Supporting information for

The biogeography and assembly of microbial communities in wastewater treatment plants in China

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This supporting information file had 48 pages, which included 6 tables (Table S1-S5, Table S7) and 8 figures (Figure S1-S8). Given that Table S6 had more than 22000 lines, it was not included here but provided as a separated excel file.

Table S1. Brief information of treatment processes related to sampled WWTPs

No.	Abbreviation of treatment process types	Full name of treatment process types	Notes
1	AAO	Anaerobic/Anoxic/Oxic process;	In the A^2O process, the returned activated sludge recycle, which contains nitrate, is directed to an anaerobic zone [1].
2	AB	Adsorption-Biodegradation process	Firstly, adsorption stage has strong bio-flocculation and biosorption effect from microorganisms and it usually operates with anoxic condition, high sludge loading and short sludge retention time. Secondly, biodegradation stage, operating on aerobic condition, low sludge loading and long sludge retention time, can remove degradable organics through biodegradation effect [2].
3	AO	Anoxic-Oxic process	The influent wastewater was fed to an anoxic zone, which was followed by an aerobic zone [1].
4	Biofilm	Biofilm	An attached-growth treatment process in which the microorganisms responsible for the conversion od the organic matter or other constituents in the wastewater to gases and cell tissue are attached to some inert medium.
4	CASS	Cyclic Activated Sludge System	Sequencing batch reactors (SBR) with a cycle format, using three baffled zones and mixed liquor is recycled from Zone 3 to Zone 1.
5	CAST	Cyclic Activated Sludge Technology	A variant of the sequencing batch reactor (SBR) and includes an anaerobic biological selector and a compartmented variable volume reactor in which nitrates recycled from the aerobic

			zone are fed alongside the influent carbon source to the biomass in the anoxic zone for denitrification prior to carbon oxidization and nitrification [3].
6	MBR	Membrane Bioreactor	in which biomass is strictly separated by a membrane, offer several advantages over the conventional activated sludge process, including a high biomass concentration, reduced footprint, low sludge production, and better permeate quality[4]
7	MSBR	Modified Sequencing Batch Reactor	A combination of A^2O and SBR
8	MUCT	Modified University of Cape Town Process	In the modified UCT process, the return activated sludge is directed to an anoxic reactor that does not receive internal nitrate recycle flow. The nitrate is reduced in this tank, and the mixed-liquor from the reactor is recycled to the anaerobic tank. The second anoxic tank follows the first anoxic tank and receives internal nitrate recycle flow from the aeration tank to provide the major portion of nitrate removal for the process.
9	OD	Oxidation Ditch	A plug-flow system with cellular recycle, which could achieve nitrification and phosphorus removal at the same time [1].
10	R- A^2O	Reverse A^2O process	Compared with A^2O process, anoxic zone is ahead of anaerobic zone.
11	SBR	Sequencing Batch Reactor	Utilize a fill-and-draw reactor with complete mixing during the batch reaction step and where the subsequent steps of aeration and clarification occur in the same tank [1].

[1] Metcalf & Eddy (2003) Wastewater Engineering: Treatment and Reuse. 4th Edition, McGraw-Hill, New York.

[2] Wu S , Qi Y , Fan C , et al. Application of novel catalytic-ceramic-filler in a coupled system for long-chain dicarboxylic acids manufacturing wastewater treatment[J]. Chemosphere, 2016, 144:2454-2461.

[3] Feng G , Jun N , Xinhui Z , et al. A dynamic modelling of nutrient metabolism in a

cyclic activated sludge technology (CAST) for treating low carbon source wastewater[J]. Environ Sci Pollut Res Int, 2017:1-15.

[4] Stephenson, T.; Judd, S.; Jefferson, B.; Brindle, K. Membrane Bioreactors for Wastewater Treatment; IWA publishing, London, 2000.

Table S2. Treatment process types and functions of sampled WWTPs

No.	WWTP Name	Treatment Process Types	Nitrification	Denitrification
1	CNHB1	AO	unkown	unkown
2	CNHB2	AO	unkown	unkown
3	CNHB3	A^2O	unkown	unkown
4(1)	CNBJ1A	R-A^2O^1	yes	yes
4(2)	CNBJ1B	A^2O	yes	yes
4(3)	CNBJ1C	MBR	yes	yes
5	CNBJ2	MBR	yes	yes
6	CNBJ3	A^2O	yes	yes
7	CNBJ4	A^2O	yes	yes
8(1)	CNBJ5A	AAO	yes	yes
8(2)	CNBJ5B	MBR	yes	yes
9	CNBJ6	MBR	yes	yes
10	CNDL1	AO	unkown	unkown
11	CNDL2	CAST	yes	yes
12	CNJN1	A^2O	yes	yes
13	CNJN2	A^2O	yes	yes
14	CNJN3	A^2O	yes	yes
15	CNJN4	A^2O	yes	yes
16	CNQD1	MSBR	yes	yes
17	CNQD2	A^2O	yes	yes
18	CNQD3	A^2O	yes	yes
19	CNQD4	A^2O	yes	yes
20	CNSH1	A^2O	yes	yes
21	CNSH2	A^2O	yes	yes
22	CNSH3	AO	yes	yes
23	CNSH4	AO	yes	yes
24	CNSH5	AO	yes	yes
25	CNXA1	OD	yes	yes
26	CNXA2	R-A^2O	yes	yes
27	CNXA3	A^2O	yes	yes
28	CNXA4	OD	yes	yes

29(1)	CNWX1A	MBR	yes	yes
29(2)	CNWX1B	OD	yes	yes
30(1)	CNWX2	MBR	yes	yes
30(2)	CNWX3A	MBR	yes	yes
31	CNWX3B	SBR	yes	yes
32	CNWX4	A^2O	yes	yes
33	CNCD1	A^2O	yes	yes
34	CNCD2	A^2O	yes	yes
35	CNCD3	CASS	yes	yes
36	CNCD4	A^2O	yes	yes
37	CNWH1	A^2O	yes	yes
38	CNWH2	AO	yes	yes
39	CNWH3	A^2O	yes	yes
40	CNWH4	A^2O	yes	yes
41	CNCQ1	OD	yes	yes
42	CNCQ2	A^2O	yes	yes
43	CNCQ3	CAST	yes	yes
44	CNCQ4	CAST	yes	yes
45	CNCS1	A^2O	yes	yes
46	CNCS2	OD	unkown	unkown
47	CNCS3	MSBR	unkown	unkown
48	CNCS4	OD	unkown	unkown
49	CNXM1	A^2O	yes	yes
50	CNXM2	A^2O	yes	yes
51	CNXM3	A^2O	yes	yes
52	CNXM4	OD	yes	yes
53	CNSZ1	MUCT	yes	yes
54	CNSZ2	MSBR	yes	yes
55(1)	CNSZ3A	A^2O	yes	yes
55(2)	CNSZ3B	OD	yes	yes
56(1)	CNSZ4A	AB	yes	yes
56(2)	CNSZ4B	OD	yes	yes
57	CNSY1	Biofilter	unknown	unknown
58	CNSY2	A^2O	yes	yes
59	CNSY3	A^2O	yes	yes
60	CNSY4	Biofilter	unknown	unknown

Table S3. Basic environmental information of 211 samples

No.	Sample ID	WWTP ID	Lati. (°N)	Longi. (°E)	MAT (℃)	Flow rate ($\times 10^4$ m^3/d)	Inf. BOD (mg/L)	Inf. COD (mg/L)	B/C*	Inf. NH_4^+ (mg/L)	Inf. TN (mg/L)	Inf. TP (mg/L)	eff. BOD (mg/L)	eff. COD (mg/L)
1	CNBJ1AA	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
2	CNBJ1AB	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
3	CNBJ1AC	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
4	CNBJ1BA	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
5	CNBJ1BB	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
6	CNBJ1BC	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
7	CNBJ1CA	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
8	CNBJ1CB	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
9	CNBJ1CC	CNBJ1	40.04	116.36	13.33	-	202.7	284.38	0.71	-	51.3	6.5	-	-
10	CNBJ2A	CNBJ2	40.01	116.43	13.33	-	280	550	0.51	45	65	8.63	16	-
11	CNBJ2B	CNBJ2	40.01	116.43	13.33	-	280	550	0.51	45	65	8.63	16	-
12	CNBJ2C	CNBJ2	40.01	116.43	13.33	-	280	550	0.51	45	65	8.63	16	-
13	CNBJ3A	CNBJ3	39.90	116.53	13.33	49	175	450	0.39	26	35	6.59	9	29.5
14	CNBJ3B	CNBJ3	39.90	116.53	13.33	49	175	450	0.39	26	35	6.59	9	29.5
15	CNBJ3C	CNBJ3	39.90	116.53	13.33	49	175	450	0.39	26	35	6.59	9	29.5
16	CNBJ4A	CNBJ4	39.83	116.43	13.33	69	220	450	0.49	48	55	5.5	5	30
17	CNBJ4B	CNBJ4	39.83	116.43	13.33	69	220	450	0.49	48	55	5.5	5	30

18	CNBJ4C	CNBJ4	39.83	116.43	13.33	69	220	450	0.49	48	55	5.5	5	30
19	CNBJ5AA	CNBJ5	39.92	116.12	13.33	2.67	-	200	-	25	45	3	-	25
20	CNBJ5AB	CNBJ5	39.92	116.12	13.33	2.67	-	200	-	25	45	3	-	25
21	CNBJ5AC	CNBJ5	39.92	116.12	13.33	2.67	-	200	-	25	45	3	-	25
22	CNBJ5BA	CNBJ5	39.92	116.12	13.33	2.67	-	200	-	25	45	3	-	25
23	CNBJ5BB	CNBJ5	39.92	116.12	13.33	2.67	-	200	-	25	45	3	-	25
24	CNBJ5BC	CNBJ5	39.92	116.12	13.33	2.67	-	200	-	25	45	3	-	25
25	CNBJ6BA	CNBJ6	40.45	115.97	13.33	2.5	200	350	0.57	30	50	6.5	1	20
26	CNBJ6BB	CNBJ6	40.45	115.97	13.33	2.5	200	350	0.57	30	50	6.5	1	20
27	CNBJ6BC	CNBJ6	40.45	115.97	13.33	2.5	200	350	0.57	30	50	6.5	1	20
28	CNCD1A	CNCD1	30.58	104.08	17.78	30	100	200	0.5	35	40	3	10	20
29	CNCD1B	CNCD1	30.58	104.08	17.78	30	100	200	0.5	35	40	3	10	20
30	CNCD1C	CNCD1	30.58	104.08	17.78	30	100	200	0.5	35	40	3	10	20
31	CNCD2A	CNCD2	30.66	104.12	17.78	10	100	200	0.5	30	60	8	5	15
32	CNCD2B	CNCD2	30.66	104.12	17.78	10	100	200	0.5	30	60	8	5	15
33	CNCD2C	CNCD2	30.66	104.12	17.78	10	100	200	0.5	30	60	8	5	15
34	CNCD3A	CNCD3	30.47	104.05	17.78	2.8	37	150	0.25	12	20	2.4	6	13
35	CNCD3B	CNCD3	30.47	104.05	17.78	2.8	37	150	0.25	12	20	2.4	6	13
36	CNCD3C	CNCD3	30.47	104.05	17.78	2.8	37	150	0.25	12	20	2.4	6	13
37	CNCD4A	CNCD4	30.51	103.96	17.78	5.09	180	350	0.51	20	30	4	8.03	16.3
38	CNCD4B	CNCD4	30.51	103.96	17.78	5.09	180	350	0.51	20	30	4	8.03	16.3

39	CNCD4C	CNCD4	30.51	103.96	17.78	5.09	180	350	0.51	20	30	4	8.03	16.3
40	CNCQ1A	CNCQ1	29.55	106.37	18.33	1.1	160	450	0.36	16	27	3.2	6.5	26
41	CNCQ1B	CNCQ1	29.55	106.37	18.33	1.1	160	450	0.36	16	27	3.2	6.5	26
42	CNCQ1C	CNCQ1	29.55	106.37	18.33	1.1	160	450	0.36	16	27	3.2	6.5	26
43	CNCQ2A	CNCQ2	29.60	106.62	18.33	80	110	310	0.35	30	40	5	10	30
44	CNCQ2B	CNCQ2	29.60	106.62	18.33	80	110	310	0.35	30	40	5	10	30
45	CNCQ2C	CNCQ2	29.60	106.62	18.33	80	110	310	0.35	30	40	5	10	30
46	CNCQ3A	CNCQ3	29.44	106.49	18.33	4.5	-	300	-	20	40	2	-	34
47	CNCQ3B	CNCQ3	29.44	106.49	18.33	4.5	-	300	-	20	40	2	-	34
48	CNCQ3C	CNCQ3	29.44	106.49	18.33	4.5	-	300	-	20	40	2	-	34
49	CNCQ4A	CNCQ4	29.47	106.52	18.33	5	180	280	0.64	23	36	3.5	5.1	23
50	CNCQ4B	CNCQ4	29.47	106.52	18.33	5	180	280	0.64	23	36	3.5	5.1	23
51	CNCQ4C	CNCQ4	29.47	106.52	18.33	5	180	280	0.64	23	36	3.5	5.1	23
52	CNCS1A	CNCS1	28.28	112.94	18.33	30	130	300	0.43	30	37	2.7	-	19
53	CNCS1B	CNCS1	28.28	112.94	18.33	30	130	300	0.43	30	37	2.7	-	19
54	CNCS1C	CNCS1	28.28	112.94	18.33	30	130	300	0.43	30	37	2.7	-	19
55	CNCS2A	CNCS2	28.25	112.98	18.33	18	90	140	0.64	17.5	25	2	-	25
56	CNCS2B	CNCS2	28.25	112.98	18.33	18	90	140	0.64	17.5	25	2	-	25
57	CNCS2C	CNCS2	28.25	112.98	18.33	18	90	140	0.64	17.5	25	2	-	25
58	CNCS3AA	CNCS3	28.25	112.98	18.33	20	110	250	0.44	19	25	3	20	60
59	CNCS3AB	CNCS3	28.25	112.98	18.33	20	110	250	0.44	19	25	3	20	60

60	CNCS3AC	CNCS3	28.25	112.98	18.33	20	110	250	0.44	19	25	3	20	60
61	CNCS3BA	CNCS3	28.25	112.98	18.33	20	110	250	0.44	19	25	3	20	60
62	CNCS3BB	CNCS3	28.25	112.98	18.33	20	110	250	0.44	19	25	3	20	60
63	CNCS3BC	CNCS3	28.25	112.98	18.33	20	110	250	0.44	19	25	3	20	60
64	CNCS4A	CNCS4	28.2	113.01	18.33	15	-	200	-	20	22	1.8	-	60
65	CNCS4B	CNCS4	28.2	113.01	18.33	15	-	200	-	20	22	1.8	-	60
66	CNCS4C	CNCS4	28.2	113.01	18.33	15	-	200	-	20	22	1.8	-	60
55	CNDL1AA	CNDL1	38.88	121.63	12.22	0.75	105	159	0.67	13.0	19.5	2.90	2.0	18.8
56	CNDL1AB	CNDL1	38.88	121.63	12.22	0.75	105	159	0.67	13.0	19.5	2.90	2.0	18.8
57	CNDL1AC	CNDL1	38.88	121.63	12.22	0.75	105	159	0.67	13.0	19.5	2.90	2.0	18.8
58	CNDL1BA	CNDL1	38.88	121.63	12.22	0.75	105	159	0.67	13.0	19.5	2.90	2.0	18.8
59	CNDL1BB	CNDL1	38.88	121.63	12.22	0.75	105	159	0.67	13.0	19.5	2.90	2.0	18.8
60	CNDL1BC	CNDL1	38.88	121.63	12.22	0.75	105	159	0.67	13.0	19.5	2.90	2.0	18.8
73	CNDL2AA	CNDL2	38.87	121.54	12.22	6	65	340	0.19	20	32.5	3	3.5	23
74	CNDL2AB	CNDL2	38.87	121.54	12.22	6	65	340	0.19	20	32.5	3	3.5	23
75	CNDL2AC	CNDL2	38.87	121.54	12.22	6	65	340	0.19	20	32.5	3	3.5	23
76	CNDL2BA	CNDL2	38.87	121.54	12.22	6	65	340	0.19	20	32.5	3	3.5	23
77	CNDL2BB	CNDL2	38.87	121.54	12.22	6	65	340	0.19	20	32.5	3	3.5	23
78	CNDL2BC	CNDL2	38.87	121.54	12.22	6	65	340	0.19	20	32.5	3	3.5	23
79	CNHB1AA	CNHB1	45.82	126.71	4.44	16	220	350	0.63	-	-	-	-	-
80	CNHB1AB	CNHB1	45.82	126.71	4.44	16	220	350	0.63	-	-	-	-	-

81	CNHB1AC	CNHB1	45.82	126.71	4.44	16	220	350	0.63	-	-	-	-	-
82	CNHB1BA	CNHB1	45.82	126.71	4.44	16	220	350	0.63	-	-	-	-	-
83	CNHB1BB	CNHB1	45.82	126.71	4.44	16	220	350	0.63	-	-	-	-	-
84	CNHB1BC	CNHB1	45.82	126.71	4.44	16	220	350	0.63	-	-	-	-	-
85	CNHB2AA	CNHB2	45.82	126.72	4.44	-	220	420	0.52	50	-	-	-	75
86	CNHB2AB	CNHB2	45.82	126.72	4.44	-	220	420	0.52	50	-	-	-	75
87	CNHB2AC	CNHB2	45.82	126.72	4.44	-	220	420	0.52	50	-	-	-	75
88	CNHB2BA	CNHB2	45.82	126.72	4.44	-	220	420	0.52	50	-	-	-	75
89	CNHB2BB	CNHB2	45.82	126.72	4.44	-	220	420	0.52	50	-	-	-	75
90	CNHB2BC	CNHB2	45.82	126.72	4.44	-	220	420	0.52	50	-	-	-	75
91	CNHB3A	CNHB3	45.76	126.75	4.44	-	220	500	0.44	40	50	5	20	60
92	CNHB3B	CNHB3	45.76	126.75	4.44	-	220	500	0.44	40	50	5	20	60
93	CNHB3C	CNHB3	45.76	126.75	4.44	-	220	500	0.44	40	50	5	20	60
94	CNJN1A	CNJN1	36.70	117.04	14.50	26.93	112.9	340	0.33	36	45	8	2.62	17.8
95	CNJN1B	CNJN1	36.70	117.04	14.50	26.93	112.9	340	0.33	36	45	8	2.62	17.8
96	CNJN1C	CNJN1	36.70	117.04	14.50	26.93	112.9	340	0.33	36	45	8	2.62	17.8
97	CNJN2A	CNJN2	36.69	116.95	14.50	18.5	135	400	0.34	45	45	7	4	35
98	CNJN2B	CNJN2	36.69	116.95	14.50	18.5	135	400	0.34	45	45	7	4	35
99	CNJN2C	CNJN2	36.69	116.95	14.50	18.5	135	400	0.34	45	45	7	4	35
100	CNJN3A	CNJN3	36.73	117.10	14.50	12.41	90	215	0.42	37.5	42.5	5	10	36
101	CNJN3B	CNJN3	36.73	117.10	14.50	12.41	90	215	0.42	37.5	42.5	5	10	36

102	CNJN3C	CNJN3	36.73	117.10	14.50	12.41	90	215	0.42	37.5	42.5	5	10	36
103	CNJN4A	CNJN4	36.69	116.90	14.50	2.5	70	170	0.42	20	24.5	2.5	2.5	14.5
104	CNJN4B	CNJN4	36.69	116.90	14.50	2.5	70	170	0.42	20	24.5	2.5	2.5	14.5
105	CNJN4C	CNJN4	36.69	116.90	14.50	2.5	70	170	0.42	20	24.5	2.5	2.5	14.5
106	CNQD1A	CNQD1	36.11	120.33	13.89	13	300	650	0.42	45	60	9	6.5	30
107	CNQD1B	CNQD1	36.11	120.33	13.89	13	300	650	0.42	45	60	9	6.5	30
108	CNQD1C	CNQD1	36.11	120.33	13.89	13	300	650	0.42	45	60	9	6.5	30
109	CNQD2A	CNQD2	36.21	120.36	13.89	0.9	80	320	0.25	21	45	5	4	35
110	CNQD2B	CNQD2	36.21	120.36	13.89	0.9	80	320	0.25	21	45	5	4	35
111	CNQD2C	CNQD2	36.21	120.36	13.89	0.9	80	320	0.25	21	45	5	4	35
112	CNQD3AA	CNQD3	36.06	120.29	13.89	7.37	450	900	0.5	80	124	10	20	80
113	CNQD3AB	CNQD3	36.06	120.29	13.89	7.37	450	900	0.5	80	124	10	20	80
114	CNQD3AC	CNQD3	36.06	120.29	13.89	7.37	450	900	0.5	80	124	10	20	80
115	CNQD4AA	CNQD4	36.15	120.36	13.89	-	400	900	0.44	58	75	10	10.5	40.2
116	CNQD4AB	CNQD4	36.15	120.36	13.89	-	400	900	0.44	58	75	10	10.5	40.2
117	CNQD4AC	CNQD4	36.15	120.36	13.89	-	400	900	0.44	58	75	10	10.5	40.2
118	CNSH1A	CNSH1	31.28	121.48	17.78	5.75	185	462	0.4	40	65	7.5	10.2	39
119	CNSH1B	CNSH1	31.28	121.48	17.78	5.75	185	462	0.4	40	65	7.5	10.2	39
120	CNSH1C	CNSH1	31.28	121.48	17.78	5.75	185	462	0.4	40	65	7.5	10.2	39
121	CNSH2A	CNSH2	31.25	121.74	17.78	232	130	320	0.41	30	-	5	7.8	35
122	CNSH2B	CNSH2	31.25	121.74	17.78	232	130	320	0.41	30	-	5	7.8	35

123	CNSH2C	CNSH2	31.25	121.74	17.78	232	130	320	0.41	30	-	5	7.8	35
124	CNSH3A	CNSH3	31.35	121.61	17.78	145	120	316	0.38	25.3	35	4	60	27.3
125	CNSH3B	CNSH3	31.35	121.61	17.78	145	120	316	0.38	25.3	35	4	60	27.3
126	CNSH3C	CNSH3	31.35	121.61	17.78	145	120	316	0.38	25.3	35	4	60	27.3
127	CNSH4A	CNSH4	31.35	121.61	17.78	49	75.4	160	0.47	11.1	35	3.6	30	37.5
128	CNSH4B	CNSH4	31.35	121.61	17.78	49	75.4	160	0.47	11.1	35	3.6	30	37.5
129	CNSH4C	CNSH4	31.35	121.61	17.78	49	75.4	160	0.47	11.1	35	3.6	30	37.5
130	CNSH5A	CNSH5	31.17	121.44	17.78	9.9	100	220	0.45	10.7	55	5	7.2	17.5
131	CNSH5B	CNSH5	31.17	121.44	17.78	9.9	100	220	0.45	10.7	55	5	7.2	17.5
132	CNSH5C	CNSH5	31.17	121.44	17.78	9.9	100	220	0.45	10.7	55	5	7.2	17.5
133	CNSY1A	CNSY1	18.21	109.48	25.56	1	50	120	0.42	7.5	17.5	1.2	3.5	20
134	CNSY1B	CNSY1	18.21	109.48	25.56	1	50	120	0.42	7.5	17.5	1.2	3.5	20
135	CNSY1C	CNSY1	18.21	109.48	25.56	1	50	120	0.42	7.5	17.5	1.2	3.5	20
136	CNSY1S	CNSY1	18.21	109.48	25.56	1	50	120	0.42	7.5	17.5	1.2	3.5	20
137	CNSY2A	CNSY2	18.30	109.53	25.56	0.7	90	180	0.5	25	40	4	5	10
138	CNSY3A	CNSY3	18.40	109.75	25.56	0.5	90	180	0.5	25	40	4	1.42	12
139	CNSY3B	CNSY3	18.40	109.75	25.56	0.5	90	180	0.5	25	40	4	1.42	12
140	CNSY3C	CNSY3	18.40	109.75	25.56	0.5	90	180	0.5	25	40	4	1.42	12
141	CNSY4S	CNSY4	18.23	109.63	25.56	1.25	80	240	0.33	13	15	5	10	17
142	CNSZ1A	CNSZ1	22.51	113.89	23.33	56	200	350	0.57	30	55	4.5	10	30
143	CNSZ1B	CNSZ1	22.51	113.89	23.33	56	200	350	0.57	30	55	4.5	10	30

144	CNSZ1C	CNSZ1	22.51	113.89	23.33	56	200	350	0.57	30	55	4.5	10	30
145	CNSZ2A	CNSZ2	22.56	114.25	23.33	8	150	300	0.5	20	24	4	5	25
146	CNSZ2B	CNSZ2	22.56	114.25	23.33	8	150	300	0.5	20	24	4	5	25
147	CNSZ2C	CNSZ2	22.56	114.25	23.33	8	150	300	0.5	20	24	4	5	25
148	CNSZ3AA	CNSZ3	22.54	114.10	23.33	17	230	400	0.58	27	43	4	3	13
149	CNSZ3AB	CNSZ3	22.54	114.10	23.33	17	230	400	0.58	27	43	4	3	13
150	CNSZ3AC	CNSZ3	22.54	114.10	23.33	17	230	400	0.58	27	43	4	3	13
151	CNSZ3BA	CNSZ3	22.54	114.10	23.33	17	230	400	0.58	27	43	4	3	13
152	CNSZ3BB	CNSZ3	22.54	114.10	23.33	17	230	400	0.58	27	43	4	3	13
153	CNSZ3BC	CNSZ3	22.54	114.10	23.33	17	230	400	0.58	27	43	4	3	13
154	CNSZ4AA	CNSZ4	22.54	114.14	23.33	35	150	325	0.46	20	30	3	30	60
155	CNSZ4AB	CNSZ4	22.54	114.14	23.33	35	150	325	0.46	20	30	3	30	60
156	CNSZ4AC	CNSZ4	22.54	114.14	23.33	35	150	325	0.46	20	30	3	30	60
157	CNSZ4BA	CNSZ4	22.54	114.14	23.33	35	150	325	0.46	20	30	3	30	60
158	CNWH1A	CNWH1	30.59	114.36	17.22	24	140	240	0.58	16.5	20	2	-	20
159	CNWH1B	CNWH1	30.59	114.36	17.22	24	140	240	0.58	16.5	20	2	-	20
160	CNWH1C	CNWH1	30.59	114.36	17.22	24	140	240	0.58	16.5	20	2	-	20
161	CNWH2A	CNWH2	30.67	114.29	17.22	30	104	165	0.63	18	20.5	3	17	25
162	CNWH2B	CNWH2	30.67	114.29	17.22	30	104	165	0.63	18	20.5	3	17	25
163	CNWH2C	CNWH2	30.67	114.29	17.22	30	104	165	0.63	18	20.5	3	17	25
164	CNWH3A	CNWH3	30.56	114.34	17.22	5	-	150	-	20	30	1.5	-	20

165	CNWH3B	CNWH3	30.56	114.34	17.22	5	-	150	-	20	30	1.5	-	20
166	CNWH3C	CNWH3	30.56	114.34	17.22	5	-	150	-	20	30	1.5	-	20
167	CNWH4A	CNWH4	30.49	114.37	17.22	15	88	150	0.59	10	25	2	-	30
168	CNWH4B	CNWH4	30.49	114.37	17.22	15	88	150	0.59	10	25	2	-	30
169	CNWH4C	CNWH4	30.49	114.37	17.22	15	88	150	0.59	10	25	2	-	30
170	CNWX1AA	CNWX1A	31.61	120.33	17.78	7	170	375	0.45	40	50	5.5	10	30
171	CNWX1AB	CNWX1A	31.61	120.33	17.78	7	170	375	0.45	40	50	5.5	10	30
172	CNWX1AC	CNWX1A	31.61	120.33	17.78	7	170	375	0.45	40	50	5.5	10	30
173	CNWX1BA	CNWX1B	31.61	120.33	17.78	1.5	170	375	0.45	40	50	5.5	10	30
174	CNWX1BB	CNWX1B	31.61	120.33	17.78	1.5	170	375	0.45	40	50	5.5	10	30
175	CNWX1BC	CNWX1B	31.61	120.33	17.78	1.5	170	375	0.45	40	50	5.5	10	30
176	CNWX2A	CNWX2	31.54	120.45	17.78	4.8	75	275	0.27	27.5	35	3.25	1.5	27
177	CNWX2B	CNWX2	31.54	120.45	17.78	4.8	75	275	0.27	27.5	35	3.25	1.5	27
178	CNWX2C	CNWX2	31.54	120.45	17.78	4.8	75	275	0.27	27.5	35	3.25	1.5	27
179	CNWX3AA	CNWX3A	31.49	120.45	17.78	1.8	180	275	0.65	27.5	35	3.25	1.5	27
180	CNWX3AB	CNWX3A	31.49	120.45	17.78	1.8	180	275	0.65	27.5	35	3.25	1.5	27
181	CNWX3AC	CNWX3A	31.49	120.45	17.78	1.8	180	275	0.65	27.5	35	3.25	1.5	27
182	CNWX3BA	CNWX3B	31.49	120.45	17.78	1.9	180	275	0.65	30	41	2.5	1.5	13
183	CNWX3BB	CNWX3B	31.49	120.45	17.78	1.9	180	275	0.65	30	41	2.5	1.5	13
184	CNWX3BC	CNWX3B	31.49	120.45	17.78	1.9	180	275	0.65	30	41	2.5	1.5	13
185	CNWX4A	CNWX4	31.53	120.33	17.78	10	100	255	0.39	25	50	16	4	31

186	CNWX4B	CNWX4	31.53	120.33	17.78	10	100	255	0.39	25	50	16	4	31
187	CNWX4C	CNWX4	31.53	120.33	17.78	10	100	255	0.39	25	50	16	4	31
188	CNXA1A	CNXA1	34.30	109.04	13.89	14.9	250	500	0.5	25	35	6.5	10	22
189	CNXA1B	CNXA1	34.30	109.04	13.89	14.9	250	500	0.5	25	35	6.5	10	22
190	CNXA1C	CNXA1	34.30	109.04	13.89	14.9	250	500	0.5	25	35	6.5	10	22
191	CNXA2A	CNXA2	34.37	108.91	13.89	2.49	400	1000	0.4	34	45	4	20	50
192	CNXA2B	CNXA2	34.37	108.91	13.89	2.49	400	1000	0.4	34	45	4	20	50
193	CNXA2C	CNXA2	34.37	108.91	13.89	2.49	400	1000	0.4	34	45	4	20	50
194	CNXA3A	CNXA3	34.37	109.00	13.89	21.84	400	1000	0.4	39	65	1.7	20	50
195	CNXA3B	CNXA3	34.37	109.00	13.89	21.84	400	1000	0.4	39	65	1.7	20	50
196	CNXA3C	CNXA3	34.37	109.00	13.89	21.84	400	1000	0.4	39	65	1.7	20	50
197	CNXA4A	CNXA4	34.21	108.84	13.89	5.5	100	250	0.4	21	42.5	3.5	9	17.5
198	CNXA4B	CNXA4	34.21	108.84	13.89	5.5	100	250	0.4	21	42.5	3.5	9	17.5
199	CNXA4C	CNXA4	34.21	108.84	13.89	5.5	100	250	0.4	21	42.5	3.5	9	17.5
200	CNXM1A	CNXM1	24.47	118.17	22.22	20.5	170	375	0.45	40	50	5.5	10	30
201	CNXM1B	CNXM1	24.47	118.17	22.22	20.5	170	375	0.45	40	50	5.5	10	30
202	CNXM1C	CNXM1	24.47	118.17	22.22	20.5	170	375	0.45	40	50	5.5	10	30
203	CNXM2A	CNXM2	24.56	118.04	22.22	6	150	400	0.38	12.5	35	5	2	35
204	CNXM2B	CNXM2	24.56	118.04	22.22	6	150	400	0.38	12.5	35	5	2	35
205	CNXM2C	CNXM2	24.56	118.04	22.22	6	150	400	0.38	12.5	35	5	2	35
206	CNXM3A	CNXM3	24.46	118.02	22.22	9	170	300	0.57	12.5	35	5	18	27.5

207	CNXM3B	CNXM3	24.46	118.02	22.22	9	170	300	0.57	12.5	35	5	18	27.5
208	CNXM3C	CNXM3	24.46	118.02	22.22	9	170	300	0.57	12.5	35	5	18	27.5
209	CNXM4A	CNXM4	24.58	118.11	22.22	4.5	175	250	0.7	32.5	40	2.5	16.5	25
210	CNXM4B	CNXM4	24.58	118.11	22.22	4.5	175	250	0.7	32.5	40	2.5	16.5	25
211	CNXM4C	CNXM4	24.58	118.11	22.22	4.5	175	250	0.7	32.5	40	2.5	16.5	25

Continuous Table S3

No.	Sample ID	Eff. NH_4^+ (mg/L)	Eff. TN (mg/L)	Eff. TP (mg/L)	HRT (h)	Volume of aeration tanks (m^3)	DO (mg/L)	pH	Cond. (uS/cm)	MLSS (mg/L)	SRT (d)	HRT in aeration tank (h)	Volume of single aeration tank (m^3)	Recycle ratio
1	CNBJ1AA	-	-	-	-	-	4.6	6.66	511	3794	-	-	-	-
2	CNBJ1AB	-	-	-	-	-	4.4	6.66	556	3794	-	-	-	-
3	CNBJ1AC	-	-	-	-	-	1.35	6.7	520	3794	-	-	-	-
4	CNBJ1BA	-	-	-	-	-	2.1	6.46	815	4300	-	-	-	-
5	CNBJ1BB	-	-	-	-	-	0.2	6.62	825	4300	-	-	-	-
6	CNBJ1BC	-	-	-	-	-	0.4	6.57	823	4300	-	-	-	-
7	CNBJ1CA	-	-	-	-	-	0.3	6.45	961	7002	-	-	-	-
8	CNBJ1CB	-	-	-	-	-	3.6	6.52	918	7002	-	-	-	-
9	CNBJ1CC	-	-	-	-	-	4.3	6.55	949	7002	-	-	-	-
10	CNBJ2A	-	-	-	9.77	-	1.8	6.44	952	9886	-	7.5	-	-
11	CNBJ2B	-	-	-	9.77	-	3.1	6.53	949	9886	-	7.5	-	-

12	CNBJ2C	-	-	-	9.77	-	0.3	6.58	921	9886	-	7.5	-	-
13	CNBJ3A	-	-	-	15.3	80352	2.09	7.17	870	3200	5	8.38	-	0.7
14	CNBJ3B	-	-	-	15.3	80352	6.36	7.05	849	3200	5	8.38	-	0.7
15	CNBJ3C	-	-	-	15.3	80352	6.28	7.17	846	3200	5	8.38	-	0.7
16	CNBJ4A	-	-	-	13.67	166750	0.77	7.08	1172	2780	12.3	6.67	-	1
17	CNBJ4B	-	-	-	13.67	166750	1.24	6.99	1141	2780	12.3	6.67	-	1
18	CNBJ4C	-	-	-	13.67	166750	3.92	7.04	1111	2780	12.3	6.67	-	1
19	CNBJ5AA	0.1	25	0.8	12	10000	0.63	6.89	885	3368	10	6	1666.7	1
20	CNBJ5AB	0.1	25	0.8	12	10000	0.45	6.93	881	3368	10	6	1666.7	1
21	CNBJ5AC	0.1	25	0.8	12	10000	3.42	6.98	877	3368	10	6	1666.7	1
22	CNBJ5BA	0.1	25	0.8	12	10000	5.9	7.09	872	4398	10	2	1666.5	1
23	CNBJ5BB	0.1	25	0.8	12	10000	6.2	7.06	874	4398	10	2	1666.5	1
24	CNBJ5BC	0.1	25	0.8	12	10000	6.1	7.1	871	4398	10	2	1666.5	1
25	CNBJ6BA	0.25	20	1.2	13	11440	7.56	7.3	905	3420	10	1.2	297	4
26	CNBJ6BB	0.25	20	1.2	13	11440	7.7	7.44	905	3420	10	1.2	297	4
27	CNBJ6BC	0.25	20	1.2	13	11440	6.66	7.24	908	3420	10	1.2	297	4
28	CNCD1A	10	20	1	11.5	129600	0.91	6.95	800	2925	16	7.5	16200	1
29	CNCD1B	10	20	1	11.5	129600	1.04	7.46	742	2925	16	7.5	16200	1
30	CNCD1C	10	20	1	11.5	129600	4.8	6.99	746	2925	16	7.5	16200	1
31	CNCD2A	5	15	1	12	49000	0.27	6.9	670	2300	18	7	4083.333	1
32	CNCD2B	5	15	1	12	49000	0.34	7.08	643	2300	18	7	4083.333	1

33	CNCD2C	5	15	1	12	49000	0.5	7.19	638	2300	18	7	4083.333	1
34	CNCD3A	3	10	0.35	-	41040	2.07	7.08	750	3728	26	-	10260	-
35	CNCD3B	3	10	0.35	-	41040	-	-	-	3728	26	-	10260	-
36	CNCD3C	3	10	0.35	-	41040	2.12	6.88	745	3728	26	-	10260	-
37	CNCD4A	2	10	0.3	14	16250	0.45	7	683	2960	13	7.8	5416.667	1
38	CNCD4B	2	10	0.3	14	16250	0.31	6.96	686	2960	13	7.8	5416.667	1
39	CNCD4C	2	10	0.3	14	16250	6.8	6.93	708	2960	13	7.8	5416.667	1
40	CNCQ1A	0.2	12	0.23	12.5	6200	0.72	-	-	2467	20	8	3100	1
41	CNCQ1B	0.2	12	0.23	12.5	6200	2.41	-	-	2467	20	8	3100	1
42	CNCQ1C	0.2	12	0.23	12.5	6200	1.2	-	-	2467	20	8	3100	1
43	CNCQ2A	2.5	15	0.4	20.5	350000	3.9	7.01	942	3246	21	10.5	43750	1
44	CNCQ2B	2.5	15	0.4	20.5	350000	1.2	7.22	920	3246	21	10.5	43750	1
45	CNCQ2C	2.5	15	0.4	20.5	350000	0.12	6.82	893	3246	21	10.5	43750	1
46	CNCQ3A	5	16.1	0.6	12	31552	0.32	7.06	837	4478	-	-	-	0.2
47	CNCQ3B	5	16.1	0.6	12	31552	0.41	7	843	4478	-	-	-	0.2
48	CNCQ3C	5	16.1	0.6	12	31552	0.29	6.84	835	4478	-	-	-	0.2
49	CNCQ4A	0.2	13.5	0.22	12	28000	3.25	7.04	831	2526	-	-	-	0.2
50	CNCQ4B	0.2	13.5	0.22	12	28000	2.32	7	843	2526	-	-	-	0.2
51	CNCQ4C	0.2	13.5	0.22	12	28000	3.02	7	834	2526	-	-	-	0.2
52	CNCS1A	0.75	5.5	0.55	10.5	120000	0.1	6.71	458	2956	13.5	-	30000	0.5
53	CNCS1B	0.75	5.5	0.55	10.5	120000	0.1	6.75	458	2956	13.5	-	30000	0.5

54	CNCS1C	0.75	5.5	0.55	10.5	120000	0.4	6.63	456	2956	13.5	-	30000	0.5
55	CNCS2A	1	7.5	0.1	6.5	17325	0.23	7.17	481	5676	7.7	5.5	-	0.6
56	CNCS2B	1	7.5	0.1	6.5	17325	3.4	7.14	474	5676	7.7	5.5	-	0.6
57	CNCS2C	1	7.5	0.1	6.5	17325	5.4	7.23	473	5676	7.7	5.5	-	0.6
58	CNCS3AA	1	20	1	12	-	0.31	6.9	600	5050	-	-	-	-
59	CNCS3AB	1	20	1	12	-	0.4	6.76	595	5050	-	-	-	-
60	CNCS3AC	1	20	1	12	-	0.56	6.95	594	5050	-	-	-	-
61	CNCS3BA	1	20	1	12	-	0.28	6.8	583	3032	-	-	-	-
62	CNCS3BB	1	20	1	12	-	0.12	6.69	580	3032	-	-	-	-
63	CNCS3BC	1	20	1	12	-	0.26	6.8	578	3032	-	-	-	-
64	CNCS4A	8	20	1.5			0.22	7.01	513	3894	-	-	10000	-
65	CNCS4B	8	20	1.5			1.76	6.88	504	3894	-	-	10000	-
66	CNCS4C	8	20	1.5			0.63	7.03	511	3894	-	-	10000	-
67	CNDL1AA	0.5	6.5	0.75	24	8333	1.8	6.5	3690	6680	30	20	-	-
68	CNDL1AB	0.5	6.5	0.75	24	8333	4.18	6.48	3870	6680	30	20	-	-
69	CNDL1AC	0.5	6.5	0.75	24	8333	5.8	6.52	4170	6680	30	20	-	-
70	CNDL1BA	0.5	6.5	0.75	24	8333	0.57	6.5	3690	4744	30	20	-	-
71	CNDL1BB	0.5	6.5	0.75	24	8333	2.4	6.51	3680	4744	30	20	-	-
72	CNDL1BC	0.5	6.5	0.75	24	8333	5.3	6.49	3880	4744	30	20	-	-
73	CNDL2AA	0.83	17	0.9	-	45356	1.67	6.8	895	5620	20	-	11339	0.2
74	CNDL2AB	0.83	17	0.9	-	45356	1.56	6.78	874	5620	20	-	11339	0.2

75	CNDL2AC	0.83	17	0.9	-	45356	1.51	6.66	902	5620	20	-	11339	0.2
76	CNDL2BA	0.83	17	0.9	-	45356	1.86	7.1	838	4836	20	-	11339	0.2
77	CNDL2BB	0.83	17	0.9	-	45356	2.48	7.24	832	4836	20	-	11339	0.2
78	CNDL2BC	0.83	17	0.9	-	45356	3.4	7.28	831	4836	20	-	11339	0.2
79	CNHB1AA	-	-	-	-	69638	0.05	6.96	807	9992	-	-	8704.75	0.75
80	CNHB1AB	-	-	-	-	69638	0.29	6.96	716	9992	-	-	8704.75	0.75
81	CNHB1AC	-	-	-	-	69638	0.15	6.96	654	9992	-	-	8704.75	0.75
82	CNHB1BA	-	-	-	-	69638	0.05	6.96	807	9992	-	-	8704.75	0.75
83	CNHB1BB	-	-	-	-	69638	0.29	6.96	716	9992	-	-	8704.75	0.75
84	CNHB1BC	-	-	-	-	69638	0.15	6.96	654	9992	-	-	8704.75	0.75
85	CNHB2AA	-	-	-	-	546729	0.72	6.86	691	9796	-	-	-	-
86	CNHB2AB	-	-	-	-	546729	5.18	6.86	623	9796	-	-	-	-
87	CNHB2AC	-	-	-	-	546729	1.4	6.86	627	9796	-	-	-	-
88	CNHB2BA	-	-	-	-	546729	0.6	6.8	762	9796	-	-	-	-
89	CNHB2BB	-	-	-	-	546729	0.4	6.8	669	9796	-	-	-	-
90	CNHB2BC	-	-	-	-	546729	4.04	6.8	644	9796	-	-	-	-
91	CNHB3A	8	20	1	25	-	0.71	7.27	935	5854	22.5	16	-	0.75
92	CNHB3B	8	20	1	25	-	6.54	7.27	925	5854	22.5	16	-	0.75
93	CNHB3C	8	20	1	25	-	4.31	7.27	977	5854	22.5	16	-	0.75
94	CNJN1A	1.5	6	0.5	12.8	89813	1	6.9	1457	3876	13	4.8	44906.5	0.75
95	CNJN1B	1.5	6	0.5	12.8	89813	3.17	7.15	1448	3876	13	4.8	44906.5	0.75

96	CNJN1C	1.5	6	0.5	12.8	89813	1.9	7.02	1406	3876	13	4.8	44906.5	0.75
97	CNJN2A	3.5	13	0.45	14.6	79857	1.5	6.78	1467	3486	12	9.6	19964.25	1
98	CNJN2B	3.5	13	0.45	14.6	79857	0.61	7.43	1430	3486	12	9.6	19964.25	1
99	CNJN2C	3.5	13	0.45	14.6	79857	1.29	7.25	1419	3486	12	9.6	19964.25	1
100	CNJN3A	2	11	0.5	13.84	38132	0.52	7.07	1452	5108	12.9	8.32	9533	1
101	CNJN3B	2	11	0.5	13.84	38132	4.12	7.2	1438	5108	12.9	8.32	9533	1
102	CNJN3C	2	11	0.5	13.84	38132	4.33	7.08	1444	5108	12.9	8.32	9533	1
103	CNJN4A	0.3	11.5	0.25	19.58	21600	0.58	7.32	1200	2222	12.9	8.95	10800	1
104	CNJN4B	0.3	11.5	0.25	19.58	21600	5.23	7.43	1184	2222	12.9	8.95	10800	1
105	CNJN4C	0.3	11.5	0.25	19.58	21600	8.03	7.42	1027	2222	12.9	8.95	10800	1
106	CNQD1A	1	10	0.3	27	-	4.81	6.72	2110	3688	15	4	-	1
107	CNQD1B	1	10	0.3	27	-	4.27	6.62	2102	3688	15	4	-	1
108	CNQD1C	1	10	0.3	27	-	4.25	6.83	2110	3688	15	4	-	1
109	CNQD2A	1.3	13	0.3	26.3	68774	3.48	7.01	3300	4368	20	16.5	34387	0.6
110	CNQD2B	1.3	13	0.3	26.3	68774	3.11	6.88	3290	4368	20	16.5	34387	0.6
111	CNQD2C	1.3	13	0.3	26.3	68774	1.23	6.88	3260	4368	20	16.5	34387	0.6
112	CNQD3AA	4	6	3	24.2	-	2.53	7.31	-	-	11.5	10	46000	3.5
113	CNQD3AB	4	6	3	24.2	-	2.39	7.24	-	-	11.5	10	46000	3.5
114	CNQD3AC	4	6	3	24.2	-	2.15	7.32	-	-	11.5	10	46000	3.5
115	CNQD4AA	1.6	-	0.75	-	-	2.2	7.34	-	-	21	21.3	42291.5	1.25
116	CNQD4AB	1.6	-	0.75	-	-	2.67	7.02	-	-	21	21.3	42291.5	1.25

117	CNQD4AC	1.6	-	0.75	-	-	2.02	7.03	-	-	21	21.3	42291.5	1.25
118	CNSH1A	2.7	14	1.25	-	6366.7	-	7.24	595	2912	9	4.7	6366.7	0.75
119	CNSH1B	2.7	14	1.25	-	6366.7	-	7.48	619	2912	9	4.7	6366.7	0.75
120	CNSH1C	2.7	14	1.25	-	6366.7	-	7.07	603	2912	9	4.7	6366.7	0.75
121	CNSH2A	10.8	-	0.36	9.5	448000	-	7.48	824	2366	13.4	6.7	56000	0.75
122	CNSH2B	10.8	-	0.36	9.5	448000	-	7.37	820	2366	13.4	6.7	56000	0.75
123	CNSH2C	10.8	-	0.36	9.5	448000	-	7.1	822	2366	13.4	6.7	56000	0.75
124	CNSH3A	3.11	11.7	0.3	9.5	55598.4	-	6.95	715	5378	-	1.67	1158.3	-
125	CNSH3B	3.11	11.7	0.3	9.5	55598.4	-	6.86	691	5378	-	1.67	1158.3	-
126	CNSH3C	3.11	11.7	0.3	9.5	55598.4	-	6.93	679	5378	-	1.67	1158.3	-
127	CNSH4A	0.578	5.2	0.165	-	-	-	7.03	585	6026	10	6.93	-	0.75
128	CNSH4B	0.578	5.2	0.165	-	-	-	7.16	529	6026	10	6.93	-	0.75
129	CNSH4C	0.578	5.2	0.165	-	-	-	6.99	560	6026	10	6.93	-	0.75
130	CNSH5A	0.5	17	0.35	-	-	-	7.15	396	3286	10	6.93	-	1
131	CNSH5B	0.5	17	0.35	-	-	-	7.76	375	3286	10	6.93	-	1
132	CNSH5C	0.5	17	0.35	-	-	-	7.11	387	3286	10	6.93	-	1
133	CNSY1A	2	9.5	0.3	15	4000	4	7.41	2520	-	5	7	2000	0
134	CNSY1B	2	9.5	0.3	15	4000	4	7.41	-	-	5	7	2000	0
135	CNSY1C	2	9.5	0.3	15	4000	4	7.41	-	-	5	7	2000	0
136	CNSY1S	2	9.5	0.3	15	4000	-	-	-	-	-	-	-	0
137	CNSY2A	0.03	10	0.2	14.5	8000	3.3	6.53	410	2794	10	10	4000	1

138	CNSY3A	0.54	6.76	0.07	14.5	7200	3.25	6.98	426	-	14	10	3600	0.36
139	CNSY3B	0.54	6.76	0.07	14.5	7200	4.78	7.51	427	-	14	10	3600	0.36
140	CNSY3C	0.54	6.76	0.07	14.5	7200	4.54	7.45	412	-	14	10	3600	0.36
141	CNSY4S	4	7.5	0.5	24	25000	-	-	-	-	-	-	-	0
142	CNSZ1A	1	12.5	0.1	22	-	7.81	6.54	726	-	12.5	14.7	-	0.75
143	CNSZ1B	1	12.5	0.1	22	-	7.81	6.55	742	-	12.5	14.7	-	0.75
144	CNSZ1C	1	12.5	0.1	22	-	7.62	6.67	753	-	12.5	14.7	-	0.75
145	CNSZ2A	0.85	11.5	0.7	13.9	40000	2.91	6.47	14230	2806	15	-	-	0.5
146	CNSZ2B	0.85	11.5	0.7	13.9	40000	6.19	6.4	14290	2806	15	-	-	0.5
147	CNSZ2C	0.85	11.5	0.7	13.9	40000	6.45	6.53	14250	2806	15	-	-	0.5
148	CNSZ3AA	2	12	0.2	13	24178	3.4	6.72	457	3860	13	8	24178	0.6
149	CNSZ3AB	2	12	0.2	13	24178	3.26	7.86	451	3860	13	8	24178	0.6
150	CNSZ3AC	2	12	0.2	13	24178	3.32	6.34	472	3860	13	8	24178	0.6
151	CNSZ3BA	2	12	0.2	13	24178	6.93	7.79	569	-	16	12	17089	0
152	CNSZ3BB	2	12	0.2	13	24178	3.03	7.42	485	-	16	12	17089	0
153	CNSZ3BC	2	12	0.2	13	24178	7.06	7.88	505	-	16	12	17089	0
154	CNSZ4AA	2	10	1.2	14	21658	2.93	6.31	631	3014	12	5.2	2707.25	0.75
155	CNSZ4AB	2	10	1.2	14	21658	3.14	6.34	637	3014	12	5.2	2707.25	0.75
156	CNSZ4AC	2	10	1.2	14	21658	2.91	6.38	649	3014	12	5.2	2707.25	0.75
157	CNSZ4BA	2	10	1.2	14	21658	6.75	7.08	553	-	16.5	12	2707.25	0
158	CNWH1A	0.35	9.5	0.5	10.5	17200	1.4	6.77	618	2242	13.5	5.5	-	1.1

159	CNWH1B	0.35	9.5	0.5	10.5	17200	4.2	7.01	622	2242	13.5	5.5	-	1.1
160	CNWH1C	0.35	9.5	0.5	10.5	17200	2.4	7.1	618	2242	13.5	5.5	-	1.1
161	CNWH2A	14	18	0.1	7.5	87500	0.02	7.28	802	3330	7	5.5	3125	0.75
162	CNWH2B	14	18	0.1	7.5	87500	0.05	7.14	742	3330	7	5.5	3125	0.75
163	CNWH2C	14	18	0.1	7.5	87500	0.9	7.23	746	3330	7	5.5	3125	0.75
164	CNWH3A	1	7.5	0.5	10	12168	0.38	7.09	504	3244	-	5.84	11458	-
165	CNWH3B	1	7.5	0.5	10	12168	0.78	6.96	482	3244	-	5.84	11458	-
166	CNWH3C	1	7.5	0.5	10	12168	1.22	6.83	470	3244	-	5.84	11458	-
167	CNWH4A	2	4.5	0.2	-	17200	0.8	7.2	638	4742	12	5.5	31529	0.5
168	CNWH4B	2	4.5	0.2	-	17200	6.2	7.1	603	4742	12	5.5	31529	0.5
169	CNWH4C	2	4.5	0.2	-	17200	5.9	7.09	602	4742	12	5.5	31529	0.5
170	CNWX1AA	5	13	1.5	12.7	10517	0.3	7.2	1102	2772	20.5	5.1	5258.5	5
171	CNWX1AB	5	13	1.5	12.7	10517	1.66	7.36	1009	2772	20.5	5.1	5258.5	5
172	CNWX1AC	5	13	1.5	12.7	10517	1.69	6.99	1015	2772	20.5	5.1	5258.5	5
173	CNWX1BA	5	13	1.5	-	-	2.55	7.14	1070	3724	-	-	-	-
174	CNWX1BB	5	13	1.5	-	-	6.63	7.24	1059	3724	-	-	-	-
175	CNWX1BC	5	13	1.5	-	-	1.9	6.98	1070	3724	-	-	-	-
176	CNWX2A	0.5	10	0.5	12.7	67500	0.34	6.92	1241	2768	20.5	5.1	-	5
177	CNWX2B	0.5	10	0.5	12.7	67500	0.08	6.85	1240	2768	20.5	5.1	-	5
178	CNWX2C	0.5	10	0.5	12.7	67500	0.26	7.1	1245	2768	20.5	5.1	-	5
179	CNWX3AA	0.5	10	0.5	19.62	17000	9.23	7.33	2037	6920	16.6	6.18	-	4

180	CNWX3AB	0.5	10	0.5	19.62	17000	9.68	7.53	2062	6920	16.6	6.18	-	4
181	CNWX3AC	0.5	10	0.5	19.62	17000	9.12	7.27	2074	6920	16.6	6.18	-	4
182	CNWX3BA	0.35	6.5	0.05	10	14400	9.18	7.45	2453	1972	12.5	-	3600	3
183	CNWX3BB	0.35	6.5	0.05	10	14400	8.41	7.2	1745	1972	12.5	-	3600	3
184	CNWX3BC	0.35	6.5	0.05	10	14400	8.2	7.2	1766	1972	12.5	-	3600	3
185	CNWX4A	2.1	12	0.22	25.29	121200	3.58	7.43	917	3092	18.42	15.32	60600	1
186	CNWX4B	2.1	12	0.22	25.29	121200	1.21	7.12	1807	3092	18.42	15.32	60600	1
187	CNWX4C	2.1	12	0.22	25.29	121200	3.36	7.15	1800	3092	18.42	15.32	60600	1
188	CNXA1A	0.43	6.5	0.1	18	26900	2.03	7.34	1116	3958	22	2.3	2690	0.9
189	CNXA1B	0.43	6.5	0.1	18	26900	1.55	7.26	1116	3958	22	2.3	2690	0.9
190	CNXA1C	0.43	6.5	0.1	18	26900	0.69	7.19	1108	3958	22	2.3	2690	0.9
191	CNXA2A	5	13	1.1	15.98	90936	0.33	7.12	855	6438	13.7	7.94	4546.8	0.9
192	CNXA2B	5	13	1.1	15.98	90936	0.7	7.14	940	6438	13.7	7.94	4546.8	0.9
193	CNXA2C	5	13	1.1	15.98	90936	0.58	7.16	949	6438	13.7	7.94	4546.8	0.9
194	CNXA3A	1	10	0.3	22	80899	0.43	7	929	4996	15.64	8.89	20224.75	0.75
195	CNXA3B	1	10	0.3	22	80899	0.51	7.03	920	4996	15.64	8.89	20224.75	0.75
196	CNXA3C	1	10	0.3	22	80899	0.35	7.09	943	4996	15.64	8.89	20224.75	0.75
197	CNXA4A	0.75	9.5	0.9	22	41189	1.47	7.41	730	3814	16	12.36	6864.833	0.78
198	CNXA4B	0.75	9.5	0.9	22	41189	1.1	7.47	843	3814	16	12.36	6864.833	0.78
199	CNXA4C	0.75	9.5	0.9	22	41189	0.9	7.5	843	3814	16	12.36	6864.833	0.78
200	CNXM1A	5	13	1.5	14	10500	0.68	6.9	3510	2852	10	3.5	3500	0.55

201	CNXM1B	5	13	1.5	14	10500	1.58	7.08	3250	2852	10	3.5	3500	0.55
202	CNXM1C	5	13	1.5	14	10500	1.03	7.04	3260	2852	10	3.5	3500	0.55
203	CNXM2A	1	19	1.5	22	51400	1.04	6.9	2829	2890	20	10	7342.857	0.65
204	CNXM2B	1	19	1.5	22	51400	1.96	6.92	2665	2890	20	10	7342.857	0.65
205	CNXM2C	1	19	1.5	22	51400	5.25	6.83	2445	2890	20	10	7342.857	0.65
206	CNXM3A	0.5	8.5	0.65	21	32275	1.03	6.96	6410	2066	15	15.5	-	0.75
207	CNXM3B	0.5	8.5	0.65	21	32275	1.17	7.08	5620	2066	15	15.5	-	0.75
208	CNXM3C	0.5	8.5	0.65	21	32275	1.37	7.1	5450	2066	15	15.5	-	0.75
209	CNXM4A	2	12.5	1.2	17.5	11000	2.13	6.72	1450	3710	16.5	6	-	0
210	CNXM4B	2	12.5	1.2	17.5	11000	2	6.83	1504	3710	16.5	6	-	0
211	CNXM4C	2	12.5	1.2	17.5	11000	1.98	7.09	1468	3710	16.5	6	-	0

Table S4. alpha-diversity of 211 samples

No.	Sample ID	Richness	Chao1	H index	Simpson index	J index
1	CNBJ1AA	2657	4713.25	6.24	140.34	0.79
2	CNBJ1AB	2787	4639.45	6.27	142.91	0.79
3	CNBJ1AC	2654	4437.51	6.25	144.13	0.79
4	CNBJ1BA	2723	4622.62	6.23	104.09	0.79
5	CNBJ1BB	2769	4444.78	6.18	90.45	0.78
6	CNBJ1BC	2686	4286.07	6.11	78.16	0.77
7	CNBJ1CA	2544	4223.76	6.09	109.86	0.78
8	CNBJ1CB	2481	4088.55	6.03	102.31	0.77
9	CNBJ1CC	2423	4044.50	6.00	96.97	0.77
10	CNBJ2A	2829	4716.00	6.36	173.47	0.80
11	CNBJ2B	2806	4524.97	6.38	183.96	0.80
12	CNBJ2C	2854	4820.52	6.31	159.31	0.79
13	CNBJ3A	2434	4131.87	6.04	90.96	0.78
14	CNBJ3B	2409	3970.66	6.01	87.89	0.77
15	CNBJ3C	2326	3799.31	5.90	68.64	0.76
16	CNBJ4A	2268	3458.93	5.94	99.60	0.77
17	CNBJ4B	2164	3285.35	5.91	102.84	0.77
18	CNBJ4C	2171	3700.92	5.91	102.87	0.77
19	CNBJ5AA	3002	5058.52	6.35	131.92	0.79
20	CNBJ5AB	2952	4729.32	6.38	143.05	0.80
21	CNBJ5AC	3008	4879.81	6.40	137.19	0.80
22	CNBJ5BA	2936	4785.24	6.31	124.01	0.79
23	CNBJ5BB	2877	4635.72	6.25	116.54	0.78
24	CNBJ5BC	2893	4727.62	6.30	118.74	0.79
25	CNBJ6BA	2594	4105.73	6.38	201.53	0.81
26	CNBJ6BB	2656	4198.52	6.36	174.88	0.81
27	CNBJ6BC	2579	4357.18	6.13	106.48	0.78
28	CNCD1A	3235	5323.66	6.49	153.02	0.80
29	CNCD1B	3238	5499.03	6.45	139.42	0.80
30	CNCD1C	3303	5490.16	6.46	132.62	0.80
31	CNCD2A	3093	5485.16	6.33	124.15	0.79
32	CNCD2B	2966	5187.19	6.26	137.59	0.78
33	CNCD2C	2891	4830.24	6.31	136.61	0.79
34	CNCD3A	2839	4645.40	6.38	164.14	0.80
35	CNCD3B	2686	4404.08	6.35	172.81	0.80

36	CNCD3C	2740	4694.25	6.35	173.65	0.80
37	CNCD4A	3005	5082.97	6.49	214.26	0.81
38	CNCD4B	2987	4824.68	6.47	195.38	0.81
39	CNCD4C	3002	4819.77	6.42	172.88	0.80
40	CNCQ1A	2528	4248.56	6.15	136.49	0.78
41	CNCQ1B	2512	4343.66	6.09	124.13	0.78
42	CNCQ1C	2611	4371.30	6.11	116.41	0.78
43	CNCQ2A	2905	4904.55	6.26	133.01	0.79
44	CNCQ2B	2861	5002.88	6.29	144.96	0.79
45	CNCQ2C	3167	5540.09	6.43	164.38	0.80
46	CNCQ3A	2543	4701.22	6.12	143.28	0.78
47	CNCQ3B	2699	4802.62	6.15	144.38	0.78
48	CNCQ3C	3221	5803.11	6.37	154.38	0.79
49	CNCQ4A	3094	5510.03	6.31	112.39	0.78
50	CNCQ4B	3005	5487.53	6.25	105.32	0.78
51	CNCQ4C	2987	5208.42	6.29	109.91	0.79
52	CNCS1A	2605	4660.45	6.00	97.92	0.76
53	CNCS1B	2855	5078.42	6.20	122.90	0.78
54	CNCS1C	2627	4472.07	5.99	91.99	0.76
55	CNCS2A	2453	4463.81	5.89	85.82	0.75
56	CNCS2B	2284	3796.54	5.77	75.58	0.75
57	CNCS2C	2407	4140.29	5.81	76.91	0.75
58	CNCS3AA	2990	5188.49	6.31	126.56	0.79
59	CNCS3AB	2950	5098.61	6.33	141.21	0.79
60	CNCS3AC	3058	5140.48	6.38	138.68	0.79
61	CNCS3BA	3030	5308.42	6.36	137.29	0.79
62	CNCS3BB	2733	4995.78	6.18	117.91	0.78
63	CNCS3BC	3029	5341.64	6.35	134.78	0.79
64	CNCS4A	2198	3869.03	5.83	101.56	0.76
65	CNCS4B	2143	3674.90	5.86	106.38	0.76
66	CNCS4C	2268	3722.50	5.94	115.60	0.77
67	CNDL1AA	2067	3719.08	5.20	25.57	0.68
68	CNDL1AB	2232	3643.44	5.29	28.21	0.69
69	CNDL1AC	1933	3277.53	5.18	28.92	0.68
70	CNDL1BA	2012	3489.82	5.04	21.10	0.66
71	CNDL1BB	1980	3277.85	5.34	35.24	0.70
72	CNDL1BC	1902	3215.50	5.17	27.89	0.68
73	CNDL2AA	1455	2564.45	4.49	15.76	0.62

74	CNDL2AB	1315	2380.78	4.37	15.79	0.61
75	CNDL2AC	1286	2354.48	4.37	17.08	0.61
76	CNDL2BA	1406	2225.55	4.68	22.72	0.65
77	CNDL2BB	1424	2361.51	4.57	18.62	0.63
78	CNDL2BC	1408	2402.73	4.53	17.15	0.63
79	CNHB1AA	3102	5290.86	6.40	147.85	0.80
80	CNHB1AB	3010	5045.23	6.35	143.62	0.79
81	CNHB1AC	2921	4898.23	6.32	141.94	0.79
82	CNHB1BA	3167	5286.14	6.46	152.22	0.80
83	CNHB1BB	3159	5185.74	6.49	167.39	0.81
84	CNHB1BC	3093	5262.00	6.45	170.27	0.80
85	CNHB2AA	3038	5208.99	6.34	125.39	0.79
86	CNHB2AB	2948	5075.25	6.29	127.21	0.79
87	CNHB2AC	2913	4969.27	6.35	142.30	0.80
88	CNHB2BA	3102	5291.94	6.40	140.82	0.80
89	CNHB2BB	3055	4969.51	6.42	161.87	0.80
90	CNHB2BC	3082	5281.00	6.38	158.20	0.79
91	CNHB3A	3147	5116.81	6.57	212.15	0.82
92	CNHB3B	2776	4666.62	6.27	142.85	0.79
93	CNHB3C	2158	2849.22	6.10	115.50	0.79
94	CNJN1A	1928	3351.16	5.36	51.86	0.71
95	CNJN1B	1931	3140.41	5.39	50.88	0.71
96	CNJN1C	1912	3302.45	5.36	51.46	0.71
97	CNJN2A	2065	3446.68	5.23	33.27	0.69
98	CNJN2B	2089	3384.27	5.21	30.93	0.68
99	CNJN2C	2074	3674.04	5.25	34.50	0.69
100	CNJN3A	2287	3947.35	5.70	47.62	0.74
101	CNJN3B	2395	3979.08	5.89	67.87	0.76
102	CNJN3C	2262	3669.55	5.71	54.99	0.74
103	CNJN4A	2474	4190.63	6.07	136.81	0.78
104	CNJN4B	2436	4358.73	6.08	141.10	0.78
105	CNJN4C	2470	4195.82	6.11	151.67	0.78
106	CNQD1A	2804	4652.19	6.22	97.20	0.78
107	CNQD1B	2726	4481.11	6.17	94.31	0.78
108	CNQD1C	2744	4468.30	6.24	110.52	0.79
109	CNQD2A	2606	4400.27	5.97	63.94	0.76
110	CNQD2B	2523	4414.19	6.00	80.42	0.77
111	CNQD2C	2572	4249.96	5.97	72.37	0.76

112	CNQD3AA	2134	3710.44	5.69	68.33	0.74
113	CNQD3AB	2198	3665.61	5.89	90.00	0.77
114	CNQD3AC	2231	3781.59	5.97	103.56	0.77
115	CNQD4AA	2525	3960.75	6.08	103.69	0.78
116	CNQD4AB	2372	3825.77	5.66	40.93	0.73
117	CNQD4AC	2391	3994.51	5.81	61.32	0.75
118	CNSH1A	2562	4249.18	6.09	126.77	0.78
119	CNSH1B	2626	4631.02	6.12	128.34	0.78
120	CNSH1C	2372	4176.15	6.04	128.33	0.78
121	CNSH2A	2990	5053.08	6.38	185.32	0.80
122	CNSH2B	2970	5062.56	6.38	186.84	0.80
123	CNSH2C	3018	5088.85	6.40	192.33	0.80
124	CNSH3A	2388	3940.27	5.84	63.62	0.75
125	CNSH3B	2567	4431.93	5.86	61.46	0.75
126	CNSH3C	2429	4067.08	5.93	71.40	0.76
127	CNSH4A	2571	4381.57	6.23	166.32	0.79
128	CNSH4B	2504	4145.99	6.20	158.27	0.79
129	CNSH4C	2494	4181.53	6.19	157.72	0.79
130	CNSH5A	2204	3564.24	5.76	68.12	0.75
131	CNSH5B	2233	3560.23	5.78	74.03	0.75
132	CNSH5C	2209	3636.26	5.73	69.08	0.74
133	CNSY1A	2557	4492.78	5.97	106.17	0.76
134	CNSY1B	2569	4587.27	5.95	102.26	0.76
135	CNSY1C	2371	4025.56	5.83	88.87	0.75
136	CNSY1S	2840	5095.41	6.18	142.75	0.78
137	CNSY2A	2280	3832.50	5.91	111.13	0.76
138	CNSY3A	3152	5135.12	6.52	209.27	0.81
139	CNSY3B	2976	4978.52	6.47	211.55	0.81
140	CNSY3C	3464	5748.01	6.73	260.27	0.83
141	CNSY4S	2935	4915.99	6.05	78.10	0.76
142	CNSZ1A	2771	4565.08	6.26	154.19	0.79
143	CNSZ1B	2777	4506.17	6.26	150.65	0.79
144	CNSZ1C	2828	4675.45	6.33	164.74	0.80
145	CNSZ2A	1576	2785.62	4.80	22.69	0.65
146	CNSZ2B	1640	2844.92	4.83	23.09	0.65
147	CNSZ2C	1608	2992.98	4.84	23.44	0.66
148	CNSZ3AA	2771	4564.52	6.36	196.84	0.80
149	CNSZ3AB	2919	4783.29	6.44	202.46	0.81

150	CNSZ3AC	2790	4604.46	6.41	203.28	0.81
151	CNSZ3BA	2720	4538.33	6.26	179.57	0.79
152	CNSZ3BB	2719	4504.53	6.24	164.06	0.79
153	CNSZ3BC	2707	4511.96	6.28	178.61	0.79
154	CNSZ4AA	2053	3407.69	5.67	59.55	0.74
155	CNSZ4AB	2132	3533.07	5.69	54.26	0.74
156	CNSZ4AC	2119	3449.05	5.68	53.88	0.74
157	CNSZ4BA	3197	5298.15	6.33	93.95	0.78
158	CNWH1A	2945	4979.02	6.37	178.67	0.80
159	CNWH1B	2748	4400.62	6.29	164.24	0.79
160	CNWH1C	2813	4501.46	6.32	170.44	0.80
161	CNWH2A	2466	4135.53	5.99	92.64	0.77
162	CNWH2B	2466	4249.60	5.95	88.76	0.76
163	CNWH2C	2469	4176.01	5.99	101.17	0.77
164	CNWH3A	2824	4742.51	6.20	113.63	0.78
165	CNWH3B	2904	5011.81	6.25	117.27	0.78
166	CNWH3C	2944	4985.51	6.26	122.67	0.78
167	CNWH4A	2546	4356.61	5.87	85.69	0.75
168	CNWH4B	2455	4336.03	5.71	68.75	0.73
169	CNWH4C	2596	4752.65	5.83	76.02	0.74
170	CNWX1AA	2895	4807.73	6.25	103.53	0.78
171	CNWX1AB	2880	4725.10	6.25	106.75	0.78
172	CNWX1AC	2881	5076.85	6.22	101.28	0.78
173	CNWX1BA	3045	5105.47	6.30	95.40	0.78
174	CNWX1BB	2906	4771.16	6.22	83.14	0.78
175	CNWX1BC	3089	5214.51	6.32	96.96	0.79
176	CNWX2A	2758	4710.57	6.18	98.52	0.78
177	CNWX2B	2984	4772.60	6.42	132.33	0.80
178	CNWX2C	2695	4741.71	6.04	76.29	0.76
179	CNWX3AA	2645	4430.09	6.22	145.94	0.79
180	CNWX3AB	2602	4309.04	6.21	145.64	0.79
181	CNWX3AC	2618	4698.71	6.22	156.22	0.79
182	CNWX3BA	2624	4496.40	6.16	118.36	0.78
183	CNWX3BB	2434	4011.50	5.99	92.44	0.77
184	CNWX3BC	2415	4225.71	5.97	89.84	0.77
185	CNWX4A	3022	5019.50	6.16	76.58	0.77
186	CNWX4B	3056	5291.72	6.24	85.78	0.78
187	CNWX4C	3007	5066.53	6.11	72.44	0.76

188	CNXA1A	3152	5058.83	6.56	211.65	0.81
189	CNXA1B	3103	4996.69	6.62	254.78	0.82
190	CNXA1C	3158	5086.08	6.62	240.99	0.82
191	CNXA2A	2822	5019.82	5.99	55.61	0.75
192	CNXA2B	2849	4862.70	6.18	87.94	0.78
193	CNXA2C	2927	4924.32	6.03	52.59	0.76
194	CNXA3A	3040	5232.60	6.37	135.33	0.79
195	CNXA3B	3023	4992.85	6.40	144.60	0.80
196	CNXA3C	2991	5010.37	6.27	121.65	0.78
197	CNXA4A	3259	5329.47	6.54	159.38	0.81
198	CNXA4B	3072	5163.04	6.37	121.93	0.79
199	CNXA4C	3129	5365.89	6.34	118.47	0.79
200	CNXM1A	2575	4148.88	6.11	99.04	0.78
201	CNXM1B	2482	4042.62	6.04	95.70	0.77
202	CNXM1C	2507	3914.99	6.11	112.18	0.78
203	CNXM2A	2202	3844.05	6.03	98.02	0.78
204	CNXM2B	1955	3338.38	5.82	80.25	0.77
205	CNXM2C	2153	3569.50	5.97	99.71	0.78
206	CNXM3A	2526	4368.99	5.71	58.77	0.73
207	CNXM3B	2423	3940.73	5.59	51.32	0.72
208	CNXM3C	2412	4035.32	5.65	55.79	0.73
209	CNXM4A	2813	5050.81	5.95	48.43	0.75
210	CNXM4B	2775	4776.82	5.96	50.99	0.75
211	CNXM4C	2826	4987.78	5.95	43.89	0.75

Table S5. Members (OTU) in the core community among WWTPs across China

No.	OTUs	Domain	Phylum	Class	Order	Family	Genus
1	OTU_1	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	*Dokdonella*
2	OTU_21	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Chitinophagaceae	*Ferruginibacter*
3	OTU_2	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Saprospiraceae	*Lewinella*
4	OTU_27	Bacteria	Bacteroidetes	Bacteroidia	Bacteroidales	Porphyromonadaceae	*Paludibacter*
5	OTU_15	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Sphingobacteriaceae	*Solitalea*
6	OTU_13	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Saprospiraceae	*Lewinella*
7	OTU_26	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Chitinophagaceae	*Terrimonas*
8	OTU_6	Bacteria	Nitrospirae	Nitrospira	Nitrospirales	Nitrospiraceae	*Nitrospira*
9	OTU_79264	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Thauera*
10	OTU_127	Bacteria	Proteobacteria	Gammaproteobacteria	Chromatiales	Chromatiaceae	*Marichromatium*
11	OTU_69	Bacteria	Ignavibacteriae	Ignavibacteria	Ignavibacteriales	Ignavibacteriaceae	*Ignavibacterium*
12	OTU_60035	Bacteria	Bacteroidetes	Bacteroidia	Bacteroidales	Porphyromonadaceae	*Paludibacter*
13	OTU_47	Bacteria	Proteobacteria	Gammaproteobacteria	Chromatiales	Chromatiaceae	*Thiobaca*
14	OTU_76204	Bacteria	Bacteroidetes	Bacteroidia	Bacteroidales	Marinilabiliaceae	*Mangroviflexus*
15	OTU_88	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Denitratisoma*
16	OTU_63	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Sinobacteraceae	*Steroidobacter*
17	OTU_105	Bacteria	Actinobacteria	Actinobacteria	Acidimicrobiales	Acidimicrobiaceae	*Ilumatobacter*
18	OTU_19	Bacteria	Proteobacteria	Deltaproteobacteria	Myxococcales	Kofleriaceae	*Kofleria*
19	OTU_94397	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Dechloromonas*
20	OTU_30	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Sulfuritalea*

21	OTU_14	Bacteria	Bacteroidetes	Bacteroidia	Bacteroidales	Marinilabiaceae	*Alkaliflexus*
22	OTU_32	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Saprospiraceae	*Lewinella*
23	OTU_129	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Sinobacteraceae	*Steroidobacter*
24	OTU_38	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	*Fulvimonas*
25	OTU_109	Bacteria	Bacteroidetes	Bacteroidia	Bacteroidales	Sunxiuqinia	*Sunxiuqinia*
26	OTU_43	Bacteria	Acidobacteria	Acidobacteria_Gp4	Gp4	Gp4	*Gp4*
27	OTU_18	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Saprospiraceae	*Lewinella*
28	OTU_54	Bacteria	Firmicutes	Clostridia	Clostridiales	Peptostreptococcaceae	*Clostridium XI*
29	OTU_34	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Saprospiraceae	*Haliscomenobacter*
30	OTU_86911	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Comamonadaceae	*Comamonas*
31	OTU_11	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Chitinophagaceae	*Ferruginibacter*
32	OTU_10	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Comamonadaceae	*Comamonas*
33	OTU_56	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Dechloromonas*
34	OTU_20301	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Chitinophagaceae	*Terrimonas*
35	OTU_64195	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Rhodocyclus*
36	OTU_33	Bacteria	Proteobacteria	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingomonas*
37	OTU_17	Bacteria	Bacteroidetes	Flavobacteriia	Flavobacteriales	Flavobacteriaceae	*Cloacibacterium*
38	OTU_125	Bacteria	Acidobacteria	Acidobacteria_Gp4	Gp4	Gp4	*Gp4*
39	OTU_197	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	*Wohlfahrtiimonas*
40	OTU_110	Bacteria	Chloroflexi	Dehalococcoidetes	Dehalogenimonas	Dehalogenimonas	*Dehalogenimonas*
41	OTU_74	Bacteria	Chloroflexi	Caldilineae	Caldilineales	Caldilineaceae	*Caldilinea*
42	OTU_65	Bacteria	Chloroflexi	Chloroflexia	Chloroflexales	Chloroflexaceae	*Heliothrix*
43	OTU_92	Bacteria	Acidobacteria	Acidobacteria_Gp4	Gp4	Gp4	*Gp4*

44	OTU_85	Bacteria	Proteobacteria	Alphaproteobacteria	Rhodobacterales	Rhodobacteraceae	*Roseibaca*
45	OTU_2646	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Comamonadaceae	*Comamonas*
46	OTU_82	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Burkholderiaceae	*Chitinimonas*
47	OTU_79356	Bacteria	Chloroflexi	Dehalococcoidetes	Dehalogenimonas	Dehalogenimonas	*Dehalogenimonas*
48	OTU_315	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	*Dyella*
49	OTU_53382	Bacteria	Proteobacteria	Betaproteobacteria	Gallionellales	Gallionellaceae	*Sideroxydans*
50	OTU_89	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Microbacteriaceae	*Pseudoclavibacter*
51	OTU_23	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Saprospiraceae	*Haliscomenobacter*
52	OTU_137	Bacteria	Bacteroidetes	Bacteroidia	Bacteroidales	Marinilabiliaceae	*Mangroviflexus*
53	OTU_29986	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	*Rhizobacter*
54	OTU_342	Bacteria	Acidobacteria	Acidobacteria_Gp10	Gp10	Gp10	*Gp10*
55	OTU_36652	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Chitinophagaceae	*Terrimonas*
56	OTU_86410	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Azospira*
57	OTU_51123	Bacteria	Proteobacteria	Alphaproteobacteria	Rhizobiales	Hyphomicrobiaceae	*Filomicrobium*
58	OTU_252	Bacteria	Proteobacteria	Alphaproteobacteria	Rhodobacterales	Rhodobacteraceae	*Paracoccus*
59	OTU_4795	Bacteria	Proteobacteria	Betaproteobacteria	Gallionellales	Gallionellaceae	*Sideroxydans*
60	OTU_4739	Bacteria	Proteobacteria	Betaproteobacteria	Gallionellales	Gallionellaceae	*Sideroxydans*
61	OTU_149	Bacteria	Firmicutes	Clostridia	Clostridiales	Lachnospiraceae	*Robinsoniella*
62	OTU_71712	Bacteria	Proteobacteria	Betaproteobacteria	Rhodocyclales	Rhodocyclaceae	*Thauera*
63	OTU_52	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Chitinophagaceae	*Ferruginibacter*

Table S7. ANOSIM results between different treatment process types

	MBR	AAO	SBR	OD	AO	Biofilm	AB process
MBR	0	0.976	0.001	0.001	0.001	0.001	0.001
AAO	-0.1602	0	0.003	0.487	0.001	0.001	0.019
SBR	0.2354	0.2296	0	0.043	0.001	0.001	0.218
OD	0.4092	0.0029	0.0845	0	0.001	0.001	0.002
AO	0.2766	0.3492	0.1769	0.2073	0	0.001	0.002
Biofilm	1	0.8898	0.5589	1	0.7568	0	0.022
AB process	1	0.3741	0.1358	0.5916	0.6314	1	0

The values of upper triangular matrices are the significance value (p-value). The values of lower triangular matrices are R value.

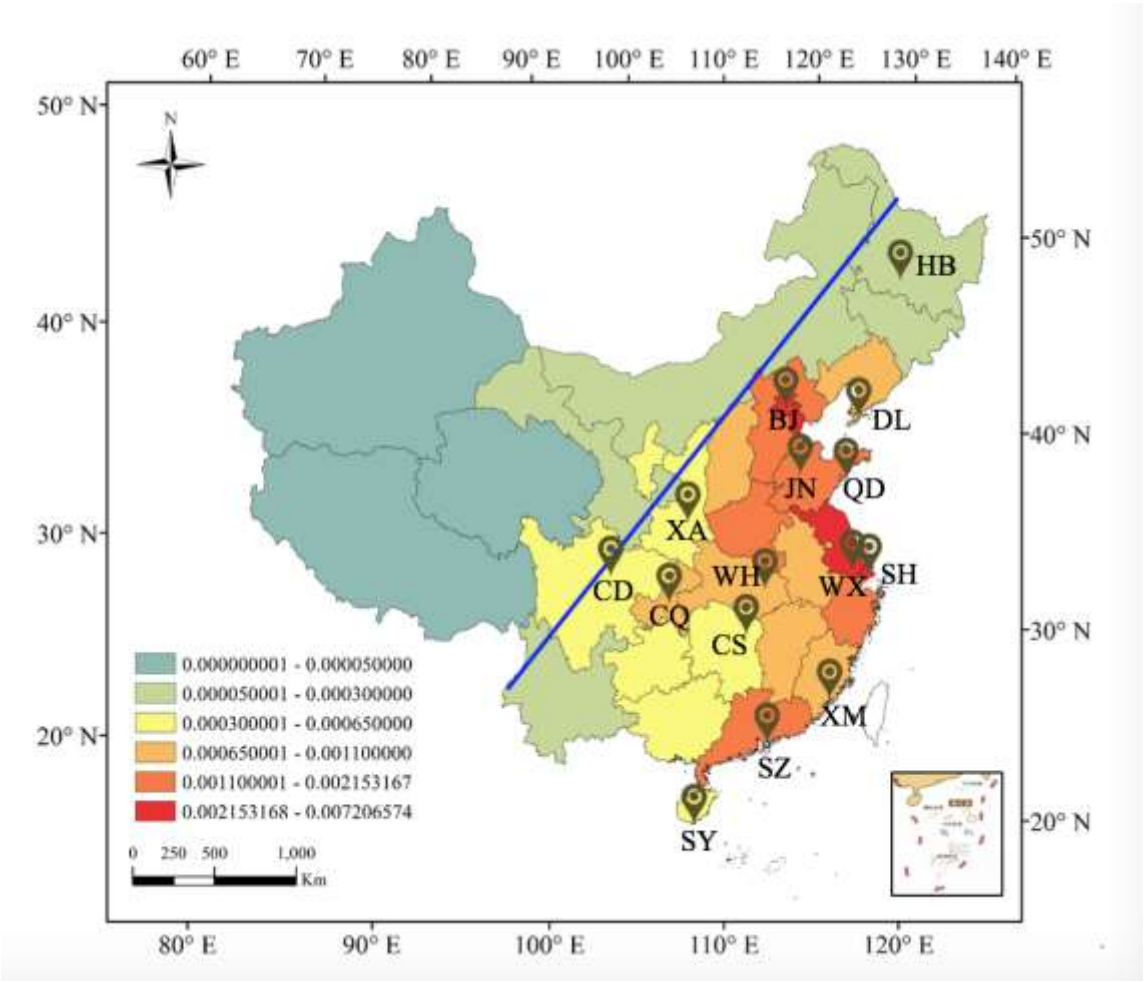


Figure S1 Geographical distribution of 15 sampling cities where activated sludge (AS) samples and environmental data were collected. Blue line represented "Hu Huanyong-Line", which divided population density of China with the "Aihui-Tengchong" line. Cities, provinces and autonomous regions were colored by the density of wastewater treatment plants (WWTPs), which was calculated by dividing total numbers of WWTPs within region by total area of this region. "Hong Kong", "Macau", and "Taiwan" were uncolored due to the lack of data about numbers of WWTPs.

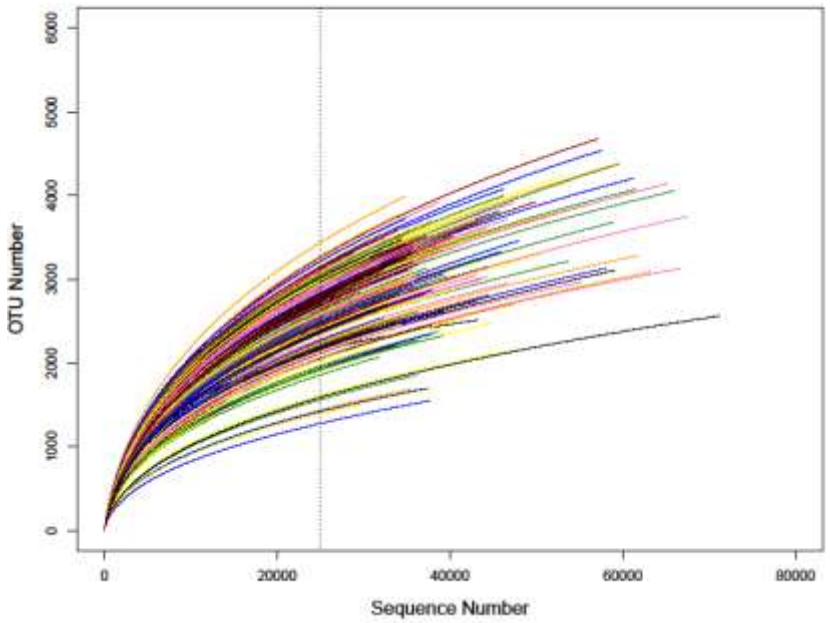


Figure S2 Rarefaction curves of all sequences at sample levels.

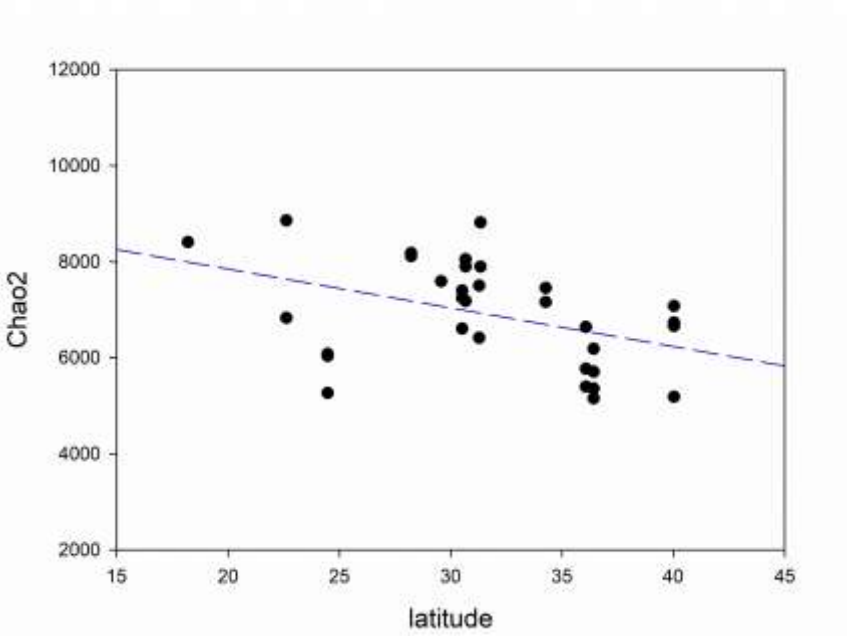


Figure S3 Correlation between latitude and Chao2 using samples collected from AAO process

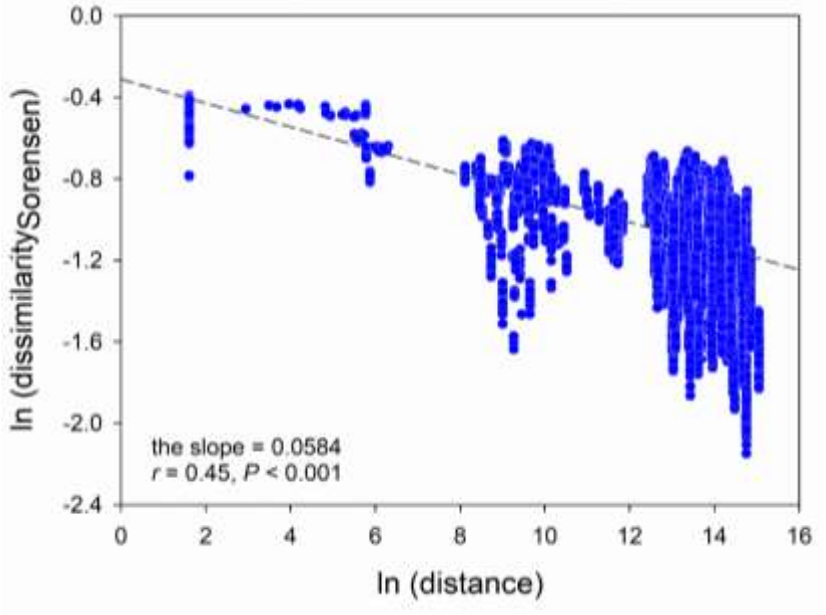
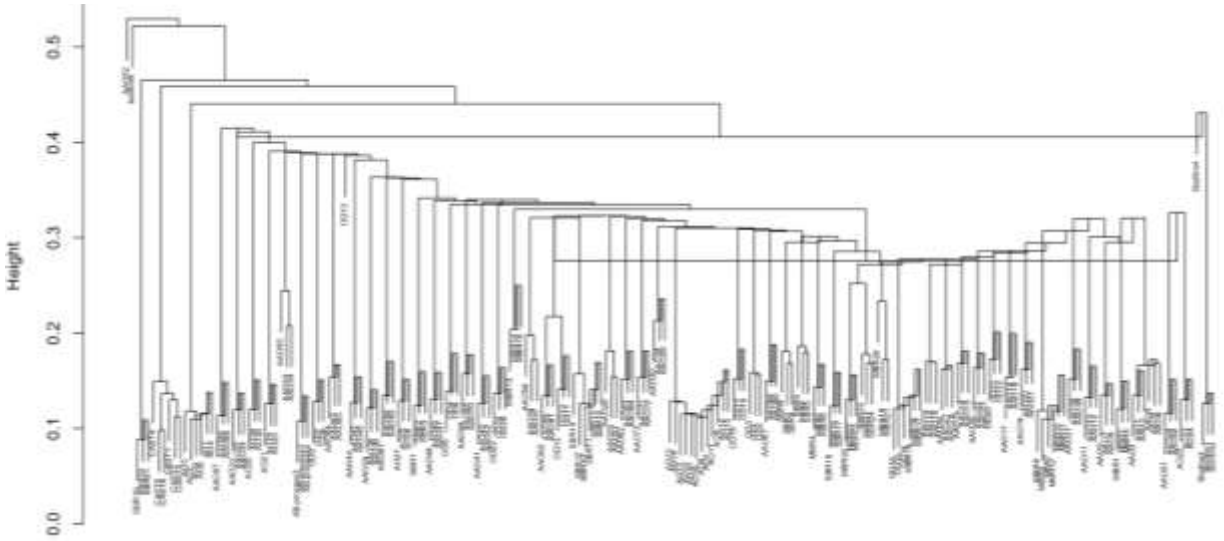


Figure S4 The relationship between taxonomic dissimilarity (Sorensen) and geographic distance

a.



b.

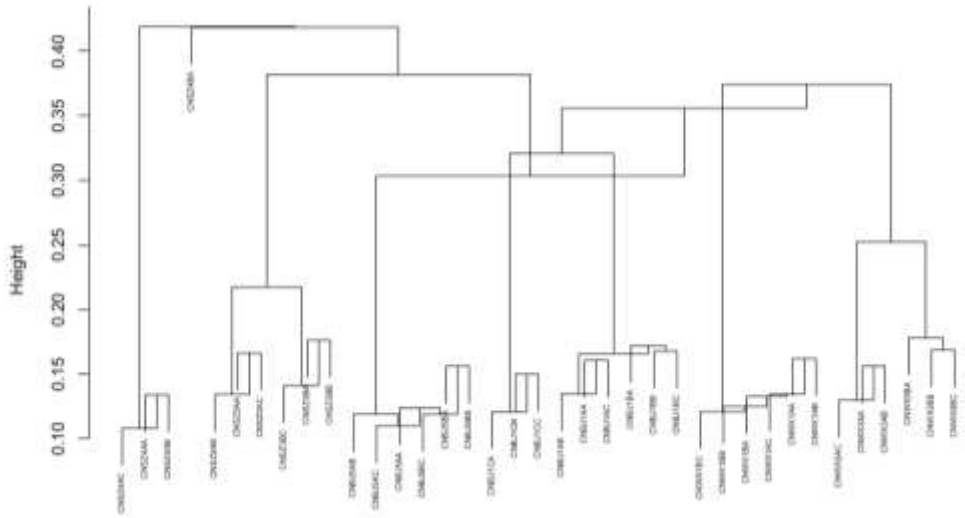


Figure S5 clustering results based on treatment process types (a) using all samples (b) using samples from the WWTPs with identical wastewater and locations

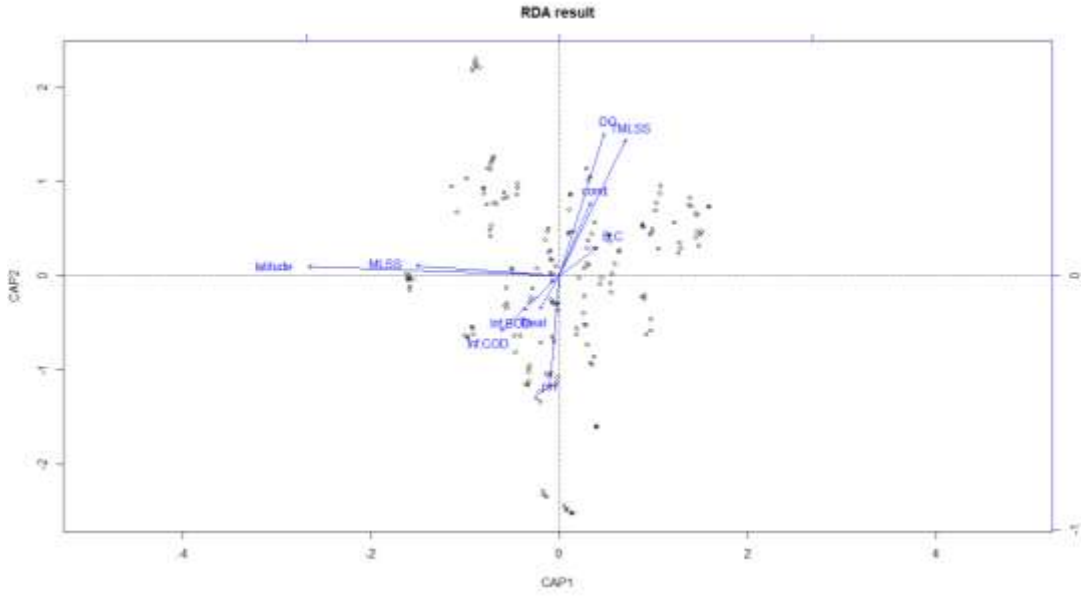


Figure S6 RDA analysis of measured environmental factors on microbial communities. DO, TMLSS, cond., B.C, Inf.COD, Inf.BOD, Treat are abbreviation of dissolved oxygen, temperature of activated sludge, conductivity, biodegradability of wastewater, concentration of influent COD, concentration of influent BOD, and treatment process types respectively.

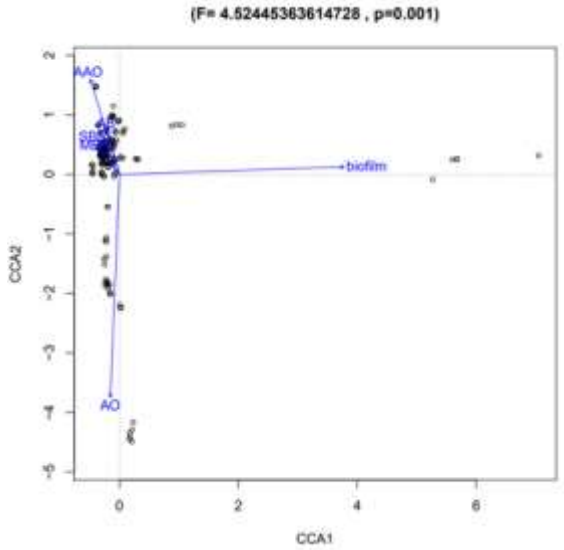


Figure S7 CCA analysis of treatment process types (AAO, AO, SBR, MBR, and biofilm) on microbial communities

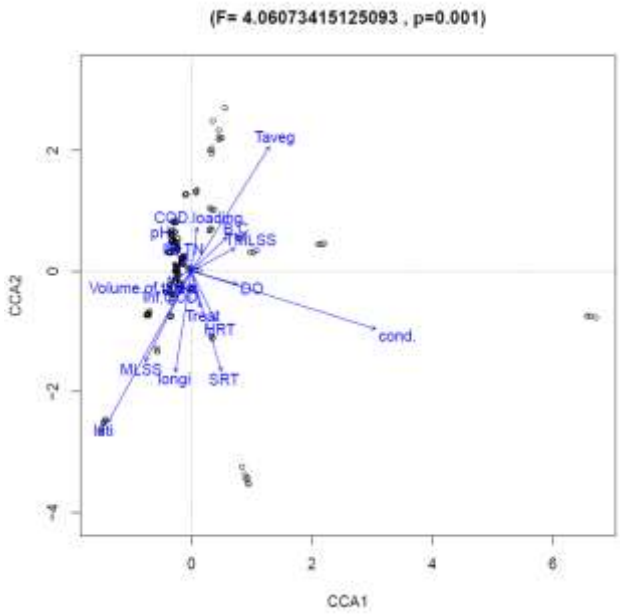


Figure S8. CCA analysis of environmental factors used in MRM analysis on microbial communities. DO, TMLSS, cond., Inf.COD, Inf.BOD, Treat, Taveg, lati, longi are abbreviation of dissolved oxygen, temperature of activated sludge, conductivity, biodegradability of wastewater, concentration of influent COD, concentration of influent BOD, treatment process types, mean annual temperature, latitude and longitude respectively.