1   # APPENDIX A

2   ## SUPPORTING INFORMATION

3   **for**

4   ## Modeling the impacts of point-source inputs on nitrogen

5   ## retention in an urban river under low-flow conditions

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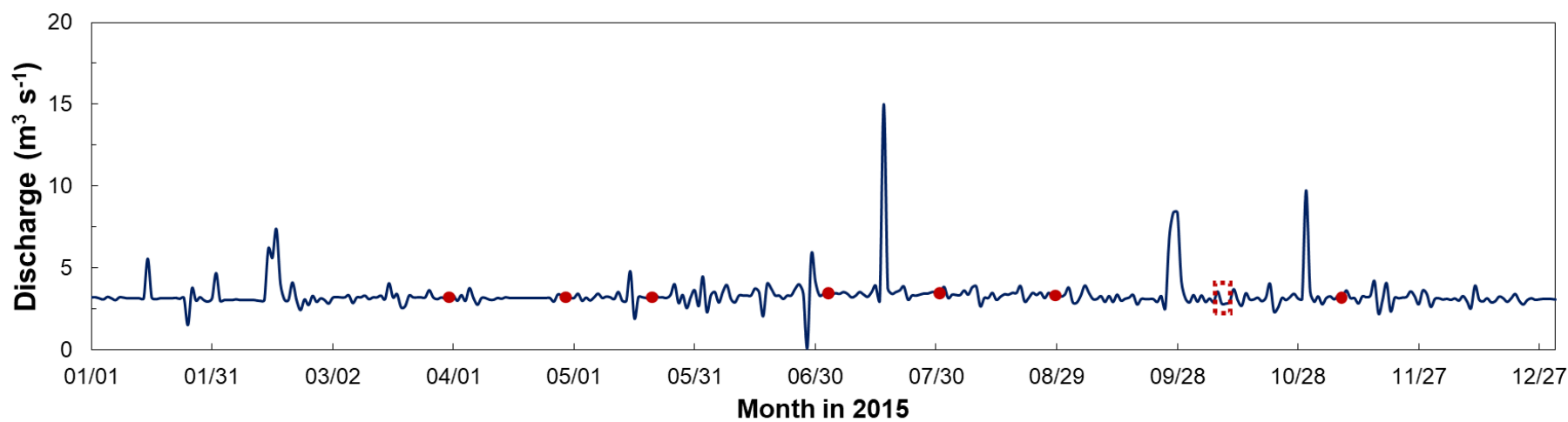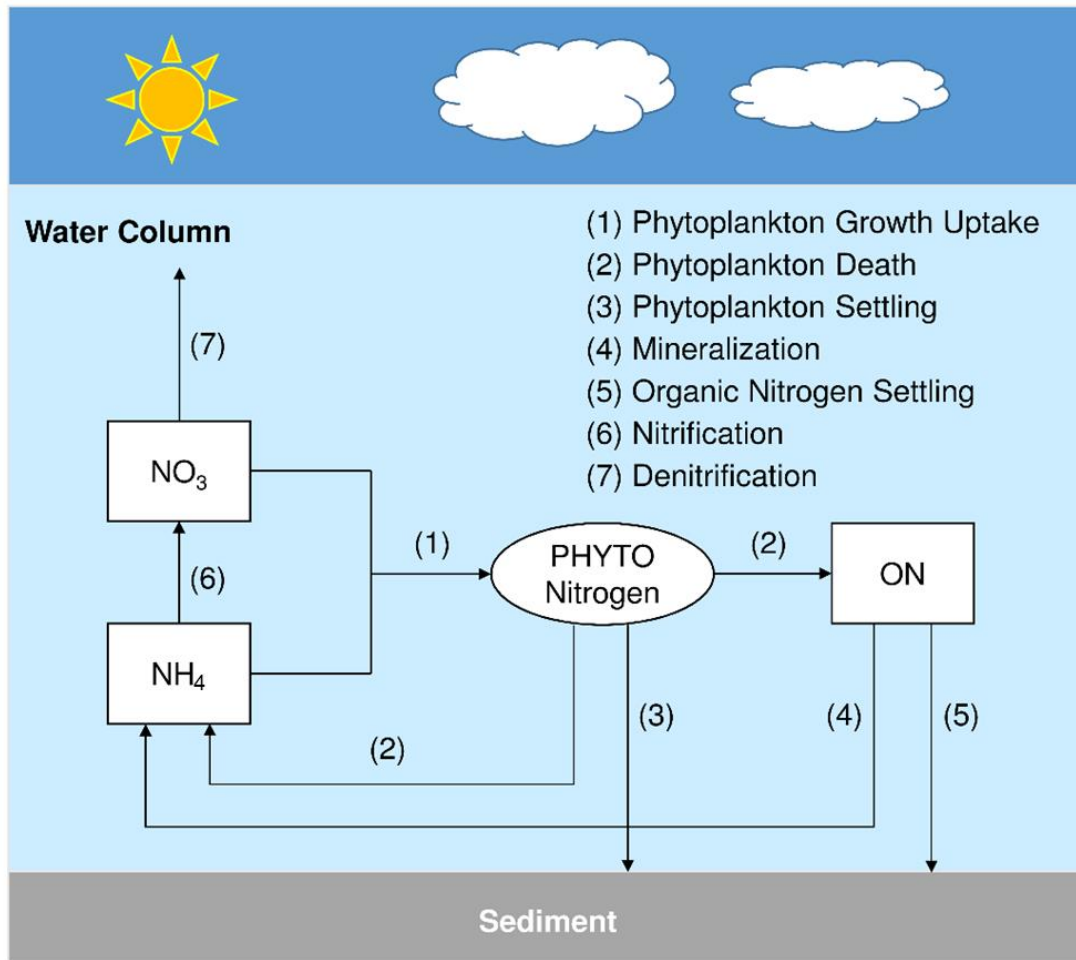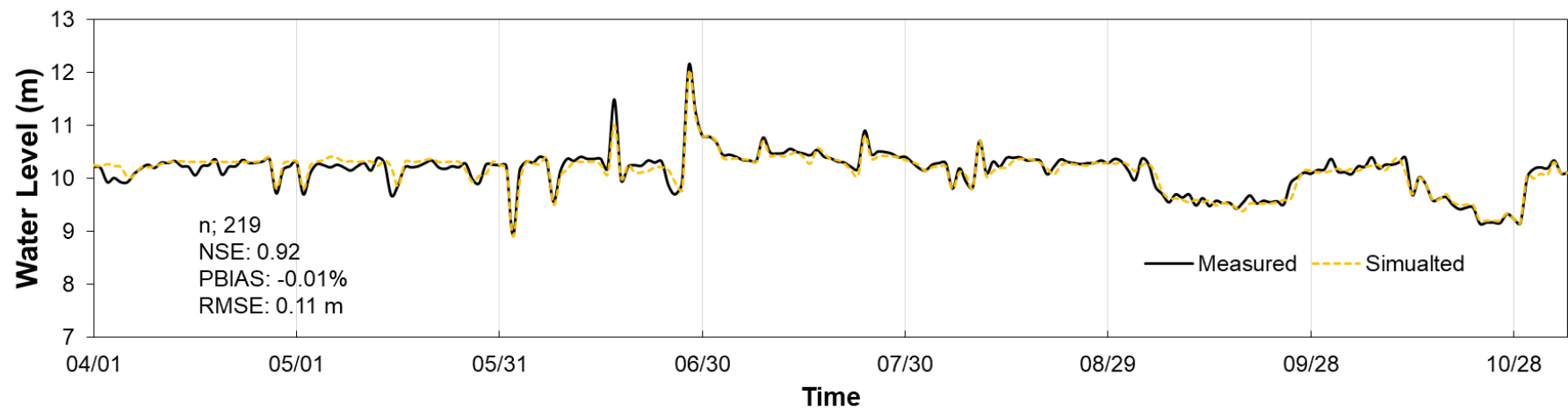13   Supporting Information consists of 8 figures and 1 table.

Figure S1 Discharge hydrograph at Site 14 in the Nanfei River for the year 2015. The red dots represent the routine sampling dates. The red dashed square represents the intensive Lagrange survey under low-flow condition.

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18 **Figure S2** Schematic description of the N cycling in the WASP EUTRO Module.

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Figure S3 Results of hydrodynamic model validation: comparison of simulated and measured values of water level at Site 14 during 1st April - 5th
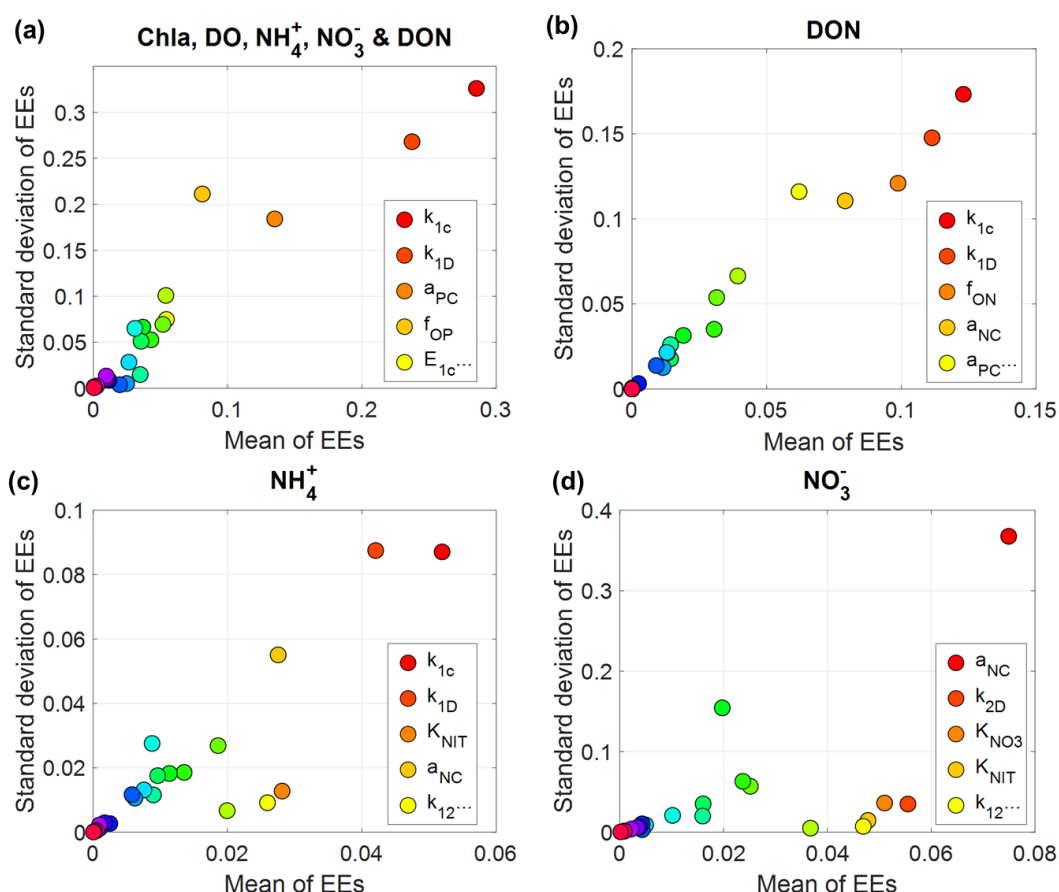
November 2015; the number of measurements was 219.

Figure S4 Parameter sensitivity ranking by Elementary Effects (EE) method with different objective functions defined respectively by (a) the sum of NSE coefficients of NH3, NO3, DON, Chl-a and DO, the NSE of (b) DON, (c) NH3, and (d) NO3. The more to the right a point along the horizontal axis, the more influential the parameters. The higher up a point along the vertical axis, the larger its degree of interactions with other parameters. Useful for screening and ranking.(Pianosi et al. 2016) The 5 most sensitive parameters for each objective function are shown in its legend.
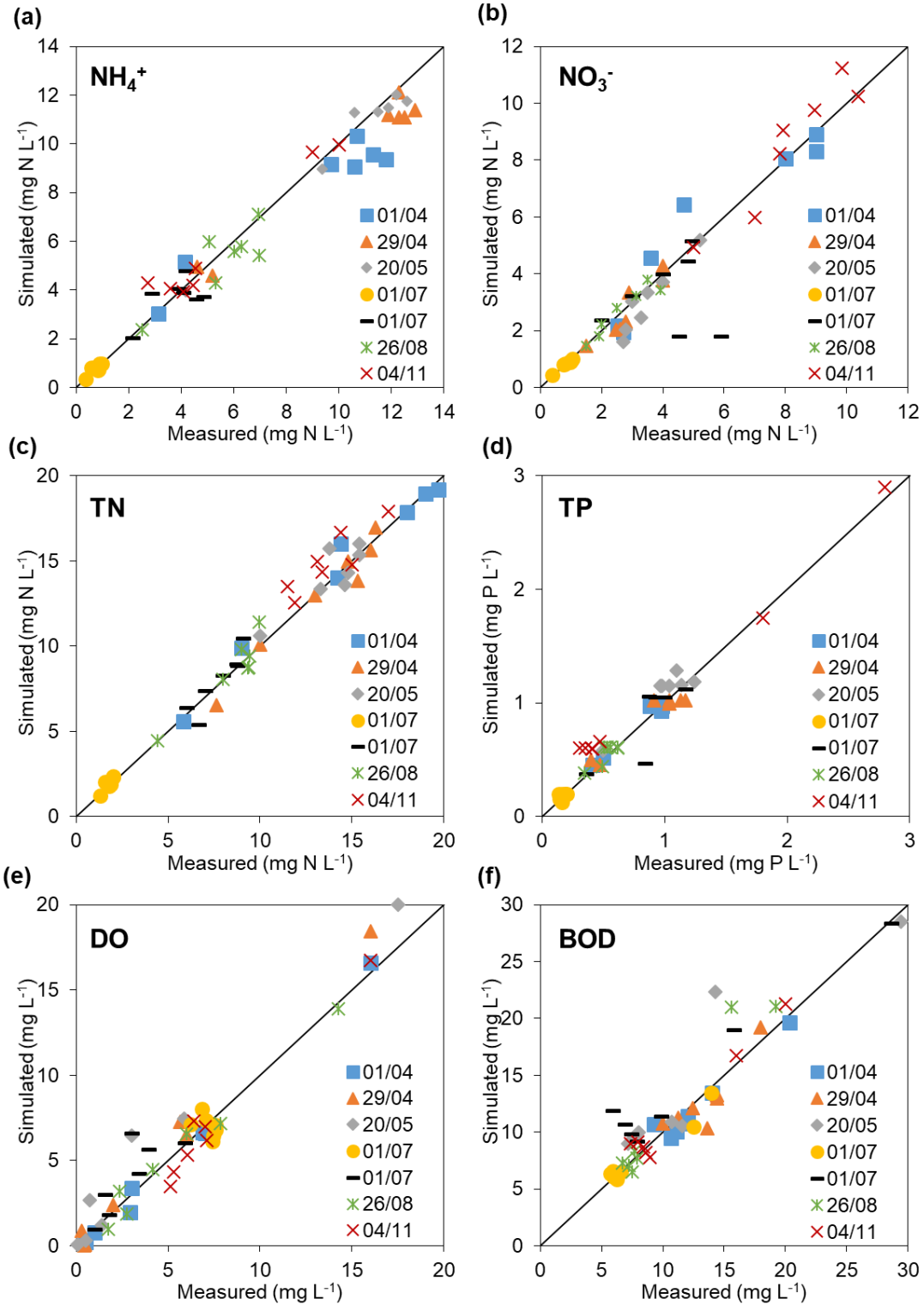
Figure S5 Results of hydrodynamic model validation: comparison of simulated and measured values of water level at Site 14 during 1st April - 5th November 2015; the number of measurements was 219.
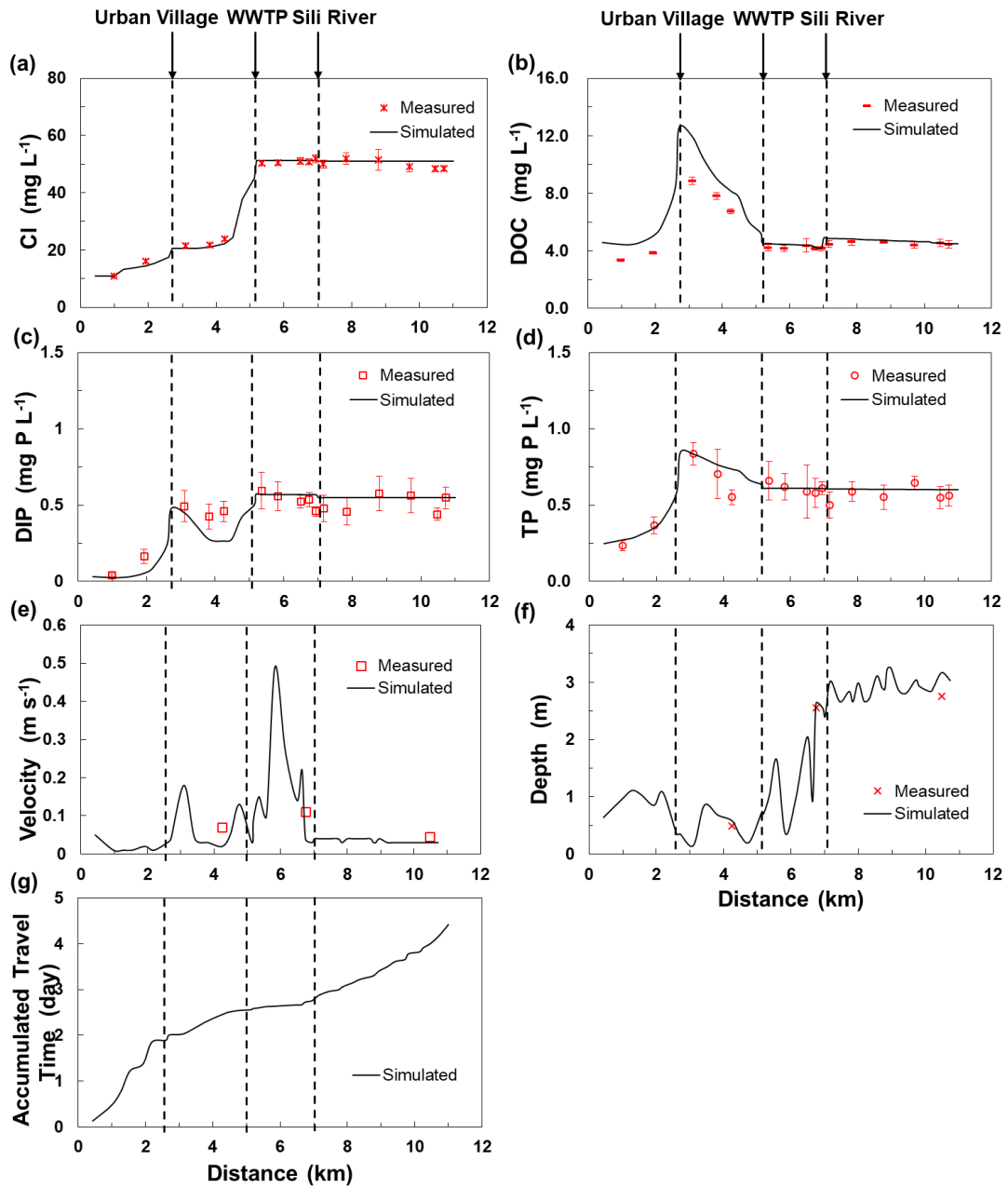
Figure S6 Longitudinal measured and simulated (a) Cl (b) DOC (c) DIP (d) TP (e) velocity (f) depth and simulated (f) accumulated travel time during low-flow conditions in the Nanfei River.
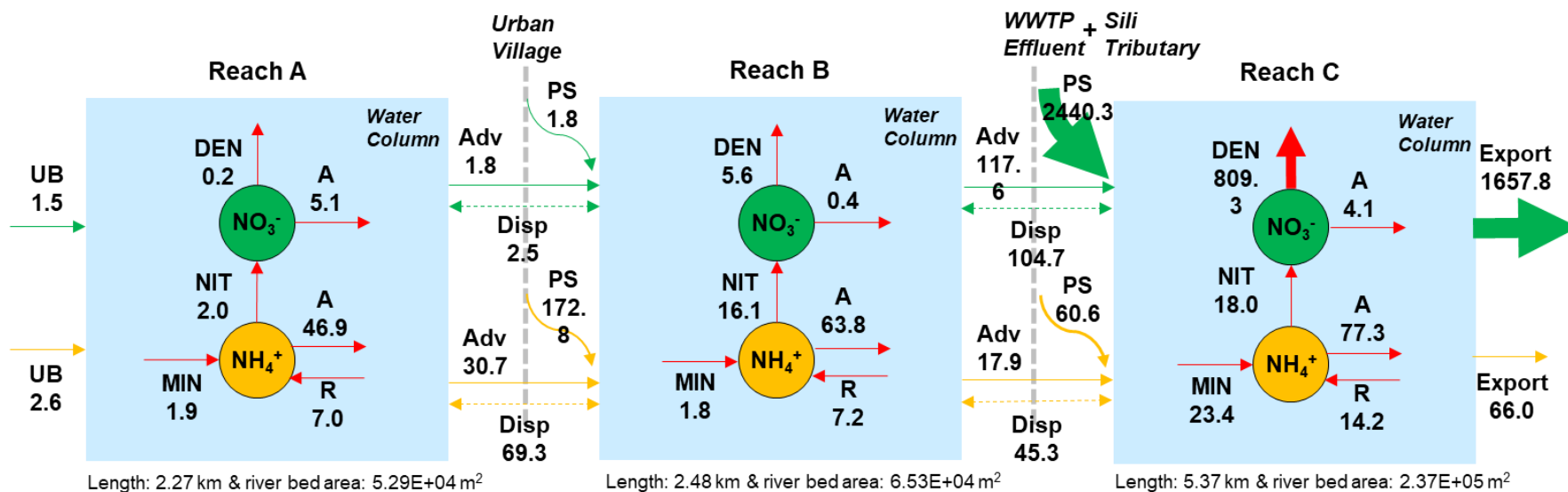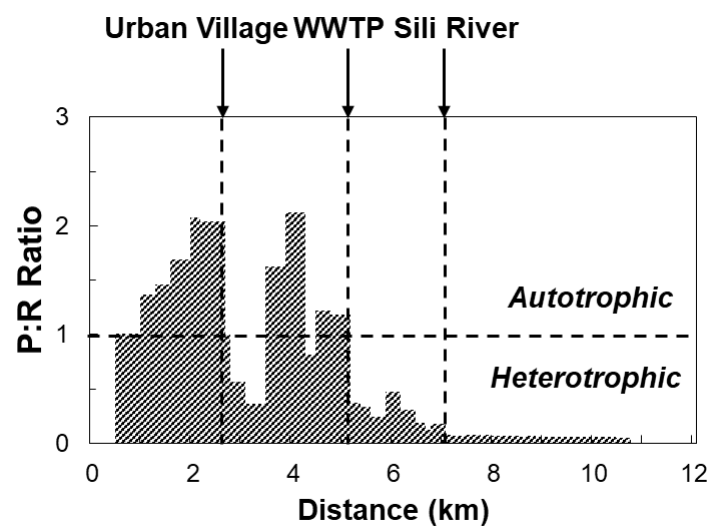
Figure S7 DIN mass balance fluxes (kg N d^{-1}) including boundaries, advections, dispersions, loadings, reactions and exports in Reaches A, B and C; UB, Adv and Disp are short for upper boundary, advective and dispersive transport, respectively.

Figure S8 Longitudinal primary production to respiration ratio and metabolism condition (Huang et al. 2017)

44 **Table S1**. DIN cycling, inputs & exports fluxes (kg N d^{-1}) in the three representative
45 reaches and whole reach.

Flux	Reach A NH$_4^+$	Reach A NO$_3^-$	Reach B NH$_4^+$	Reach B NO$_3^-$	Reach C NH$_4^+$	Reach C NO$_3^-$	Whole Reach NH$_4^+$	Whole Reach NO$_3^-$
Inputs								
Upper Boundary	1.5	2.6	30.7	1.8	17.9	117.6	1.5	2.6
Urban village			172.8	3.5			172.8	3.5
WWTP					19.5	1757.4	19.5	1757.4
Sili River					41.0	682.9	41.0	682.9
Dispersion	69.3	2.5	-114.6	102.2	45.3	-104.7		
Σ Inputs	70.8	5.1	88.9	107.4	123.7	2453.2	234.8	2446.3
Processes								
Mineralization	1.9		1.8		23.4		27.0	
Nitrification	-2.0	2.0	-16.1	16.1	-18.0	18.0	-36.1	36.1
Phytoplankton death	7.0		7.2		14.2		28.4	
Assimilatory uptake	-46.9	-5.1	-63.8	-0.4	-77.3	-4.1	-188.0	-9.6
Denitrification		-0.2		-5.6		-809.3		-815.1
Σ Processes	-40.1	-3.3	-71.0	10.2	-57.7	-795.4	-168.7	-788.6
Export	30.7	1.8	17.9	117.6	66.0	1657.8	66.0	1657.8

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References

Huang, J., Yin, H., Chapra, S.C. and Zhou, Q. (2017) Modelling dissolved oxygen depression in an urban river in China. Water (9).

Pianosi, F., Beven, K., Freer, J., Hall, J.W., Rougier, J., Stephenson, D.B. and Wagener, T. (2016) Sensitivity analysis of environmental models: A systematic review with practical workflow. Environmental Modelling & Software 79(Supplement C), 214-232.