

## **Supporting information**

for

### **Seeking sustainability: multi-objective evolutionary optimization for urban wastewater reuse in China**

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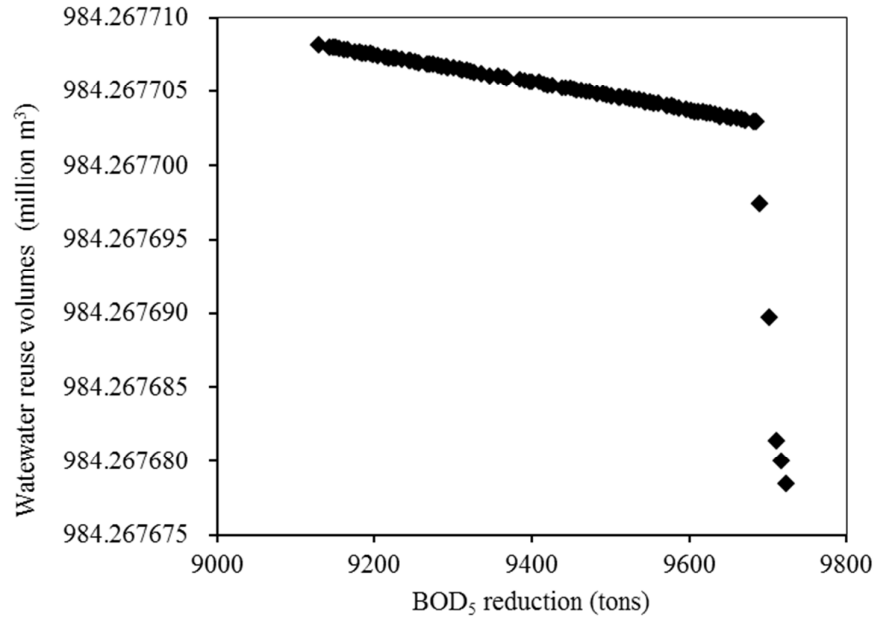


Figure S1 Pareto front obtained by NSGA II using the two-objective (i.e. maximization of wastewater reuse volume and BOD<sub>5</sub> reduction) problems study for wastewater reuse in Beijing.

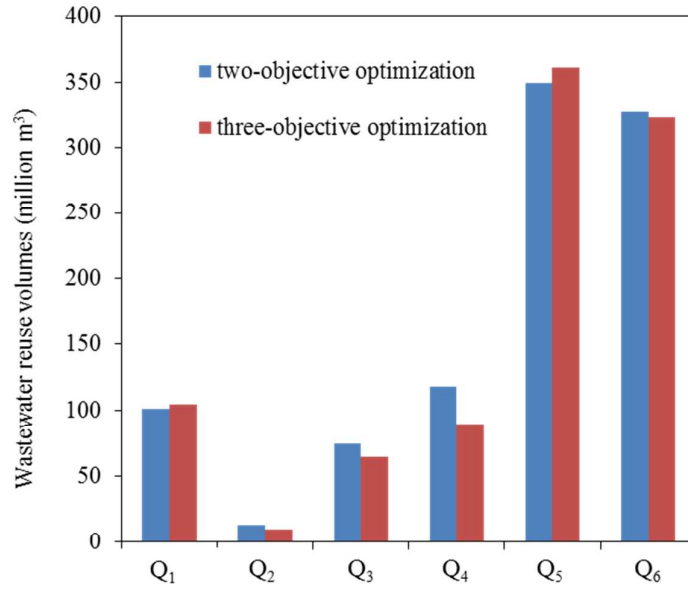


Figure S2 Wastewater reuse allocations of Beijing obtained by NSGA II using the three-objective (i.e. maximization of wastewater reuse volume, economic profit and BOD<sub>5</sub> reduction) and two-objective (i.e. maximization of wastewater reuse volume and BOD<sub>5</sub> reduction) problems studies.

TABLE S1. Summary of parameters from statistical reports and previous studies

Region	V <sub>a</sub> million m <sup>3</sup>	A <sub>v</sub> 1000 ha	E <sub>v</sub> m <sup>3</sup> /ha	E <sub>c</sub> *C <sub>c</sub> million m <sup>3</sup>	K <sub>c</sub> %	A <sub>g</sub> million m <sup>2</sup>	E <sub>g</sub> m <sup>3</sup> /(d m <sup>2</sup> )	K <sub>g</sub> %	T <sub>g</sub> day	A <sub>r</sub> million m <sup>2</sup>	K <sub>r</sub>	E <sub>r</sub> m <sup>3</sup> /(d m <sup>2</sup> )	A <sub>c</sub> milli on	E <sub>c</sub> m <sup>3</sup>	K <sub>c</sub>	V <sub>d</sub> million m <sup>3</sup>	k <sub>1</sub> %	R <sub>w</sub> million m <sup>3</sup>	b <sub>2</sub> *W <sub>i</sub> million m <sup>3</sup>	S <sub>1</sub> million m <sup>3</sup>	S <sub>2</sub> million m <sup>3</sup>
Anhui	16670	789	5000	3540	82	759.77	0.002	60	210	227.22	1	0.003	4.37	0.3	10	3020	30	220	85.16	1256.1	1170.95
Beijing	1080	66.8	5000	40	82	635.4	0.002	60	210	91.64	1	0.003	8.58	0.3	10	1530	30	400	58.06	1196.2	1138.18
Chongqing	1980	618.6	5000	1470	82	438.54	0.002	60	210	108.7	1	0.003	2.20	0.3	10	1860	30	50	11.76	760.6	748.84
Fujian	9720	679.4	5000	1920	82	508.02	0.002	60	210	139.08	1	0.003	4.30	0.3	10	2270	30	130	138.48	1097.3	958.84
Gansu	9430	415.4	5000	1100	82	163.37	0.002	60	210	69.13	1	0.003	1.75	0.3	10	1080	30	300	13.49	251.48	237.99
Guangdong	22750	1208	5000	3890	82	4106	0.002	60	210	592.15	1	0.003	16.56	0.3	10	9420	30	860	269.63	5120.1	4850.50
Guangxi	19460	1040.7	5000	1710	82	644.61	0.002	60	210	130.29	1	0.003	3.28	0.3	10	4650	30	530	32.83	866.97	834.14
Guizhou	5000	710	5000	2423	82	305.21	0.002	60	210	38.84	1	0.003	2.43	0.3	10	1650	30	60	7.09	432.5	425.41
Hainan	3390	225	5000	45	82	497.84	0.002	60	210	41.33	1	0.003	0.83	0.3	10	650	30	10	5.89	357.75	351.86
Hebei	14380	1157.9	5000	70	82	711.03	0.002	60	210	279.35	1	0.003	11.18	0.3	10	2400	30	290	333.42	2095.7	1762.25
Heilongjiang	24960	223	5000	1030	82	721.66	0.002	60	210	152.96	1	0.003	4.03	0.3	10	1760	30	180	110.17	533.92	423.75
Henan	12560	1720	5000	200	82	695.96	0.002	60	210	233.93	1	0.003	8.85	0.3	10	3610	30	730	110.28	2030.1	1919.75
Hubei	13830	1060	5000	3490	82	620.62	0.002	60	210	263.41	1	0.003	4.35	0.3	10	3240	30	20	113.73	1533.1	1419.35
Hunan	18580	1190	5000	2740	82	495.93	0.002	60	210	182.34	1	0.003	4.71	0.3	10	4640	30	320	36.39	1322.1	1285.67
Jiangsu	30420	1260.	5000	13420	82	2374.8	0.002	60	210	584.05	1	0.003	12.04	0.3	10	5290	30	320	7.9	3485	3477.0

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Jiangxi	15100	535.5	5000	2040	82	450.63	0.002	60	210	123.29	1	0.003	2.887	0.3	10	2750	30	390	14.61	858.44	843.83
Jilin	7380	236.9	5000	690	82	387.40	0.002	60	210	133.05	1	0.003	3.24	0.3	10	1640	30	370.00	71.8	592.7	520.90
Liaoning	8980	465.4	5000	1766	82	959.68	0.002	60	210	247.27	1	0.003	6.07	0.3	10	2550	30	340	145.27	1467.1	1321.86
Neimenggu	13450	270.8	5000	70	82	410.59	0.002	60	210	132.57	1	0.003	4.21	0.3	10	1500	30	980	149.76	580.72	430.96
Ningxia	6500	107.3	5000	37	82	183.99	0.002	60	210	42.38	1	0.003	0.95	0.3	10	180	30	140	12.89	180.1	167.21
Qinghai	2320	42	5000	134	82	38.94	0.002	60	210	14.30	1	0.003	0.67	0.3	10	350	30	80	-	77.22	-
Shandong	15480	1791.2	5000	20	82	1655.77	0.002	60	210	661.23	1	0.003	15.6	0.3	10	3620	30	460	603.34	5162.8	4559.47
Shanghai	1680	136.3	5000	7140	82	1222.83	0.002	60	210	94.81	1	0.003	3.15	0.3	10	2350	30	120	242.6	2049.8	1807.22
Shaanxi	5550	458.3	5000	129	82	281.69	0.002	60	210	109.66	1	0.003	4.22	0.3	10	1480	30	100	64.5	621.83	557.33
Shanxi	3800	228.3	5000	1765	82	325.13	0.002	60	210	113.49	1	0.003	5.26	0.3	10	1060	30	260	36.03	652.02	615.99
Sichuan	12730	1205.6	5000	207	82	774.06	0.002	60	210	202.58	1	0.003	7.65	0.3	10	3800	30	210	65.45	1322.8	1257.35
Tianjin	1100	87.1	5000	87	82	217.28	0.002	60	210	104.92	1	0.003	3.46	0.3	10	550	30	120	11.82	603.44	591.62
Xinjiang	48460	322.6	5000	30	82	440.97	0.002	60	210	89.64	1	0.003	2.69	0.3	10	1280	30	2650	40.96	366.19	325.23
Tibet	3170	22.4	5000	-	82	29.43	0.002	60	210	6.58	1	0.003	0.33	0.3	10	200	30	-	15	2.36	12.64
Yunnan	9530	735.1	5000	80	82	319.4	0.002	60	210	95.07	1	0.003	5.08	0.3	10	2280	30	390	13.43	615.37	601.94
Zhejiang	9460	624.5	5000	130	82	1052	0.002	60	210	319.98	1	0.003	11.91	0.3	10	3940	30	930	1000.38	2798.1	1797.66

TABLE S2 Survey data of 54 reclaimed wastewater treatment plants in 33 cities

NO.	Location of reclaimed wastewater treatment plant		Core treatment process	Treatment scale (10 <sup>4</sup> m <sup>3</sup> /d )	Usage	Total investment (million RMB Yuan)	Operating and management cost (RMB Yuan/m <sup>3</sup> )	Reclaimed wastewater price (RMB Yuan/m <sup>3</sup> )
1	Beijing	Fangzhuang	Coagulation, sand filtration, and disinfection	1.00	toilet flushing, car washing, greening, road cleaning, and ash rinsing	-	1.10	1.00
2		Miyun	Membrane filtration	4.50	landscape water supplement for Chaobai river, agricultural irrigation, municipal miscellaneous, and industrial uses	84.00	1.3-1.50	1.00
3		Qinghe	Membrane filtration	8.00	scenic environment water for Olympic Park, municipal miscellaneous, and domestic toilet flushing	100.00	1.0-1.50	1.00
4		Liuyuan	Coagulation, sand filtration, and disinfection	17.00	municipal miscellaneous and cooling water for thermal power plant	1120.00	0.8-1.00	1.00
5		Beixiaohe	Membrane filtration	6.00	municipal miscellaneous (50000 m <sup>3</sup> /d) and scenic environment water for Olympic Park (10000 m <sup>3</sup> /d)	-	1.40-1.50	1.00
6		Jiuxianqiao	Coagulation, sand filtration, and disinfection	6.00	scenic environment water	-	0.90-1.00	1.00
7		Gaobeidian	Coagulation, sand filtration, and disinfection	4.00	cooling water for heat power plant (38000 m <sup>3</sup> /d) and toilet flushing and greening (2000 m <sup>3</sup> /d)	-	0.90-1.00	1.00
8		Lugouqiao	Biological treatment	8.00	scenic environment water and industrial uses	-	-	1.00
9	Xi'an in	Fangzhiche	Coagulation, sand	5.00	industrial cooling water and scenic	52.50	1.50	1.55

NO.	Location of reclaimed wastewater treatment plant		Core treatment process	Treatment scale (10 <sup>4</sup> m <sup>3</sup> /d )	Usage	Total investment (million RMB Yuan)	Operating and management cost (RMB Yuan/m <sup>3</sup> )	Reclaimed wastewater price (RMB Yuan/m <sup>3</sup> )
	Shaanxi province	ng	filtration, and disinfection		environment water			
10		Dianzicun	Coagulation, sand filtration, and disinfection	8.00	industrial use, scenic environment water, agricultural irrigation, and municipal miscellaneous	50.43	-	-
11	Zhengzhou in Henan province	Wulongkou	Coagulation, sand filtration, and disinfection	5.00	cooling water for heat power plant (4.2-5.34 million m <sup>3</sup> /d), scenic environment water for Venice Village (0.165 million m <sup>3</sup> /d), and landscape water supplement for Jinshui river and Xionger river	46.78	0.35-0.68	0.75
12	Qingdao in Shandong province	Qingdao	Coagulation, sand filtration, and disinfection	4.00	ash rinsing and cooling water for thermal power plant and domestic uses	438.00	0.48	0.80
13	Zibo in Shandong province	Zibo	Coagulation, sand filtration, and disinfection	5.00	cooling water for Nanding thermal power plant (16800 m <sup>3</sup> /d) and Shandong aluminum plant (10000 m <sup>3</sup> /d), scenic environment water for villages	27.40	0.66	-
14	Dalian in Liaoning province	Hengjixinrun water company	Biological treatment	2.00	industrial uses	-	-	-
15		Dalian petrochemical company	Biological treatment	6.00	influent for demineralized water and circulating water	-	-	-
16		Beihai	Biological treatment	1.00	cycling cooling water and boiler feedwater for power plant	-	-	-
17		Taishan thermal power plant	Membrane filtration	4.00	cycling cooling water and boiler feedwater for power plant	-	-	-

NO.	Location of reclaimed wastewater treatment plant		Core treatment process	Treatment scale (10 <sup>4</sup> m <sup>3</sup> /d )	Usage	Total investment (million RMB Yuan)	Operating and management cost (RMB Yuan/m <sup>3</sup> )	Reclaimed wastewater price (RMB Yuan/m <sup>3</sup> )
18	Mudanjiang in Heilongjiang province	Jingbo lake	Coagulation, sand filtration, and disinfection	10.00	cycling cooling water for thermal power plant, coking plant, pharmaceutical factory, refinery, and paper mill	77.95	0.87	1.00
19	Yinchuan in Jiangxi province	Beijiao	Biological treatment	2.20	municipal miscellaneous, domestic uses, and scenic environment water	-	-	for landscaping : 0.8, for power plant: 0.91
20		Xixia	Biological treatment	3.00	cycling cooling water for power plant and urban landscaping water	-	0.92	for landscaping : 0.8, for power plant: 0.92
21	Datong in Shanxi province	Xijiao	Biological treatment	3.70	cycling cooling water for Datong thermal power plant (36000 m <sup>3</sup> /d) and greening water (1000 m <sup>3</sup> /d)	26.84	0.78	-
22	Shenzhen in Guangdong province	Binhe	Biological treatment	30.00	supplemental water for rivers, parks and golf courses and municipal miscellaneous	350.00	-	-
23		Xili	Biological treatment	5.00	supplemental water for Dasha river and Futian river	180.00	-	-
24		Henggang	Membrane filtration	5.00	scenic environment water, greening water, and road cleaning	126.87	-	-
25		Luofang	Biological treatment	35.00	supplemental water for reservoir, scenic environment water, greening water, and road cleaning	263.40	-	-
26	Hefei in Anhui province	Heifei	Biological treatment	11.00	cooling water for steelworks (50000 m <sup>3</sup> /d) and supplemental water for rivers (50000 m <sup>3</sup> /d)	77.22	0.45	-
27		Tangxihe	Membrane filtration	3.00	supplemental water for Tangxi river and municipal miscellaneous	149.00	1.59	-
28	Fuyang in Anhui	Fuyang	Biological	5.00	cycling cooling water for thermal	102.60	-	-



NO.	Location of reclaimed wastewater treatment plant		Core treatment process	Treatment scale (10 <sup>4</sup> m <sup>3</sup> /d )	Usage	Total investment (million RMB Yuan)	Operating and management cost (RMB Yuan/m <sup>3</sup> )	Reclaimed wastewater price (RMB Yuan/m <sup>3</sup> )
	province		treatment		power plants			
29	Ningxia	Shizuishan	Biological treatment	4.00	greening water (3000 m <sup>3</sup> /d), reuse for Dawukou coal washery (2600 m <sup>3</sup> /d), and ash rinsing water for Dawukou thermal power plant (30000 m <sup>3</sup> /d)	42.88	0.66	-
30	Urumchi in Xinxiang province	Qidaowan	Biological treatment	5.00	cycling cooling water for thermal power plants of Shenhua Group and Zhongtai chemical factory	127.00	-	-
31		Chengdong	Biological treatment	4.00	cycling cooling water for thermal power plants		4.00-6.00	-
32	Tianjin	economic development zone	Membrane filtration	3.90	boiler feedwater	34.00	2.23	-
33		Jizhuangzi	Membrane filtration	5.00	greening water within the factory and domestic toilet flushing	110.00	domestic use: 1.1 ; industrial use: 0.7	for domestic use:1.1, for industrial use: 3.1
34		Tianjin Petrochemical Corporation	Membrane filtration	1.50	cycling cooling water for thermal power plant	-	1.34	-
35	Huhehaote in Neimenggu province	Jinqiao	Membrane filtration	5.00	cycling cooling water and boiler feedwater for thermal power plant	-	1.00	-
36		Gongzhufu	Biological treatment	3.00	municipal miscellaneous and scenic environment water	-	1.00	-
37		Gaizhangyi ng	Biological treatment	3.00	cycling cooling water for thermal power plant	-	1.00	-
38	Liyang in Jiangsu province	Liyang	Biological treatment	5.00	cycling cooling water for Jiangsu shente steel co., LTD	130.00	0.60	0.40

NO.	Location of reclaimed wastewater treatment plant		Core treatment process	Treatment scale (10 <sup>4</sup> m <sup>3</sup> /d )	Usage	Total investment (million RMB Yuan)	Operating and management cost (RMB Yuan/m <sup>3</sup> )	Reclaimed wastewater price (RMB Yuan/m <sup>3</sup> )
39	Wuxi in Jiangsu province	Xinqu	Membrane filtration	8.00	miscellaneous for Wuxi Hynix - STMicroelectronics plant and municipal miscellaneous	400.00	-	-
40	Kunming in Yunnan province	Kunming	Biological treatment	0.80	Road cleaning and scenic environment water	13.09	-	for toilet flushing: 1.50, for car washing: 3.00, for scenic environment: 1.00
41	Lanzhou in Gansu province	Yanerwan	Biological treatment	16.0	greening water within plant and scenic environment water	-	-	-
42	Wuhan in Hubei province	Sanjintan	Biological treatment	7.00	greening, road cleaning, and miscellaneous in Houhu region and Huangxiaohe and Tazihu	-	-	-
43	Shishi in Fujian province	Central region	Membrane filtration	10.00	industrial uses	148.08	-	-
44	Xingtai in Hebei province	Xingtai	Biological treatment	6.00	municipal miscellaneous and scenic environment water	120.00	-	-
45	Zhangjiakou in Hebei province	Kangbao	Biological treatment	1.60	industrial uses, agricultural irrigation and scenic environment water	54.64	-	-
46	Pingdingshan in Henan province	Pingdingshan thermal power plant	Biological treatment	7.00	cycling cooling water and greening water within the thermal power plant	700.00	-	-
47	Mengzhou in Henan province	Mengzhou	Coagulation, sand filtration, and disinfection	2.00	municipal miscellaneous and scenic environment water	-	-	-
48	Changshang in Hunan province	Pingtang	Biological treatment	12.00	toilet flushing, greening, car washing, construction, firefighting, and scenic environment water	101.06	-	-
49	Shanghai	Bailonggan	Coagulation, sand	0.30	greening water and road sweeping	-	0.30	-

NO.	Location of reclaimed wastewater treatment plant		Core treatment process	Treatment scale (10 <sup>4</sup> m <sup>3</sup> /d )	Usage	Total investment (million RMB Yuan)	Operating and management cost (RMB Yuan/m <sup>3</sup> )	Reclaimed wastewater price (RMB Yuan/m <sup>3</sup> )
		g	filtration, and disinfection					
50	Changchun in Jilin province	Yingju	Coagulation, sand filtration, and disinfection	4.00	domestic miscellaneous	-	-	-
51	Shuangliao in Jilin province	Shuangliao	Coagulation, sand filtration, and disinfection	2.00	municipal miscellaneous and scenic environment water	129.00	-	-
52	Taizhou in Zhejiang province	Jiaojiang	Biological treatment	10.00	supplemental water for rivers, municipal miscellaneous and scenic environment water	452.43	-	-
53	Fuyang in Zhejiang province	Dayuan	Biological treatment	7.00	domestic miscellaneous and scenic environment water	274.17	-	-
54	Anshun in Guizhou province	Anshun	Biological treatment	5.00	greening, road cleaning, firefighting, and car washing	47.27	-	-

TABLE S3. Pareto front obtained by NSGA II using the three-objective problems study for wastewater reuse in Beijing

No.	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRY)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)
1	703.33	7812.50	984.27	283.70	9.31	50.18	37.25	339.40	264.42
2	624.81	9524.85	984.17	120.13	11.01	74.20	112.85	352.11	313.86
3	711.96	8807.02	982.13	174.72	10.30	98.16	47.38	345.63	305.94
4	767.12	5953.97	984.06	432.63	8.15	116.33	29.24	142.39	255.33
5	716.29	8881.35	967.05	149.63	10.86	107.85	36.93	350.20	311.59
6	742.53	7995.53	984.24	246.68	9.36	110.42	33.17	291.62	292.99
7	736.55	8398.99	978.78	204.78	9.48	110.48	31.99	319.19	302.86
8	645.10	9453.65	984.12	120.67	11.60	86.60	100.29	351.89	313.06
9	683.82	9028.40	984.24	155.23	10.31	96.90	72.69	343.41	305.70
10	760.37	6530.10	984.27	379.52	8.56	115.04	30.23	186.45	264.46
11	701.57	8781.90	984.25	177.36	9.96	99.30	59.28	335.96	302.38
12	707.42	8625.60	984.22	190.94	10.03	102.54	56.84	322.48	301.38
13	757.37	6739.57	984.16	361.02	8.51	114.04	31.04	199.95	269.59
14	756.67	5542.42	984.27	471.63	7.14	103.79	34.41	133.54	233.75
15	751.25	7218.34	984.23	317.29	8.71	112.45	32.15	235.83	277.80
16	744.38	7847.44	984.20	260.50	9.31	110.81	32.90	279.57	291.11
17	771.63	5596.45	983.86	465.11	7.36	118.00	28.91	114.72	249.76
18	690.79	8968.30	984.26	160.55	10.28	97.06	66.57	345.67	304.13
19	705.67	8939.19	984.24	160.96	10.54	104.05	56.58	345.46	306.66
20	767.29	5909.35	983.93	436.29	7.99	116.25	29.20	140.63	253.56
21	709.33	9011.86	978.48	148.52	11.76	106.98	49.91	349.52	311.79
22	747.63	7510.22	984.00	290.04	9.01	111.76	32.53	258.31	282.35
23	740.34	8264.98	983.89	224.39	9.14	107.66	32.14	308.52	302.05
24	750.21	7309.22	984.23	309.05	8.74	112.18	32.30	242.40	279.57
25	655.08	9420.48	984.21	120.80	12.14	92.81	94.14	351.72	312.60
26	630.64	9507.40	984.26	119.49	11.28	78.49	109.54	352.45	313.02
27	747.98	7485.34	980.69	289.88	8.95	112.67	30.92	253.16	285.12
28	767.75	5891.20	983.81	438.02	8.03	116.70	29.18	137.66	254.21
29	687.51	9172.35	980.02	135.32	11.21	103.06	68.04	352.23	310.16
30	747.05	7565.10	984.01	285.01	9.06	111.60	32.55	262.50	283.28
31	637.81	9476.96	984.22	120.79	11.44	82.00	104.77	352.07	313.16
32	731.00	7202.70	984.27	324.54	8.57	94.67	41.34	245.43	269.71
33	744.50	7628.79	984.26	280.53	9.13	110.50	34.30	263.83	285.98
34	698.15	7937.92	984.27	270.64	9.71	53.37	42.75	340.69	267.12
35	751.80	7070.92	983.96	330.65	8.77	112.17	32.38	225.34	274.65
<b>36</b>	<b>610.36</b>	<b>9585.18</b>	<b>984.27</b>	<b>117.91</b>	<b>11.73</b>	<b>66.58</b>	<b>121.82</b>	<b>352.60</b>	<b>313.62</b>
37	732.89	8568.14	981.04	193.67	10.45	106.31	33.41	330.72	306.49
38	748.93	5755.92	984.27	454.80	7.36	94.91	34.89	158.34	233.96
39	713.70	8900.25	967.33	148.38	10.88	107.15	39.04	350.25	311.63

No.	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRY)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)
40	695.15	8037.29	984.26	247.07	9.64	98.09	70.83	269.69	288.94
41	765.94	5972.08	984.24	430.88	8.05	116.17	30.18	144.11	254.84
42	735.15	7827.64	984.26	263.17	9.13	106.04	38.90	280.30	286.72
43	764.74	6123.86	983.88	416.51	8.05	115.69	29.54	156.95	257.14
44	763.55	6179.23	984.16	412.20	8.28	115.60	30.49	158.19	259.40
45	664.72	9386.47	984.23	121.33	12.28	98.47	88.19	351.52	312.45
46	739.31	8159.55	984.11	232.31	9.59	108.90	34.06	302.74	296.51
47	761.87	6361.92	983.85	395.09	8.36	114.98	30.00	173.12	262.30
48	669.88	9338.76	984.00	125.15	11.84	99.50	84.22	351.36	311.93
49	751.95	7061.72	981.16	328.38	8.75	111.99	29.99	228.58	273.47
50	640.61	9470.40	984.22	120.57	11.47	83.85	103.14	351.93	313.27
51	717.57	8806.33	971.76	164.78	11.89	101.81	36.51	345.34	311.42
52	716.57	8856.49	982.11	165.39	10.55	105.68	46.00	350.05	304.44
53	730.96	8320.61	984.22	218.40	9.63	105.11	38.48	315.59	297.00
54	642.03	9460.83	983.72	120.40	11.49	84.83	101.96	352.10	312.94
55	759.34	6609.83	984.25	372.24	8.60	114.78	30.41	192.31	265.91
56	678.15	8496.55	984.26	210.83	10.16	81.38	73.84	315.77	292.28
57	723.74	8223.27	984.24	227.59	9.43	103.40	45.07	305.28	293.46
58	741.54	8118.36	984.09	236.52	9.26	109.16	32.70	299.32	297.12
59	650.23	9428.05	983.25	120.56	11.94	89.76	96.46	352.05	312.49
60	766.30	5849.07	984.25	443.20	8.15	114.84	30.20	134.67	253.19
61	765.72	6066.05	984.06	422.43	8.19	115.99	29.50	150.52	257.43
62	659.64	9404.26	984.27	121.13	11.99	95.47	91.43	351.70	312.55
63	727.59	8439.70	984.23	207.81	9.72	103.68	39.89	324.66	298.48
64	761.24	6440.58	984.27	388.43	8.40	115.05	30.40	177.61	264.37
65	717.98	8554.50	984.26	197.78	9.73	101.47	46.82	329.22	299.25
66	763.47	6232.46	983.74	407.18	8.39	115.26	29.68	162.45	260.78
67	729.40	8369.90	984.21	213.79	9.73	105.14	39.55	318.14	297.85
68	725.96	8680.04	982.95	185.33	10.35	105.91	40.33	332.70	308.34
69	675.11	9253.61	984.21	134.47	11.07	97.76	79.57	350.11	311.24
70	756.57	6811.47	984.24	354.62	8.39	113.73	31.18	205.34	270.98
71	676.92	9067.28	984.22	151.28	11.43	98.58	79.61	335.64	307.69
72	681.31	9100.47	982.14	147.46	10.08	98.25	74.36	340.77	311.23
73	740.98	6862.80	984.27	352.11	8.85	108.54	42.68	201.11	270.98
74	716.25	8648.54	984.20	188.61	10.34	103.08	48.44	331.71	302.01
75	750.95	6693.46	984.26	365.85	8.54	111.32	35.85	196.19	266.50
76	732.75	8463.11	981.29	203.74	10.30	105.42	34.02	324.16	303.66
77	721.79	8716.72	979.42	176.98	10.14	103.43	39.21	347.27	302.39
78	713.77	8897.20	967.36	148.69	10.88	107.16	39.02	350.05	311.57
79	755.96	6906.47	984.17	346.07	8.64	113.32	30.71	212.41	273.02
80	763.96	6185.58	983.85	411.12	8.21	115.47	29.69	160.46	258.90
81	770.27	5638.42	984.01	461.55	7.36	117.66	29.80	117.09	250.55

No.	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRY)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)
82	764.99	6108.90	983.93	418.04	8.09	115.77	29.53	155.29	257.22
83	753.19	6971.59	982.97	337.30	8.79	113.24	31.27	222.08	270.28
84	746.27	7593.02	983.46	282.69	9.09	111.35	32.78	262.03	285.52
85	655.08	9420.48	984.21	120.80	12.14	92.81	94.14	351.72	312.60
86	748.46	7369.41	983.67	303.31	8.80	111.18	32.49	247.48	280.41
87	762.20	6330.61	984.26	397.86	8.23	114.75	29.92	173.40	260.09
88	765.72	6011.07	984.23	426.76	8.75	116.41	29.82	147.88	254.61
89	611.29	9575.60	984.16	118.67	11.32	66.87	121.28	352.24	313.77
90	762.92	6290.97	984.23	402.82	8.24	115.11	30.27	164.68	263.11
91	622.07	9536.72	984.19	119.14	11.77	73.26	114.48	352.39	313.14
92	633.50	9495.02	984.23	120.24	11.02	79.71	107.69	352.16	313.41
93	694.45	9081.01	983.17	146.72	10.08	103.80	65.31	348.38	308.88
94	672.14	8272.15	984.27	234.74	10.11	73.93	77.30	301.55	286.64
95	768.57	5811.07	983.49	444.90	7.87	117.19	29.12	131.63	252.78
96	745.28	7734.21	984.06	270.58	9.21	110.89	32.83	272.10	288.45
97	755.39	6962.92	984.16	340.91	8.70	113.14	30.68	216.71	274.02
98	636.10	9486.88	984.24	120.43	11.58	81.05	105.82	351.87	313.50
99	616.74	9554.92	984.26	119.82	11.11	69.27	117.75	352.10	314.21
100	626.69	9523.67	984.22	118.99	11.87	76.20	111.72	352.31	313.12
101	745.53	7431.20	984.26	298.64	8.94	109.70	34.32	251.80	280.86
102	662.76	9205.96	984.26	142.95	10.72	88.17	86.65	347.33	308.43
103	667.96	9355.89	984.08	123.77	11.98	99.12	85.69	351.41	312.11
104	724.16	8758.46	975.47	168.61	10.19	107.83	36.55	345.03	307.25
105	768.12	5705.64	984.26	455.87	7.35	117.12	31.23	120.88	251.82

MCM: million cubic meters

MRY: million RMB Yuan

TABLE S4. Pareto front obtained by NSGA II using the three-objective problems study for wastewater reuse in Jiangsu province

No.	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRY)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)
1	790.71	9854.78	1281.78	263.15	786.95	75.84	56.48	87.45	11.92
2	885.12	5327.91	1281.78	674.68	296.25	155.96	81.87	63.87	9.16
3	888.74	4979.62	1281.78	707.95	259.45	159.14	84.68	61.32	9.24
4	891.23	4680.22	1281.78	736.97	231.39	160.73	85.83	57.92	8.94
5	888.47	5184.66	1281.78	687.09	268.56	160.48	86.85	68.77	10.03
6	877.33	6262.69	1281.78	583.84	373.69	151.83	81.07	80.74	10.61
7	828.31	9116.41	1281.78	325.05	620.89	100.14	57.68	165.60	12.43
8	890.44	4819.42	1281.78	723.32	243.70	160.32	85.34	60.01	9.10
9	936.65	10460.89	1281.78	140.00	744.72	198.70	30.63	158.59	9.15
10	886.12	5637.49	1281.78	642.18	300.79	160.43	88.00	79.51	10.89
11	933.07	10300.78	1281.78	157.35	730.97	195.97	33.09	155.31	9.08
12	813.37	9282.83	1281.78	310.91	715.90	94.47	57.65	91.26	11.60
13	934.14	10240.94	1281.78	163.33	724.02	196.64	33.11	154.78	9.90
14	849.40	8040.05	1281.78	418.01	550.08	129.14	72.89	99.68	11.99
15	868.78	6939.71	1281.78	519.68	443.84	145.10	77.19	84.94	11.03
16	893.13	7881.29	1281.78	414.42	496.17	169.06	73.75	115.13	13.25
17	888.56	5082.69	1281.78	697.37	262.95	160.00	86.27	65.55	9.63
18	888.07	5409.27	1281.78	664.42	281.75	161.41	88.09	75.44	10.67
19	886.47	6375.50	1281.78	568.17	366.93	161.48	83.31	90.18	11.70
20	795.00	9650.15	1281.78	281.73	764.31	79.54	57.78	86.60	11.83
21	880.00	6770.73	1281.78	531.59	413.87	155.39	79.19	90.31	11.44
22	878.92	6123.58	1281.78	596.96	358.52	153.45	82.56	79.65	10.65
23	909.68	10573.11	1281.78	140.01	792.47	176.56	31.41	131.78	9.55
24	841.97	8471.00	1281.78	378.21	593.98	122.76	70.44	104.13	12.26
25	885.80	5855.78	1281.78	621.01	331.87	158.74	82.59	77.13	10.44
26	744.61	12573.91	1281.65	12.15	1211.82	25.83	3.34	26.47	2.03
27	805.68	9922.03	1281.78	250.21	794.94	87.46	50.57	87.71	10.90
28	923.85	11328.45	1280.04	58.44	878.90	183.83	10.94	140.02	7.91
29	856.24	7768.64	1281.78	441.82	529.81	135.41	73.40	89.83	11.51
30	908.06	10591.82	1281.78	138.84	796.53	175.09	31.15	130.68	9.48
31	879.02	7253.63	1281.78	483.59	457.50	155.21	76.60	96.94	11.94
32	920.24	10111.88	1281.78	181.72	721.24	185.25	36.71	147.46	9.39
33	893.97	9244.97	1281.78	277.25	613.90	171.88	66.77	137.23	14.75
<b>34</b>	<b>715.31</b>	<b>12821.89</b>	<b>1281.77</b>	<b>0.01</b>	<b>1280.55</b>	<b>0.01</b>	<b>0.03</b>	<b>0.11</b>	<b>1.08</b>
35	859.98	7438.83	1281.78	473.34	497.94	138.12	74.73	86.42	11.24
36	870.18	6700.83	1281.78	543.08	420.70	145.92	78.44	82.78	10.86
37	796.17	8799.35	1281.78	375.77	586.85	60.80	51.41	196.16	10.80
38	853.22	7852.62	1281.78	434.84	540.94	132.54	72.46	89.53	11.47

No.	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRY)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)
39	836.25	8524.50	1281.78	375.56	617.54	117.10	67.32	92.30	11.95
40	846.69	8145.74	1281.78	408.87	564.72	126.24	71.06	98.95	11.95
41	861.58	7327.10	1281.78	485.04	475.35	137.10	73.72	99.30	11.28
42	915.27	8273.27	1281.78	367.31	546.90	182.01	54.83	121.10	9.64
43	961.81	9763.97	1278.08	198.73	672.50	214.56	19.95	161.55	10.80
44	854.46	12071.16	1272.16	4.51	1001.59	123.14	3.86	136.47	2.59
45	748.15	12610.44	1280.29	4.25	1220.31	31.69	4.27	17.66	2.11
46	873.14	6574.68	1281.78	554.32	404.34	148.83	80.04	83.22	11.04
47	948.31	11199.74	1281.27	61.53	844.21	206.14	13.00	148.13	8.26
48	786.91	12222.73	1280.74	27.23	1125.92	65.05	8.26	51.05	3.22
49	920.29	10032.82	1281.78	188.75	696.84	188.68	44.74	151.30	11.47
50	906.32	10443.46	1281.78	154.37	780.30	173.88	33.53	130.03	9.68
51	771.17	12471.95	1280.54	8.55	1176.00	51.45	5.34	36.88	2.32
52	958.93	11023.80	1279.68	73.57	798.63	214.93	14.61	168.63	9.32
53	910.59	10364.02	1281.78	160.53	766.66	177.32	33.87	133.89	9.51
54	884.30	6507.85	1281.78	555.92	382.65	159.44	81.93	90.22	11.61
55	902.58	7712.89	1281.78	428.66	501.57	171.49	61.75	108.51	9.79
56	900.95	9088.71	1281.78	291.37	634.65	171.91	52.61	120.21	11.04
57	805.34	9665.08	1281.78	275.51	753.56	89.28	58.44	92.81	12.18
58	888.04	5530.87	1281.78	652.03	287.74	162.21	89.10	79.61	11.09
59	831.78	8354.23	1281.78	395.17	610.90	111.44	65.69	87.26	11.32
60	890.43	4820.53	1281.78	723.21	243.77	160.32	85.34	60.04	9.10
61	808.33	9761.15	1281.78	265.13	777.58	89.75	51.68	86.81	10.84
62	789.66	12175.50	1274.60	23.07	1120.91	70.56	7.06	49.74	3.26
63	765.96	12478.79	1280.83	10.40	1180.90	46.83	5.84	34.68	2.17
64	725.85	12762.43	1281.72	1.58	1253.01	8.93	1.30	15.50	1.41
65	715.31	12821.89	1281.77	0.01	1280.55	0.01	0.03	0.11	1.08
66	904.48	11518.81	1281.74	49.42	923.71	166.29	9.87	125.69	6.76
67	801.65	8984.74	1281.78	354.21	601.40	67.14	51.42	196.43	11.18
68	726.80	12453.03	1281.77	31.83	1218.78	11.13	6.45	11.25	2.32
69	813.40	9536.20	1281.78	285.29	750.11	94.46	53.91	87.12	10.89
70	863.69	7127.56	1281.78	503.19	460.08	140.68	76.93	89.65	11.26
71	869.55	7026.49	1281.78	510.77	446.76	145.96	77.37	89.39	11.53
72	874.52	6283.29	1281.78	583.19	380.57	148.91	80.04	78.59	10.48
73	737.04	12669.01	1281.73	5.80	1239.26	19.41	1.58	13.96	1.71
74	930.08	10183.72	1281.78	170.27	721.44	193.61	34.80	152.49	9.17
75	754.61	12536.09	1280.30	8.93	1203.96	37.41	5.14	22.51	2.35
76	886.28	5712.10	1281.78	635.27	319.99	158.81	82.94	74.53	10.24
77	763.01	11119.71	1281.77	148.64	1018.22	46.34	26.88	36.64	5.04
78	880.61	6038.25	1281.78	604.75	347.33	155.02	83.54	80.39	10.75
79	829.38	8419.23	1281.78	389.40	614.94	110.34	67.38	87.95	11.78
80	926.90	9370.65	1281.78	252.99	647.06	190.86	41.91	139.73	9.24



No.	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRY)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)
81	888.45	11878.00	1265.05	1.12	936.61	154.12	1.25	169.61	2.34
82	950.38	11192.25	1281.77	61.98	842.02	207.79	13.10	148.55	8.33
83	840.94	8716.19	1281.78	354.57	627.90	121.02	65.67	100.35	12.28
84	831.25	8215.20	1281.78	409.31	597.58	110.79	66.74	86.25	11.11
85	888.15	7565.72	1281.78	448.22	473.60	164.19	75.58	107.43	12.76
86	904.70	6803.43	1281.78	518.80	417.95	172.78	67.81	95.07	9.37
87	816.22	8942.62	1281.78	342.94	676.76	98.62	63.41	88.21	11.83
88	942.49	11230.34	1280.98	60.80	852.46	200.83	12.51	146.20	8.18
89	824.41	12096.27	1280.94	24.85	1068.40	95.48	5.61	83.41	3.20
90	819.34	10830.45	1281.77	153.48	921.39	95.82	28.93	75.53	6.64
91	787.26	10946.23	1281.78	155.92	979.48	66.66	25.61	48.87	5.24
92	902.09	9454.63	1281.78	254.45	655.97	172.87	51.30	135.78	11.42
93	774.46	11587.41	1281.77	97.48	1074.67	54.17	15.64	35.98	3.84
94	864.79	6945.68	1281.78	521.07	448.69	141.04	76.47	83.59	10.93
95	862.67	7224.82	1281.78	494.91	462.43	137.98	74.74	100.23	11.50
96	885.92	5951.83	1281.78	611.25	338.35	159.25	82.73	79.54	10.67
97	742.61	11708.95	1281.78	99.30	1123.99	25.53	14.11	15.86	2.97
98	902.21	8672.85	1281.78	332.86	602.54	171.18	52.16	113.16	9.88
99	717.72	12726.76	1281.77	8.44	1264.72	2.44	1.84	2.91	1.42
100	956.74	11106.27	1281.18	68.09	814.53	212.64	13.90	162.39	9.63
101	779.20	12388.31	1271.02	2.57	1141.80	60.47	2.80	61.85	1.54
102	757.26	12507.23	1277.08	7.82	1183.84	38.77	3.28	41.24	2.13
103	784.38	12296.62	1272.23	11.09	1125.94	64.69	4.24	64.07	2.19
104	899.01	11818.76	1276.79	15.10	934.06	161.91	7.71	155.16	2.85
105	931.44	11389.22	1279.75	48.69	869.39	188.30	8.14	160.18	5.05

MCM: million cubic meters

MRY: million RMB Yuan

TABLE S5. Spatial distributions of regional water resources and external sets of criteria

Region	Water availability <sup>a</sup> (billion m <sup>3</sup> )	Per capita water resources (m <sup>3</sup> )	Water shortage degree	Water shortage type	External set of criteria
Tibet	449.24	149637			
Qinghai	65.78	11669.6			
Hainan	48.07	5543.45	No	-	F <sub>1</sub> , F <sub>3</sub>
Xinjiang	92.01	4218.07			
Guizhou	114.12	3284.36			
Yunnan	148.00	3219.76			
Guangxi	135.06	2934.40		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Hunan	190.70	2903.31		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Jiangxi	103.79	2328.79		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Sichuan	186.58	2320.18		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Fujian	77.49	2100.20	mild	Quality-related	F <sub>2</sub> , F <sub>3</sub>
Chongqing	59.07	2047.90		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Heilongjiang	77.22	2015.55		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Hubei	103.40	1806.41		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Neimenggu	41.90	1695.92		Quantity-related	F <sub>3</sub> , F <sub>1</sub>
Shaanxi	60.44	1619.27		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Jilin	39.88	1452.28		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Guangdong	147.13	1410.60	moderate	Quality-related	F <sub>2</sub> , F <sub>3</sub>
Zhejiang	74.42	1367.36		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Anhui	60.21	1011.89		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Gansu	24.41	954.554		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Liaoning	29.48	673.863		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Jiangsu	37.33	474.575		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Henan	32.79	348.785		Quantity-related	F <sub>3</sub> , F <sub>1</sub>
Shanxi	10.34	289.432		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Shandong	27.41	286.117	severe	Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Hebei	11.99	166.824		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Shanghai	3.68	159.911		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Ningxia	0.88	138.890		Quality-related	F <sub>2</sub> , F <sub>3</sub>
Beijing	2.68	136.700		Quantity-related	F <sub>3</sub> , F <sub>2</sub>
Tianjin	1.54	118.873		Quantity-related	F <sub>3</sub> , F <sub>2</sub>

<sup>a</sup> Excluding water transfer capacity

TABLE S6. The control strategies of wastewater reuse scales, allocations, and pollutants reduction for 31 provinces

Region	F <sub>1</sub> (MCM)	F <sub>2</sub> (Tons)	F <sub>3</sub> (MRV)	Q <sub>1</sub> (MCM)	Q <sub>2</sub> (MCM)	Q <sub>3</sub> (MCM)	Q <sub>4</sub> (MCM)	Q <sub>5</sub> (MCM)	Q <sub>6</sub> (MCM)	Ammonia nitrogen reduction <sup>a</sup> (Tons)	Total nitrogen <sup>a</sup> (Tons)	Total phosphorus <sup>a</sup> (Tons)
Anhui	126.17	11378.22	568.77	0.00	567.80	0.01	0.12	0.10	0.73	11378.85	3.65	1137.21
Beijing	610.36	9585.18	984.27	117.91	11.73	66.58	121.82	352.60	313.62	5899.85	1568.10	62.72
Chongqing	796.15	10225.83	511.12	0.10	509.63	0.07	0.02	0.13	1.18	10226.50	5.91	1021.86
Fujian	152.14	7467.82	373.31	0.01	186.32	0.01	0.21	186.32	0.44	7468.20	2.20	373.61
Gansu	32.39	1034.22	48.59	0.41	25.77	0.57	0.37	4.10	17.37	1050.45	86.85	89.75
Guangdong	2182.05	20904.12	2174.52	60.05	1167.91	147.59	180.94	493.67	124.35	11194.05	621.75	24.87
Guangxi	108.08	2969.07	150.42	3.65	68.65	2.18	0.28	73.64	2.02	2945.50	10.10	141.75
Guizhou	85.17	1104.46	109.60	108.48	0.34	0.63	0.01	0.01	0.13	23.05	0.65	0.97
Hainan	78.40	1631.41	105.29	32.22	6.23	31.79	6.27	27.06	1.71	1469.75	8.55	16.22
Hebei	1145.01	6980.43	1180.70	512.10	16.65	57.99	59.92	387.96	146.09	14102.65	730.45	354.70
Heilongjiang	-71.94	6239.44	125.58	2.93	97.44	4.57	8.41	9.06	3.17	2468.85	15.85	201.85
Henan	179.50	3562.66	356.07	355.76	0.01	0.24	0.00	0.00	0.04	6	0.20	0.11
Hubei	178.63	7806.14	390.31	0.00	390.04	0.00	0.00	0.26	0.00	7806.00	0	780.08
Hunan	160.72	4692.22	229.77	1.98	183.36	3.10	1.80	6.52	33.01	4720.85	165.05	439.34
Jiangsu	715.31	12821.89	1281.77	0.01	1280.55	0.01	0.03	0.11	1.08	6414.30	5.40	0.22
Jiangxi	190.74	2743.26	126.71	0.52	55.71	2.00	2.26	10.13	56.08	2804.00	280.40	234.80
Jilin	166.80	3592.46	168.50	6.97	77.03	1.44	5.12	3.14	74.81	3604.85	374.05	318.64
Liaoning	651.91	13568.57	703.93	79.26	259.68	37.04	20.87	190.10	116.96	13077.80	584.80	776.67
Neimenggu	155.34	5552.57	231.53	0.00	0.17	0.40	0.00	0.00	230.97	5785.65	1154.85	508.47
Ningxia	9.47	350.07	27.63	0.31	3.71	1.12	0.67	1.20	20.62	239.70	103.10	4.13

Qinghai	18.65	415.38	20.42	0.12	18.08	0.06	0.01	0.02	2.12	416.40	10.60	40.82
Shandong	-1079.16	10212.17	2444.07	1393.57	5.21	208.51	180.23	469.13	187.43	6189.70	937.15	37.49
Shanghai	1048.50	6331.14	632.78	0.01	631.79	0.01	0.07	0.04	0.86	3168.15	4.30	0.17
Shaanxi	122.50	2170.89	129.09	45.19	8.54	6.57	6.31	44.02	18.46	1770.30	92.30	57.69
Shanxi	369.26	2544.03	252.85	5.50	104.05	15.69	11.57	78.80	37.24	1422.95	186.20	7.45
Sichuan	143.16	5013.19	265.22	34.92	68.31	19.77	20.96	82.08	39.19	4802.15	195.95	222.84
Tianjin	531.86	1664.78	289.65	134.94	5.69	17.10	13.47	67.67	50.78	1027.45	253.90	10.16
Xinjiang	6.47	4390.07	289.29	12.74	0.36	258.98	0.64	9.93	6.64	5564.20	33.20	15.33
Tibet	0.28	13.38	0.76	0.35	0.00	0.00	0.00	0.00	0.41	10.25	2.05	0.90
Yunnan	109.42	153.98	139.32	125.83	0.82	1.74	0.81	3.19	6.94	102.20	34.70	1.39
Zhejiang	752.14	9190.73	1075.57	280.12	16.46	37.91	27.22	357.40	356.45	5759.45	1782.25	71.29
Total	9675.47	176309.77	15387.40	3315.95	5768.06	923.68	670.40	2858.40	1850.91	142920.10	9254.51	6953.50

MCM: million cubic meters

MRY: million RMB Yuan

<sup>a</sup> The reduction of pollutions which are not restricted in reclaimed wastewater quality standards were not included.