



Figure S1 TN and TP loads of each city in the Tuojiang River Basin, a): 2019; b): 2018

Table S1 List of abbreviation in the equations

Equation	Parameters					
Eq.(1)	FN	nitrogen emission of planting source (t)	NF	the amount of nitrogen fertilizer (t)	CF	the amount of compound fertilizer (t)
Eq.(2)	FP	phosphorus emission of planting source (t)	NP	the amount of phosphate fertilizer (t)		
Eq.(3)	FNR	the total nitrogen into the river(t)	η	the loss coefficients into the river		
Eq.(4)	FPR	the total phosphorus into the river (t)				
Eq.(5)	DW	TN and TP emissions of rural living source (kg)	P	the rural population	C_1	TN and TP emissions in domestic sewage (g/(person day))
	C_2	TN and TP content in solid household waste of rural residents	ρ	the solid waste emission coefficient (kg/(person year))	C_3	TN and TP emissions in human manure and urine (g/(person day))
Eq.(6)	DWR	the amount of TN and TP entering the river from the rural living source (kg)	ϕ	domestic sewage treatment rate	μ	the coefficient of domestic sewage entering the river
	λ	the coefficient of household waste entering the river	β	the loss coefficient of human excrement into the river		
Eq.(7)	LF_i	TN and TP emission of poultry and livestock farming source (kg)	Q_k	the breeding quantity of the k kind of livestock (head)	R_{ik}	the TN or TP emission coefficient of type k livestock (kg/head a)
Eq.(8)	LFR_i	the amount of TN/ TP entering the river of livestock farming source (kg)	α	the loss coefficient of poultry and livestock farming source		
Eq.(9)	$GWFi$	the gray water footprint of TN or TP (m^3/a)	L_i	the non-point source pollution load of TN or TP (kg/a)	C_{max}	the maximum acceptable concentration of nitrogen and phosphorus pollution
	C_{nat}	the natural background value of TN and TP in the basin				
Eq.(10)	TR	total amount of surface water resources				

Table S2 The proportion of TN and TP load in rural living source of each city in the basin

City	Total amount	2019 TN	2018 TN	2019 TP	2018 TP
	/Proportion	Load/t	Load/t	Load/t	Load/t
Deiyang	Total amount	1018.53	1040.17	154.34	157.61
	Proportion/%	9.08	8.88	9.08	8.88
Chengdu	Total amount	1665.87	2036.38	252.43	308.57
	Proportion/%	14.85	17.39	14.85	17.39
Ziyang	Total amount	2219.28	2228.10	336.28	337.62

	Proportion/%	19.78	19.02	19.78	19.02
Meishan	Total amount	1108.23	1138.87	167.93	172.57
	Proportion/%	9.88	9.72	9.88	9.72
Neijiang	Total amount	2331.61	2360.87	353.30	357.74
	Proportion/%	20.79	20.16	20.79	20.16
Zigong	Total amount	1773.70	1815.06	268.77	275.03
	Proportion/%	15.81	15.50	15.81	15.50
Luzhou	Total amount	1100.39	1093.24	166.74	165.66
	Proportion/%	9.81	9.33	9.81	9.33

Table S3 The proportion of TN and TP load in poultry and livestock farming source of each city in the basin

City	Total amount /Proportion	2019 TN Load/t	2018 TN Load/t	2019 TP Load/t	2018 TP Load/t
Deiyang	Total amount	1639.00	1737.00	402.00	426.00
	Proportion/%	16.62	15.22	16.64	15.23
Chengdu	Total amount	1470.00	1951.00	360.00	478.00
	Proportion/%	14.91	17.10	14.90	17.08
Ziyang	Total amount	1828.00	2390.00	448.00	586.00
	Proportion/%	18.54	20.95	18.54	20.94
Meishan	Total amount	759.00	849.00	186.00	208.00
	Proportion/%	7.70	7.44	7.70	7.43
Neijiang	Total amount	1787.00	1911.00	438.00	469.00
	Proportion/%	18.12	16.75	18.13	16.76
Zigong	Total amount	1275.00	1398.00	312.00	343.00
	Proportion/%	12.93	12.25	12.91	12.26
Luzhou	Total amount	1102.00	1174.00	270.00	288.00
	Proportion/%	11.18	10.29	11.18	10.29

Table S4 TN and TP GWF of planting source in the TJRB (10^9 m^3)

District / county	TP GWF in 2019	TP GWF in 2018	TN GWF in 2019	TN GWF in 2018
Jingyang	21.45	21.64	9.07	8.62
Guanghan	44.24	37.11	14.71	14.79
Shifang	31.38	27.82	13.17	14.24
Mianzhu	29.65	25.23	14.72	14.80
Pengzhou	32.85	28.53	11.46	11.26
Xindu	16.60	14.42	5.35	5.69

Qingbaijiang	12.23	10.63	3.94	4.19
Jingtang	36.60	31.79	11.79	12.55
Longquanyi	5.11	4.44	1.65	1.75
Jianyang	69.55	60.41	22.40	23.84
Yanjiang	31.26	26.03	17.87	18.25
Anyue	27.92	23.40	11.18	11.23
Lezhi	10.89	9.39	14.65	15.06
Renshou	93.13	80.91	37.19	38.77
Shizhong	11.80	11.03	3.72	4.27
Dongxin	51.33	43.88	29.85	30.71
Weiyaun	31.17	26.29	13.62	16.06
Longchang	12.92	12.63	7.98	9.46
Zizhong	64.19	65.00	27.20	29.26
Ziliujing	5.38	4.64	1.73	1.80
Gongjing	18.70	18.54	5.55	5.87
Da,an	13.57	11.58	6.33	6.40
Yantan	25.01	21.38	10.11	10.27
Rongxian	49.94	42.10	13.12	13.24
Fushun	54.56	45.98	14.70	14.94
Jiangyang	15.03	19.23	8.85	10.50
Longmatan	10.22	8.64	4.23	4.30
Luxian	50.45	43.01	24.66	25.52
Total	877.12	775.66	360.77	377.64

Table S5 TN and TP GWF of living source in the TJRB (10^9 m^3)

District/ county	TN GWF in 2019	TP GWF in 2019	TN GWF in 2018	TP GWF in 2018
Jingyang	2.02	0.31	2.11	0.32
Guanghan	3.18	0.48	3.24	0.49
Shifang	2.26	0.34	2.31	0.35
Mianzhu	2.72	0.41	2.73	0.41
Pengzhou	3.16	0.48	3.26	0.49
Xindu	1.97	0.30	2.09	0.32
Qingbaijiang	1.41	0.21	1.42	0.21
Jingtang	4.69	0.71	4.69	0.71
Longquanyi	2.02	0.31	2.05	0.31
Jianyang	3.41	0.52	6.85	1.04

Yanjiang	6.52	0.99	6.39	0.97
Anyue	10.13	1.54	10.34	1.57
Lezhi	5.54	0.84	5.56	0.84
Renshou	11.08	1.68	11.39	1.73
Shizhong	1.75	0.27	1.82	0.28
Dongxin	4.76	0.72	4.80	0.73
Weiyaun	4.10	0.62	4.12	0.62
Longchang	8.31	1.26	8.42	1.28
Zizhong	4.41	0.67	4.45	0.67
Ziliujing	0.52	0.08	0.53	0.08
Gongjing	1.49	0.23	1.54	0.23
Da'an	2.30	0.35	2.32	0.35
Yantan	2.52	0.38	2.60	0.39
Rongxian	4.47	0.68	4.56	0.69
Fushun	6.43	0.97	6.60	1.00
Jiangyang	2.72	0.41	2.75	0.42
Longmatan	0.75	0.11	0.78	0.12
Luxian	7.54	1.14	7.40	1.12
Total	112.18	17.00	117.13	17.75

Table S6 TN and TP GWF of poultry and livestock farming source in the TJRB (10^9 m^3)

District/ county	TN GWF in 2019	TP GWF in 2019	TN GWF in 2018	TP GWF in 2018
Jingyang	6.71	8.23	6.35	7.79
Guanghan	4.46	5.46	4.79	5.87
Shifang	2.30	2.82	2.67	3.28
Mianzhu	2.92	3.58	3.57	4.37
Pengzhou	3.04	3.73	3.55	4.35
Xindu	1.21	1.48	1.96	2.41
Qingbaijiang	0.87	1.07	0.73	0.90
Jingtang	4.02	4.92	5.78	7.08
Longquanyi	0.73	0.90	1.37	1.67
Jianyang	4.83	5.92	6.12	7.50
Yanjiang	5.32	6.53	6.86	8.41
Anyue	7.83	9.60	9.93	12.17
Lezhi	5.13	6.29	7.12	8.73
Renshou	7.59	9.30	8.50	10.42

Shizhong	1.44	1.76	1.62	1.99
Dongxin	4.29	5.26	4.83	5.92
Weiyaun	3.47	4.25	3.72	4.56
Longchang	4.99	6.12	5.23	6.41
Zizhong	3.68	4.51	3.71	4.55
Ziliujing	0.42	0.51	0.45	0.55
Gongjing	1.12	1.37	1.26	1.54
Da,an	2.31	2.83	1.87	2.29
Yantan	1.08	1.33	1.16	1.43
Rongxian	4.08	5.00	4.48	5.49
Fushun	3.76	4.61	4.77	5.84
Jiangyang	1.94	2.38	2.40	2.94
Longmatan	1.54	1.89	1.48	1.82
Luxian	7.55	9.25	7.86	9.63
Total	98.60	120.88	114.12	139.90

Table S7 TN and TP GWF of ANPS in the TJRB (10⁹ m³)

District/ county	TP GWF in 2019	TP GWF in 2018	TN GWF in 2019	TN GWF in 2018
Jingyang	31.21	31.02	17.80	17.08
Guanghan	52.11	45.44	22.35	22.82
Shifang	35.91	32.85	17.73	19.22
Mianzhu	35.29	31.67	20.35	21.10
Pengzhou	38.97	35.35	17.66	18.07
Xindu	19.58	18.41	8.53	9.74
Qingbaijiang	14.37	12.60	6.22	6.35
Jingtang	45.08	42.42	20.49	23.01
Longquanyi	7.54	7.67	4.40	5.17
Jianyang	78.05	73.10	30.64	36.81
Yanjiang	42.72	39.28	29.71	31.50
Anyue	45.20	43.40	29.14	31.49
Lezhi	21.38	22.32	25.32	27.74
Renshou	110.83	99.95	55.86	58.65
Shizhong	14.89	14.40	6.91	7.71
Dongxin	60.19	53.44	38.90	40.34

Weiyaun	38.52	33.97	21.19	23.90
Longchang	25.33	25.42	21.28	23.11
Zizhong	72.03	72.92	35.28	37.42
Ziliujing	6.29	5.59	2.67	2.78
Gongjing	21.20	21.25	8.16	8.67
Da,an	18.14	15.63	10.94	10.59
Yantan	28.24	24.78	13.71	14.03
Rongxian	58.33	51.05	21.66	22.28
Fushun	64.04	56.82	24.88	26.31
Jiangyang	19.47	24.26	13.51	15.65
Longmatan	12.68	11.05	6.52	6.55
Luxian	65.41	58.25	39.75	40.78
Total	1083.00	1004.30	571.55	608.89