9	nd
Freq[c]	7/7	6/7	4/7	6/7	3/7	6/7	5/7	3/7	1/7	0/7	3/7	0/7	7/7	0/7	1/7	3/7	1/7	6/7	2/7
Haihe River, tributaries, 2010																			
S1	118.5	29.4	nd[a]	5.3	5.1	27.3	3.2	nd	nd	nd	5.8	nd	4.2	nd	nd	1.6	nd	2.6	nd
S2	1135.5	104.6	nd	13.2	6.6	181.5	15.9	nd	nd	nd	1.7	nd	4.9	1.6	1.1	nd	nd	31.1	nd
S3	19591.0	1930.0	nd	19.0	160.0	5807.5	1340.0	nd	nd	nd	11.9	nd	0.9	1.2	nd	nd	nd	55.2	nd
S4	252.5	29.0	nd	2.1	3.3	67.0	12.4	nd	nd	nd	1.0	nd	1.6	1.1	nd	nd	nd	6.7	40.7
S14	164.0	24.3	nd	5.8	4.0	208.5	5.6	nd	nd	nd	0.7	nd	4.6	nd	nd	nd	nd	9.5	nd
S15	70.3	12.7	nd	2.4	nd	56.0	3.1	nd	nd	nd	nd	nd	0.1	nd	nd	nd	nd	154.3	14.9
Mean	3555.3	355.0	nd	8.0	29.8	1058.0	230.0	nd	nd	nd	3.5	nd	2.7	0.6	0.2	0.3	nd	43.2	9.3
Med	208.3	29.2	nd	5.6	4.5	124.2	9.0	nd	nd	nd	1.4	nd	2.9	0.5	nd	nd	nd	20.3	nd
Freq	6/6	6/6	0/6	6/6	5/6	6/6	6/6	0/6	0/6	0/6	5/6	0/6	6/6	3/6	1/6	1/6	0/6	6/6	2/6
Haihe River, mainstream, 2008																			
S5	92.2	11.7	nd	nd	nd	72.0	nd	nd	nd	nd	nd	nd	8.4	1.1	0.9	nd	nd	7.2	nd
S6	128.2	25.4	nd	3.4	nd	182.1	5.3	nd	nd	nd	nd	nd	4.3	1.1	nd	nd	nd	15.8	nd
S7	84.6	11.5	nd	4.3	nd	50.2	nd	nd	nd	nd	nd	nd	7.6	nd	1.3	nd	nd	4.2	nd

Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SIA	SPD	SDM	SMZ	SD	SMM	SPI	JOS	ROX	ERY
S8	69.7	12.8	nd	2.9	4.4	29.0	nd	nd	nd	nd	nd	nd	6.9	0.7	1.8	nd	nd	2.0	nd
S10	70.7	11.8	nd	nd	5.7	41.5	3.2	nd	nd	nd	nd	nd	1.1	nd	nd	nd	nd	9.8	nd
S11	40.4	nd	nd	nd	nd	6.0	nd	nd	nd	nd	nd	nd	1.0	81.2	nd	nd	nd	nd	nd
S12	1024.8	159.0	nd	nd	nd	259.2	24.6	nd	nd	nd	nd	nd	1.8	nd	nd	nd	nd	104.6	nd
S13	129.0	27.6	nd	13.7	3.6	86.6	0.6	nd	nd	nd	nd	nd	4.4	1.4	1.6	nd	nd	2.6	nd
Mean	205.0	32.5	nd	3.0	1.7	90.8	4.2	nd	nd	nd	nd	nd	4.4	10.7	0.7	nd	nd	18.3	nd
Med	88.4	12.3	nd	1.4	nd	61.1	0.3	nd	nd	nd	nd	nd	4.4	0.9	0.4	nd	nd	5.7	nd
Freq	8/8	7/8	0/8	4/8	3/8	8/8	4/8	0/8	0/8	0/8	0/8	0/8	8/8	4/8	4/8	0/8	0/8	7/8	0/8
Haihe River, tributaries, 2008																			
S3	837.2	89.1	nd	nd	4.6	274.1	21.4	nd	nd	nd	1.2	nd	10.2	1.6	nd	nd	nd	8.8	nd
S14	80.1	5.9	nd	nd	nd	34.0	2.4	nd	nd	nd	nd	nd	0.9	nd	nd	nd	nd	0.8	nd
S15	108.8	32.1	nd	nd	nd	31.4	6.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	4.9	nd
Mean	342.0	42.4	nd	nd	1.5	113.2	10.2	nd	nd	nd	0.4	nd	3.7	0.5	nd	nd	nd	4.9	nd
Med	108.8	32.1	nd	nd	nd	34.0	6.7	nd	nd	nd	nd	nd	0.9	nd	nd	nd	nd	4.9	nd
Freq	3/3	3/3	0/3	0/3	1/3	3/3	3/3	0/3	0/3	0/3	1/3	0/3	2/3	1/3	0/3	0/3	0/3	3/3	0/3
Dagu Drainage River, 2010																			
S16	9331.0	688.0	nd	38.6	164.0	5427.5	637.0	nd	nd	nd	14.7	nd	nd	3.7	nd	nd	nd	30.3	56.8
S17	2872.3	250.6	nd	9.1	21.7	1248.2	114.0	nd	nd	nd	4.9	nd	nd	nd	nd	nd	nd	22.0	nd
S18	509.4	69.3	11.0	25.2	11.1	331.9	18.7	10.6	0.4	nd	4.1	nd	0.7	nd	nd	29.2	nd	24.1	4.8
S19	100.0	9.8	nd	nd	nd	90.3	2.2	nd	2.3	nd	1.2	nd	2.3	nd	nd	nd	nd	7.1	nd
S20	299.0	99.7	12.2	36.7	36.1	178.5	30.6	34.0	3.2	nd	1.1	1.0	0.7	1.1	nd	nd	nd	31.6	nd
S21	242.3	26.9	nd	nd	nd	129.2	4.5	nd	nd	0.7	0.9	nd	10.3	nd	nd	nd	nd	15.7	nd
mean	2225.7	190.7	3.9	18.3	38.8	1234.3	134.5	7.4	1.0	0.1	4.5	0.2	2.3	0.8	nd	4.9	nd	21.8	10.3
med	404.2	84.5	nd	17.1	16.4	255.2	24.7	nd	0.2	nd	2.6	nd	0.7	nd	nd	nd	nd	23.0	nd
Freq	6/6	6/6	2/6	4/6	4/6	6/6	6/6	2/6	3/6	1/6	6/6	1/6	4/6	2/6	0/6	1/6	0/6	6/6	2/6

Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SIA	SPD	SDM	SMZ	SD	SMM	SPI	JOS	ROX	ERY
Dagu Drainage River, 2008																			
S16	99.0	43.6	nd	nd	nd	26.3	nd	nd	nd	nd	nd	nd	0.3	nd	nd	nd	nd	4.0	nd
S17	158.0	16.1	nd	nd	1.4	56.6	2.9	nd	nd	nd	nd	nd	0.4	nd	nd	nd	nd	7.2	2.3
S18	3604.0	320.6	nd	1.5	40.9	878.6	149.0	nd	nd	1.2	nd	nd	0.5	2.6	nd	nd	nd	25.3	nd
S20	11534.0	950.6	nd	10.4	128.5	4042.6	233.0	nd	nd	nd	nd	nd	2.3	4.1	nd	nd	nd	13.9	nd
S21	6726.2	622.6	nd	6.9	39.7	2465.8	141.5	nd	nd	nd	nd	nd	1.2	2.9	nd	nd	nd	20.3	nd
mean	4424.2	390.7	nd	3.8	42.1	1494.0	105.3	nd	nd	0.2	nd	nd	1.0	1.9	nd	nd	nd	14.1	0.5
med	3604.0	320.6	nd	1.5	39.7	878.6	141.5	nd	nd	nd	nd	nd	0.5	2.6	nd	nd	nd	13.9	nd
Freq	5/5	5/5	0/5	3/5	4/5	5/5	4/5	0/5	0/5	1/5	0/5	0/5	5/5	3/5	0/5	0/5	0/5	5/5	1/5
Chentaizi Drainage River, 2010																			
S22	5995.5	503.6	nd	7.2	42.1	2128.5	230.0	nd	nd	3.6	14.4	nd	2.6	2.4	nd	nd	nd	21.1	nd
S23	587.0	64.2	nd	25.2	nd	196.5	13.2	nd	nd	nd	2.2	nd	nd	nd	nd	nd	nd	51.1	nd
S24	13885.4	1017.9	nd	50.9	83.2	3875.9	349.0	nd	nd	nd	10.3	nd	2.7	4.4	1.2	nd	nd	299.1	nd
S25	6291.0	775.0	nd	80.7	nd	1937.5	98.5	nd	nd	nd	16.6	nd	11.3	nd	nd	nd	nd	155.0	nd
mean	6689.7	590.2	nd	41.0	31.3	2034.6	172.7	nd	nd	0.9	10.9	nd	4.2	1.7	0.3	nd	nd	131.6	nd
med	6143.3	639.3	nd	38.1	21.1	2033.0	164.3	nd	nd	nd	12.3	nd	2.7	1.2	nd	nd	nd	103.1	nd
Freq	4/4	4/4	0/4	4/4	2/4	4/4	4/4	0/4	0/4	1/4	4/4	0/4	3/4	2/4	1/4	0/4	0/4	4/4	0/4
Chentaizi Drainage River, 2008																			
S22	1376.2	154.6	nd	2.1	4.7	525.8	13.5	nd	nd	1.0	nd	nd	0.9	1.4	nd	nd	nd	34.4	3.4
S23	11366.2	1514.6	nd	40.7	nd	1365.8	26.9	nd	nd	nd	nd	nd	3.1	nd	nd	nd	nd	23.1	nd
S24	6626.2	957.6	nd	83.1	nd	2075.8	76.5	nd	nd	nd	24.9	nd	11.1	10.8	nd	nd	nd	31.4	nd
S25	11066.2	1454.6	nd	156.8	nd	2735.8	212.5	nd	nd	nd	nd	nd	7.4	nd	nd	nd	nd	101.0	nd
mean	7608.7	1020.4	nd	70.7	1.2	1675.8	82.3	nd	nd	0.3	6.2	nd	5.6	3.0	nd	nd	nd	47.5	0.9
med	8846.2	1206.1	nd	61.9	nd	1720.8	51.7	nd	nd	nd	nd	nd	5.2	0.7	nd	nd	nd	32.9	nd
Freq	4/4	4/4	0/4	4/4	1/4	4/4	4/4	0/4	0/4	1/4	1/4	0/4	4/4	2/4	0/4	0/4	0/4	4/4	1/4

Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SIA	SPD	SDM	SMZ	SD	SMM	SPI	JOS	ROX	ERY
Duliujian River, 2010																			
S26	1411.0	162.0	nd	28.3	nd	802.5	31.8	nd	nd	nd	8.9	nd	3.9	5.0	2.5	nd	nd	34.8	nd
S27	45.4	5.7	nd	2.2	nd	27.5	nd	nd	nd	nd	0.7	nd	0.9	nd	nd	nd	nd	3.9	nd
Fish ponds, 2010																			
F2	12.4	2.4	nd	9.1	nd	2.8	nd	nd	nd	nd	nd	nd	0.5	nd	nd	nd	nd	nd	nd
F3	166.0	24.3	nd	3.0	nd	10.6	nd	nd	nd	nd	nd	nd	2.8	nd	nd	nd	nd	nd	nd

[a]: not detected;
[b]: median;
[c]: frequency.

Table S5 Sediment-water distribution coefficient (K_d) of antibiotics in rivers (L/kg)

Antibiotic	K_d	$LogK_d$	Antibiotic	K_d	$LogK_d$
NOR	37542	4.57	ST	409	2.61
CIP	14176	4.15	SPD	230	2.36
ENR	8128	3.91	SMZ	245	2.39
FLE	2934	3.47	SD	118	2.07
OFL	33973	4.53	SMM	195	2.29
LOM	39838	4.60	ROX	1991	3.30
SAR	2268	3.36	ERY	1338	3.13

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Table S6 Concentrations of detectable antibiotics in fish samples (μg/kg, dw)

	Fish	Sites	NOR	CIP	DIF	ENR	FLE	OFL	LOM	SAR	ST	SIA	SPD	SMZ	SMM	SPI	ERY
Fish ponds	crucian carp, 2008	F6	0.9	nd[a]	nd	nd	0.6	0.4	nd	nd	nd	nd	nd	nd	nd	278.0	nd
	common carp, 2008	F1	0.5	nd	nd	1.1	0.2	0.5	nd	nd	nd	nd	nd	nd	nd	nd	nd
		F4	nd	nd	nd	nd	nd	nd	nd	nd	0.1	0.3	nd	0.4	0.3	nd	nd
		F5	nd	nd	nd	nd	nd	nd	nd	nd	0.1	nd	nd	nd	nd	nd	nd
	silver carp, 2008	F1	nd	nd	nd	0.2	nd	nd	nd	1.3	nd	0.3	3.3	0.4	nd	1020.0	nd
		F4	3.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.1	nd	nd	nd
		F5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1150.0	nd
Haihe River	crucian carp, 2010	S5	11.6	9.3	nd	2.7	nd	nd	2.3	3.5	nd	5.2	nd	68.0	nd	nd	45.1
		S6	63.5	12.5	nd	nd	nd	nd	nd	1.8	nd	0.5	nd	15.4	nd	nd	5.0
		S9	2.5	8.1	nd	nd	nd	nd	nd	nd	nd	996.3	nd	54.2	nd	nd	27.7
	crucian carp, 2008	S1	51.6	8.4	nd	50.8	nd	10.5	nd	nd	3.2	3.3	nd	0.5	nd	1.3	nd
		S3	nd	nd	0.3	nd	nd	nd	nd	nd	nd	nd	nd	0.1	nd	430.0	nd
		S5	nd	nd	0.2	0.6	nd	nd	0.3	nd	nd	nd	nd	nd	nd	nd	nd
		S7	36.9	1.7	8.2	1.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.6	nd
		S13	nd	nd	nd	nd	nd	nd	nd	0.7	nd	nd	nd	nd	nd	396.0	nd
	common carp, 2008	S7	1.2	nd	nd	nd	0.3	nd	nd	0.3	nd	1.0	nd	nd	nd	nd	nd
	silver carp, 2008	S1	0.5	2.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.2	nd	nd	nd

[a]: not detected.

Sample pretreatment for surface water, sediment and fish muscle

Water: Water samples were filtered through nylon film (0.45 μm) to remove particles. Before extraction with Oasis HLB cartridge (6 cc, 200 mg; Waters Corp. Milford, USA), 0.2 g of chelating reagent, Na_2EDTA, and 20 ng of surrogate standards (Norfloxacin-d_5, Ofloxacin-d_3, Sarafloxacin-d_8, Sulfamethoxazole-d_4, Sulfamethazine-d_4, Spiramycin I-d_3 and Erythromycin-$^{13}C_3$) were added to 200 mL water sample. The HLB cartridges were conditioned with 5 ml methanol and 5 ml ultra-pure water. After loading of samples, cartridges were washed with 15 mL of ultra-pure water and vacuum-dried for 20 min. Finally, the cartridges were eluted with 6 mL of methanol containing 5% ammonium hydroxide. All the eluates were concentrated to 1 mL with a stream of nitrogen at 35 ^{o}C, and 15 μL of this solution was injected into the high-performance liquid chromatography-electrospray ionization tandem mass spectrometry (HPLC-ESI MS/MS) system for analysis.

Sediment: Approximately 0.1 g of the dry sludge was extracted with 15 mL of the mixture of acetonitrile and EDTA-McIlvaine buffer (pH≈4.0) (2:1) in 50 mL polypropylene centrifuge tube (20 ng of surrogate was added). After vortex mixing for 30 s, the sludge sample was sonicated for 4 min, and then centrifuged for 10 min at 10000 rpm, and the supernatant was collected. The procedure was repeated three times. The supernatant was combined, concentrated to about 15 mL by rotatory vaporization, diluted to approximately 100 mL with ultra-pure water, and then extract by SPE with a HLB cartridge. The SPE procedure was the same as the wastewater sample. The eluate was concentrated to 1 mL with a stream of nitrogen at 35 ^{o}C, and 15 μL of this solution was injected into the high-performance liquid chromatography-electrospray ionization tandem mass spectrometry (HPLC-ESI MS/MS) system for analysis.

Fish: 0.1 g of pretreated lyophilized fish muscle was spiked with 20 ng of surrogate before being thoroughly mixed with 7 g of diatomite from Varian (Walnut Creek, KS, USA). The mixture was put into a 34 mL stainless steel extraction cell with 100% methanol as the extracting solvent.

The ASE 350 extraction conditions were: extraction temperature, 70 ^{o}C; extraction pressure, 1500 psi; preheating period, 5min; static extraction, 10 min; final extraction volume, 60 mL; flush volume 60% of the cell volume; nitrogen purge, 120 s; and number of extraction cycles, 2. Each PLE extract was concentrated by RE-2000 rotary evaporator (Yarong, Shanghai, China) to a final volume of about 1 mL at 37 °C and 0.08 MPa in 100 mL round-bottom flasks. Immediately after concentration, the extract was transferred to a 100 mL conical tube and the round-bottom flasks were rinsed twice with 0.5 ml of methanol. After that, 100 ml of regent water was added to this conical tube, and then the solution was extracted by SPE with a HLB cartridge. The SPE procedure was the same as the wastewater sample. The eluate was concentrated to 1 mL with a stream of nitrogen at 35 ^{o}C, and 15 μL of this solution was injected into the high-performance liquid chromatography-electrospray ionization tandem mass spectrometry (HPLC-ESI MS/MS) system for analysis.

Analysis methods of HPLC-MS/MS

Separation of analytes was carried out on a XTerra MS C_{18} column (2.1 mm× 100 mm i.d., 3.5 μm) with mobile phase of A, methanol: acetonitrile (1:1, V/V), and B, 0.3% formic acid/water (containing 0.1% ammonium formate, V/V，pH = 2.9). The gradient elution was performed as follows: A 10% in the first 2 min, 10-70% in 10 min, then increased to 100 % in 4min and maintained for 3 min, after that, the mobile phase was returned to the initial conditions in 0.1 min and maintained for 13.9 min. The flow rate of the mobile phase was 0.2 mL/min, and the column temperature was 25 ^{o}C. The injection volume was 15 μL. The MS/MS parameters for the instrument were optimized. Curtain gas pressure: 0.14 MPa, Collision gas pressure: 0.02 MPa, Ion spray voltage: 5000 V, Tempreture: 600□, Gas1: 0.38 MPa, Gas2: 0.45 MPa. The detailed parameters of MS/MS and ion pair of the analytes are shown in **Table S1**.