Supplementary Material

Bacterial community shifts driven by nitrogen pollution in river sediments of a highly urbanized city

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Fig. S1. The landscape of a river heavily polluted by anthropogenic wastewater discharge in the study area

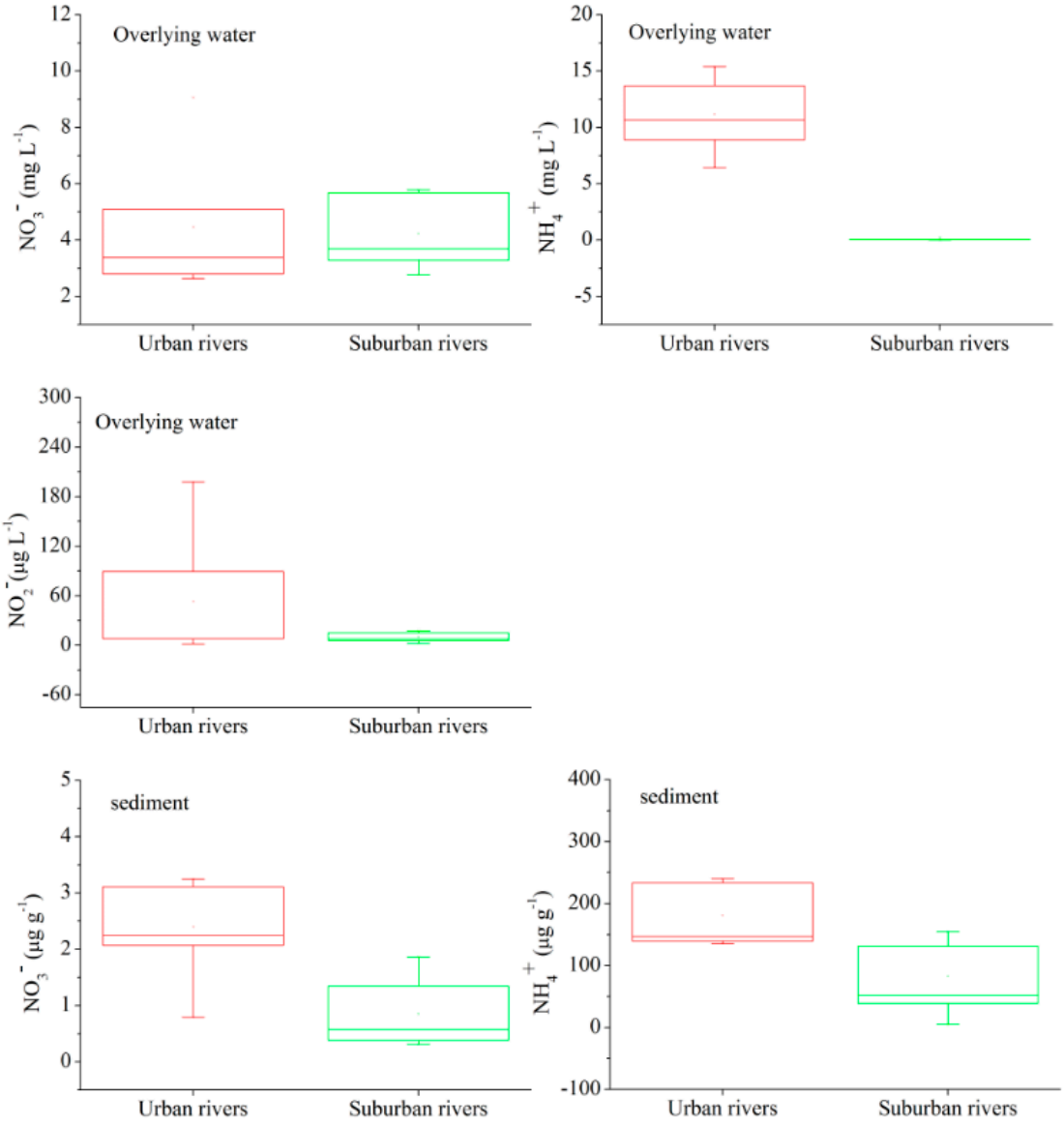

Fig. S2. Concentrations of inorganic nitrogen forms in urban and suburban rivers

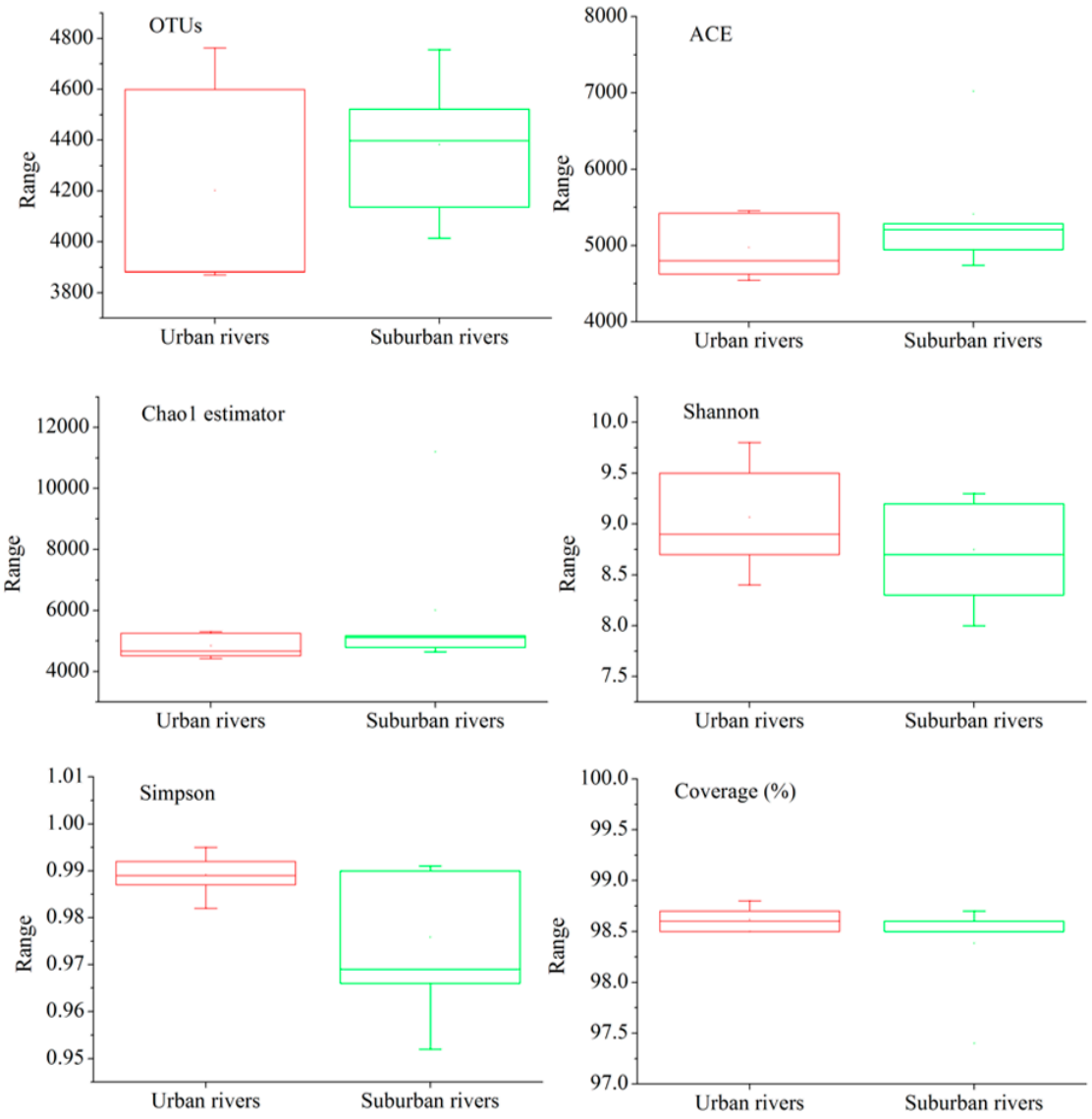

Fig. S3. Diversity indices of bacterial community in urban and suburban rivers

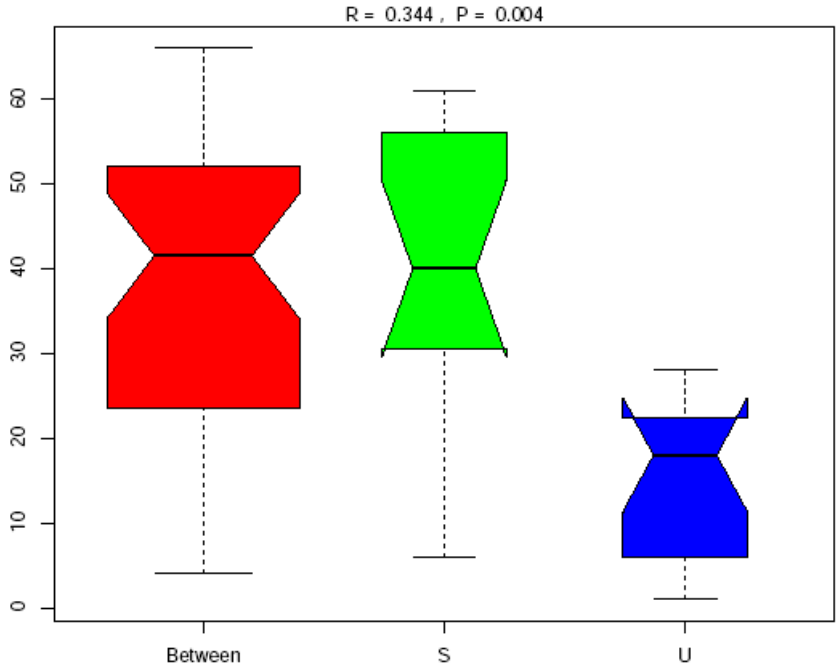

Fig. S4. Analysis of similarity about the bacterial community.

Table S1. Relative abundance (%) of top 36 abundant families in the samples. *P*_value of ANOVA analysis indicated significant difference of bacterial abundance between grouped urban and suburban rivers.

Phylum	Family	Urban rivers		Suburban rivers		*P*_value
		range	mean	range	mean	
Acidobacteria	*Acidobacteriaceae_.Subgroup_1*	0.02–1.42	0.37	0.02–0.56	0.13	0.34
	Gemmatimonadaceae	0.31–1.96	0.64	0.32–1.55	0.69	0.89
Bacteroidetes	*WCHB1-69*	0.29–1.51	0.68	0.15–0.33	0.24	**0.04***
	Chitinophagaceae	0.15–0.43	0.27	0.05–0.34	0.44	0.51
	Flavobacteriaceae	0.52–2.78	1.28	0.65–7.08	2.09	0.46
Chloroflexi	*Anaerolineaceae*	1.98–5.67	3.4	2.34–4.38	3.18	0.75
Cyanobacteria	*unidentified_Chloroplast*	0.04–1.29	0.54	0.03–0.12	0.18	0.15
Firmicutes	*Planococcaceae*	1.03–1.21	1.14	1.91–8.85	4.08	**0.04***
Gemmatimonadetes	*Gemmatimonadaceae*	0.31–1.96	0.64	0.32–1.55	0.69	0.89
Proteobacteria	*Syntrophaceae*	1.52–2.98	1.92	0.85–1.76	1.27	**0.026***
	Bacillaceae	0.17–0.29	0.21	0.23–21.32	6.57	0.14
	Pseudomonadaceae	0.73–2.70	1.62	0.77–2.01	1.31	0.38
	Comamonadaceae	2.60–6.08	3.42	2.33–5.43	2.99	0.57
	Helicobacteraceae	0.40–2.27	0.94	0.16–2.80	1.19	0.63
	Rhodocyclaceae	6.26–12.96	9.83	4.17–8.65	5.74	**0.005****
	Geobacteraceae	2.08–3.96	3.03	1.33–2.13	1.75	**0.0018****
	M20-Pitesti	0.50–1.40	0.71	0.27–0.69	0.43	0.10
	Acetobacteraceae	0.19–1.29	0.59	0.18–0.48	0.26	0.17
	Gallionellaceae	2.10–4.74	3.04	1.39–4.27	2.66	0.54
	Clostridiaceae_1	0.48–0.75	0.58	0.58–4.03	1.64	0.07
	Desulfobacteraceae	0.76–1.89	1.15	0.50–1.09	0.84	0.17
	Enterobacteriaceae	0.51–11.51	3.42	0.50–17.70	4.39	0.77

	Moraxellaceae	0.70–1.72	1.00	0.63–3.07	1.82	0.056
	unidentified_Xanthomonadales	1.55–2.46	1.88	0.73–1.37	0.99	**0.0004****
	Hydrogenophilaceae	1.68–3.73	2.60	1.13–3.53	2.26	0.46
	Nitrosomonadaceae	0.59–1.95	0.97	0.53–1.26	0.93	0.90
	Oxalobacteraceae	0.68–1.29	0.87	0.68–9.68	2.66	0.24
	Alcaligenaceae	0.74–1.16	0.94	0.45–1.09	0.78	0.21
	Crenotrichaceae	0.42–1.17	0.68	0.28–0.74	0.44	0.12
	Desulfobulbaceae	1.31–2.16	1.65	1.22–2.10	1.53	0.61
	Xanthomonadaceae	1.68–3.31	2.61	1.60–3.30	2.38	0.66
	Burkholderiaceae	0.10–3.80	0.88	0.08–0.45	0.16	0.25
	Spongiibacteraceae	1.03–1.52	1.33	0.62–1.16	0.82	**0.0018****
	Sphingomonadaceae	0.40–0.96	0.65	0.41–2.09	0.75	0.73
Spirochaetes	*Spirochaetaceae*	0.81–1.89	1.12	0.54–1.04	0.85	0.17
Verrucomicrobia	*Verrucomicrobiaceae*	0.18–1.47	0.47	0.16–0.38	0.24	0.30

*$P < 0.05$, **$P < 0.01$

Table S2. Relationships between properties and relative abundances of phylum bacterial communities.

	Proteobacteria	*Firmicutes*	*Bacteroidetes*	*Chloroflexi*	*Actinobacteria*	*Acidobacteria*	*Verrucomicrobia*	*Spirochaetes*	*Gemmatimonadetes*	*Nitrospirae*
pH [a]	-0.63*	0.66*	-0.17	0.20	0.21	0.25	-0.12	-0.35	0.18	0.61*
DO [a]	-0.25	0.21	0.26	-0.11	0.61*	0.05	-0.57	-0.76*	0.63*	0.47
DOC [a]	0.53	-0.42	0.26	-0.34	-0.21	-0.41	0.10	-0.24	-0.20	-0.61*
NO_3^- [a]	-0.11	0.10	0.11	-0.24	0.19	0.10	-0.13	-0.01	0.08	0.05
NH_4^+ [a]	0.54	-0.63*	0.08	-0.06	-0.13	-0.11	0.39	0.25	0.04	-0.65*
NO_2^- [a]	-0.08	-0.19	0.43	0.24	0.15	0.17	0.74**	0.09	0.10	-0.28
Fe(II) [b]	0.60*	-0.26	-0.35	-0.39	-0.70*	-0.36	-0.01	0.02	-0.43	-0.48
Sulfide [b]	-0.57	0.53	0.19	-0.04	0.41	0.14	-0.31	-0.50	0.37	0.59*
TOC [b]	-0.36	0.32	-0.56	0.43	0.01	0.39	0.45	0.23	0.32	-0.04
TN [b]	-0.22	-0.12	-0.02	-0.52	0.20	0.56	0.82**	0.43	0.22	0.03
C/N [b]	-0.08	0.40	-0.37	-0.16	-0.30	-0.31	-0.39	-0.15	-0.09	-0.14
NO_3^- [b]	0.48	-0.59*	0.31	-0.21	0.05	-0.10	0.19	0.07	0.20	-0.41
NH_4^+ [b]	0.54	-0.30	-0.13	-0.54	-0.60*	-0.45	0.27	0.33	-0.34	-0.87**

Note: [a] indicated properties of overlying water, [b] indicated properties of sediment. $^*P < 0.05$ and $^{**}P < 0.01$ indicated significant correlation.

Table S3. Correlations among geochemical properties in overlying water and sediments.

	pH [a]	DO [a]	NO_3^- [a]	NH_4^+ [a]	NO_2^- [a]	Fe(II) [b]	Sulfide [b]	TOC [b]	TN [b]	C/N [b]	NO_3^- [b]	NH_4^+ [b]
pH [a]		0.24	-0.18	-0.78**	-0.15	-0.03	0.79**	0.15	-0.11	0.30	-0.79**	-0.66*
DO [a]			0.22	-0.17	-0.29	-0.36	0.68*	-0.25	-0.46	0.12	0.11	-0.29
NO_3^- [a]				-0.17	-0.32	-0.24	0.03	0.04	-0.02	-0.10	0.18	0.26
NH_4^+ [a]					0.39	-0.02	-0.58*	-0.06	0.19	-0.31	0.70*	0.62*
NO_2^- [a]						-0.20	-0.25	0.16	0.65*	-0.44	0.27	0.03
Fe(II) [b]							-0.26	0.05	-0.28	0.40	-0.12	0.40
Sulfide [b]								-0.08	-0.34	0.29	-0.41	-0.52
TOC [b]									0.53	0.34	0.03	0.19
TN [b]										-0.58*	0.25	-0.01
C/N [b]											-0.30	0.13
NO_3^- [b]												0.56*
NH_4^+ [b]												

Note: [a] indicated properties of overlying water, [b] indicated properties of sediment. *$P < 0.05$ and **$P < 0.01$ indicated significant correlation.