Supplementary Materials

Table S1. The Absolute Abundance of Several Common ARGs in the Surface Water (copies/mL)

Study sites	*sul1*	*sul2*	*tetA*	*tetW*	*ermB*	bla_{TEM}	*qnrS*	Reference
Taihu Lake, China	–	–	10^4–10^5	–	–	–	–	[1]
Lake Tai, China	1.9×10^3–7.9×10^5	–	–	–	–	2.9×10^0–4.5×10^4	–	[2]
Huangpu river, China	0.32×10^5–1.84×10^5	0.43×10^5–4.19×10^5	0.28×10^3–3.16×10^3	1.61×10^1–3.84×10^2	–	1.36×10^3–20.0×10^3	–	[3]
Liuxi River, China	1.3×10^4–6.7×10^7	6.1×10^3–4.9×10^7	–	7.6×10^3–4×10^7	–	–	4.5×10^2–4.8×10^8	[4]
Haihe River, China	2.2×10^6	3.6×10^7	–	–	–	–	–	[5]
Haihe River, China	9.70×10^4–1.30×10^7	8.60×10^5–8.83×10^8	–	1.15×10^5–3.3×10^6	–	–	–	[6]
Jiulong River, China	–	5.96×10^8	–	–	–	–	–	[7]
Pearl River, China	$10^{5.8(R)}$	$10^{5.5(R)}$	–	–	$10^{3.5(R)}$	–	$10^{3.7(R)}$	[8]
East River, China	$9\times10^{5(R)}$	$8\times10^{5(R)}$	$10^{4(R)}$	$8\times10^{4(R)}$	$7.9\times10^{4(R)}$	–	$7\times10^{2(R)}$	[9]
West River，China	$7\times10^{5(R)}$	$7\times10^{4(R)}$	$3\times10^{3(R)}$	$10^{5(R)}$	$8\times10^{4(R)}$	–	$7\times10^{1(R)}$	[9]
North River，China	$8\times10^{5(R)}$	$9\times10^{4(R)}$	$2\times10^{3(R)}$	$6\times10^{4(R)}$	$10^{5(R)}$	–	$2\times10^{3(R)}$	[9]
Yangtze River delta	3.07×10^5–8.87×10^5	2.20×10^5–4.25×10^6	2.02×10^3–9.45×10^3	8.69×10^0–4.49×10^2	–	–	–	[10]
Lake Maggiore，Italy&Switzerland	–	$10^{4(R)}$	$10^{2(R)}$	–	–	–	–	[11]
Almendares River，Cuba	–	–	–	$10^{2.45(R)}$	$10^{2.6(R)}$	$10^{1.95(R)}$	–	[12]

Table S1 (continued)

Study sites	*sul1*	*sul2*	*tetA*	*tetW*	*ermB*	bla_{TEM}	*qnrS*	Reference
Ter River，Spain	10^{3}	–	–	$10^{2.4}$	$10^{2.8}$	$10^{1.5}$	$10^{3.2}$	[13]
Ter River，Spain	$10^{4.8(R)}$	–	–	$10^{3.2(R)}$	$10^{2.2(R)}$	$10^{4.0(R)}$	$10^{4.0(R)}$	[14]
Warta River，Poland	$1.9×10^{4}$	$6.0×10^{2}$	–	–	–	–	–	[15]
Zimny Potok，Poland	$1.0×10^{1}$–$9.0×10^{7}$	$4.7×10^{1}$–$3.5×10^{2}$	$0.2×10^{1}$–$0.8×10^{1}$	–	–	–	–	[16]
River Toce，Italy&Switzerland	–	ND–$3.59×10^{2}$	$1.42×10^{1}$–$4.59×10^{2}$	–	ND–$7.13×10^{2}$	–	ND–$4.88×10^{2}$	[17]
Iowa River， USA	–	–	–	–	$1.75×10^{2}$–$1.30×10^{4}$	–	–	[18]
River Llobregat, Spain	–	–	–	–	–	$10^{3.8(R)}$	$10^{3(R)}$	[19]
River Llobregat, Spain	–	–	–	–	–	–	$10^{2.5(R)}$	[20]

(R) : Calculated from the figures; some of the data were collected by Yang et al. [21]

Table S2. The Relative Abundance of Several Common ARGs in the Surface Water (copies/16S rDNA)

Study sites	*sul1*	*sul2*	*tetA*	*tetW*	*ermB*	bla_{TEM}	Reference
Six urban lakes，China	3.51×10^{-3}–2.79×10^{-2}	1.40×10^{-4}–2.84×10^{-3}	4.48×10^{-5}–2.43×10^{-4}	–	–	–	[22]
Beijiang River, China	$10^{-2.56}$–$10^{-0.52}$	$10^{-3.25}$–$10^{-1.24}$	–	–	–	–	[23]
Beijiang River, China	1.41×10^{-2}	1.58×10^{-3}	1.38×10^{-2}–1.37×10^{-1}	–	–	–	[24]
Yangtze River Lakes, China	$1.85\times10^{-2(M)}$	$2.09\times10^{-3(M)}$	$2.96\times10^{-3(M)}$	–	–	–	[25]
Rivers of Beijing, China	$10^{-3(R)}$	ND	10^{-2}–$10^{-1(R)}$	ND	–	–	[26]
Bosten Lake, China	2.81×10^{-5}–3.33×10^{-3}	1.04×10^{-5}–3.80×10^{-3}	–	1.58×10^{-6}–4.19×10^{-4}	–	–	[27]
Urban river, South Africa	10^{-2}–$10^{-1(R)}$	10^{-2}–$10^{-1(R)}$	–	–	–	–	[28]
Drweca River, Poland	–	–	$10^{-0.22(R)}$	–	–	–	[29]
Bernesga River, Spain	–	–	–	–	–	$10^{-5(R)}$	[30]
Cache La Poudre River,USA	$10^{-4(R)}$	$10^{-4(R)}$	–	$10^{-5(R)}$	–	–	[31]
Almendares Rivera	–	–	–	10^{-6}–$10^{-5(R)}$	10^{-5}–$10^{-4(R)}$	ND–$10^{-6(R)}$	[32]
Lake Geneva, Switzerland	2.8×10^{-3}–7.7×10^{-2}	2.0×10^{-4}–2.1×10^{-2}	–	–	–	–	[33]

Table S2 (continued)

Study sites	*sul1*	*sul2*	*tetA*	*tetW*	*ermB*	bla_{TEM}	*qnrS*	Reference
Twenty-One Swiss lakes	1.50×10^{-3}–2.1×10^{-1}	3.40×10^{-3}	–	–	–	–	–	[34]
Cohana Bay of Titicaca Lake,Peru	10^{-3}–$5\times10^{-3(R)}$	5×10^{-4}–$10^{-3(R)}$	–	–	–	–	–	[35]
South Platte River (SP) and the Poudre River (PR), USA	$3.5\times10^{-2(R)}$	–	–	–	–	–	–	[36]
Stroubles Creek	$10^{-2(R)}$	$10^{-4(R)}$	–	$10^{-4(R)}$	–	–	–	[37]

(R): Calculated from the figures; some of the data were collected by Yang et al. [21]; (M):Median values

Table S3. The Fate of Several Common ARGs in the Effluent-Receiving Water

ARGs	Study sites	Range of absolute gene abundance copies/ml or g	Range of relative gene abundance copies/16S rDNA	Reference
bla$_{SHV}$	Treated waste water, Spain	–	$10^{-3.8}$	[30]
	aquaculture sites, Cuba	–	10^{-6}–10^{-4}	[32]
bla$_{TEM}$	aquaculture sites, Cuba	–	10^{-6}–10^{-5}	[32]
sul1	landfill leachate, China	10^{7}–10^{8}	–	[38]
	Treated waste water, Netherlands	10^{4}–10^{6}	–	[39]
	Treated waste water, China	–	10^{-1}–10^{0}	[26]
	swine wastes, China	–	2.5×10^{-1}–5.0×10^{-1}	[40]
sul2	landfill leachate, China	10^{8}–10^{9}	–	[38]
	Treated waste water, Swedish	10^{2}–10^{4}	–	[41]
	Treated waste water, China	10^{4}–10^{5}	–	[39]
	Treated waste water, China	–	10^{-1}–10^{0}	[26]
	swine wastes, China	–	1.5×10^{-1}–4.0×10^{-1}	[40]
tetA	landfill leachate, China	10^{8}	–	[38]
	Treated waste water, Swedish	<LOQ–10^{2}	–	[41]
	Treated waste water, Germany	10^{2}	–	[42]
	Treated waste water, China	–	10^{-2}–10^{-1}	[26]
	swine wastes, China	–	5.0×10^{-1}–2.0×10^{0}	[40]
tetW	Treated waste water, Netherlands	10^{3}–10^{4}	–	[39]
	Treated waste water, Germany	10^{4}	–	[42]
	Treated waste water, China	–	10^{-6}–10^{-5}	[26]
	aquaculture sites, Cuba	–	10^{-5}–10^{-4}	[32]
ermB	Treated waste water, Netherlands	10^{3}	–	[39]
	swine wastes, China	–	<LOQ	[40]
	aquaculture sites, Cuba	–	10^{-5}-10^{-3}	[32]

Table S4. The Antibiotic Resistant Percentage of Indicator Isolates in the Drinking Water Sources

Sampling sites	Tet-resistant bacteria	Chl-resistant bacteria	Sulf-resistant bacteria	Amx-resistant bacteria	Imi-resistant bacteria	Ery-resistant bacteria	Kan-resistant bacteria	Str-resistant bacteria	Amp-resistant bacteria	Ctet-resistant bacteria	Nor-resistant bacteria	Reference
Enterobacteriaceae isolates												
Bayou Lafourche, USA	13.6% (30 μg)	–	10.9% (23.75/1.25μg SMX/TMP)	–	–	–	–	–	–	–	–	[43]
Ayodhya–Faizabad, India	–	–	–	–	–	–	–	–	–	–	70% (10 μg)	[44]
Enterococcus spp. isolates												
Bayou Lafourche, USA	0	–	–	–	–	6.5% (15 μg)	–	–	–	–	–	[43]
E. coli isolates												
Passaúna River, Brazil	12.5% or 25% (30 μg)	0 (30 μg)	–	25% or 50% (20 μg)	12.5% (10 μg)	–	–	–	37.5% (10 μg)	–	–	[45]
Hamilton, Canada	0–5% (30 μg/mL)	–	92–100% (50 μg/mL)	0–5% (125 μg/mL)	–	0–8% (90 μg/mL)	0–5% (40 μg/mL)	0–8% (60 μg/mL)	0–5% (50 μg/mL)	0–8% (50 μg/mL)	–	[46]
Anacostia River, USA	29% (25 μg/mL)	0 (10 μg/mL)	13% (500 μg/mL)	–	–	–	0 (25 μg/mL)	21% (12.5μg/mL)	8% (10 μg/mL)	29% (25 μg/mL)	–	[47]
Mmabatho, South Africa	40% (30 μg)	30% (30 μg)	–	–	–	40% (15 μg)	10% (30 μg)	–	20% (10 μg)	–	35% (10 μg)	[48]

Table S4 (continued)

Sampling sites	Tet-resistant bacteria	Chl-resistant bacteria	sulf-resistant bacteria	Amx-resistant bacteria	Imi-resistant bacteria	Ery-resistant bacteria	Kan-resistant bacteria	Str-resistant bacteria	Amp-resistant bacteria	Ctet-resistant bacteria	Nor-resistant bacteria	Reference
E. coli isolates												
Ayodhya-Faizabad, India	–	–	–	–	–	–	–	–	–	–	48% (10 μg)	[44]
Well water, India	16.7% (Vitek 2)	–	11.1% (Vitek 2)	–	–	–	–	–	16.7% (Vitek 2)	–	–	[49]
Osun State, Nigeria	33% (30 μg)	20% (30 μg)	100% (25 μg)	59% (25 μg)	0 (10 μg)	–	< 5% (30 μg)	2% (300 μg)	57% (25 μg)	–	–	[50]
Acinetobacter spp.												
Not mentioned	10.7% (30 μg)	–	0 (25 μg)	–	–	–	–	–	7.1% (25 μg)	–	–	[50]

Note: Tet, tetracycline; Chl, chloramphenicol; Sulf, sulfonamide; Amx, amoxicillin; Imi, imipenem; Ery, erythromycin; Str, Streptomycin; Amp, ampicillin; Kan, kanamycin; Ctet, chlortetracycline; Nor, norfloxacin; Vitek 2, using the Vitek 2 instrument with standardized cards to test antibiotic susceptibility; value in the brackets is corresponding antibiotic concentration (or content) selected for the susceptibility tests.

Table S5. The Abundance of Common ARGs in the Effluent and Activated Sludge of UWTPs

ARGs	Effluent (copies/mL)	Activated sludge (copies/g)	Reference
Sul1	4.09×10^{5}	1.11×10^{9}	[51]
	10^{5}–10^{6}	10^{10}–10^{11}	[52]
	10^{5}–10^{7}	–	[53]
	10^{4}–10^{7}	10^{7}–10^{9}	[54]
	6.21×10^{3}–6.05×10^{4}	6.17×10^{8}–6.76×10^{9}	[55]
Sul2	4.86×10^{5}	6.29×10^{9}	[51]
	10^{6}–10^{7}	10^{10}–10^{11}	[52]
	10^{5}–10^{7}	–	[53]
	10^{3}–10^{6}	10^{5}–10^{8}	[54]
	5.30×10^{5}–2.5×10^{6}	2.14×10^{10}–2.09×10^{11}	[55]
ErmB	2.42×10^{4}	5.81×10^{9}	[51]
	10^{3}–10^{5}	10^{6}–10^{8}	[53]
TetA	10^{3}–10^{6}	–	[53]
	2.20×10^{2}–3.32×10^{3}	4.90×10^{6}–2.69×10^{8}	[54]
TetM	1.44×10^{3}	9.49×10^{8}	[51]
	10^{4}–10^{5}	10^{8}–10^{9}	[52]
	10^{3}–10^{5}	10^{5}–10^{7}	[54]
TetW	10^{5}–10^{6}	10^{9}–10^{10}	[52]
	10^{3}–10^{6}	–	[53]
	10^{2}–10^{4}	10^{5}–10^{6}	[54]
	4.76×10^{3}–2.22×10^{5}	2.34×10^{8}–3.47×10^{9}	[55]
Bla_{TEM}	10^{3}–10^{6}	–	[53]
intI1	1.74×10^{5}	4.38×10^{8}	[51]
	10^{6}–10^{7}	10^{10}–10^{11}	[52]
	10^{5}–10^{8}	10^{8}–10^{10}	[54]
	9.72×10^{4}–4.59×10^{5}	2.63×10^{9}–8.51×10^{10}	[55]

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