Designing Resilient Drinking Water Systems Treating Eutrophic Sources: A Holistic Evaluation of Biological Stability and Treatment Sequence

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Table S1. Concentration of key chemical and biological parameters in the source water (SW) and throughout the full treatment. Values represent mean concentrations. Abbreviations: SW: source water; RWR: raw water reservoir; CPT: conventional pre-treatment; AOP_C: advanced oxidation process in the conventional line; AOP_A: advanced oxidation process in the advanced line; GAC: granular activated carbon filtration; FDW: final drinking water.

Parameter	SW	RWR	CPT	AOP_C	APT	AOP_A	GAC	FDW
TOC (mg/L)	5.91	5.63	1.97	1.85	2.22	2.00	1.20	1.17
Fe (µg/L)	205	159	125	21	<10	<10	<10	<10
Mn (µg/L)	NA	35	31	23	20	22	<10	<10
NH_4^+ (mg/L)	0.05	0.076	0.045	0.05	0.076	0.075	0.007	0.007
NO_3^- (mg/L)	1.321	1.121	1.094	1.048	1.03	0.859	1.148	1.125
NO_2^- (mg/L)	0.011	0.022	0.004	0.065	0.021	0.078	0.003	0.004
PO_4^{3-} (mg/L)	0.063	0.033	<0.01	<0.01	0.01	<0.01	0.025	0.012
Zooplankton (units/L)	342	171	NA	NA	NA	NA	29900	3430

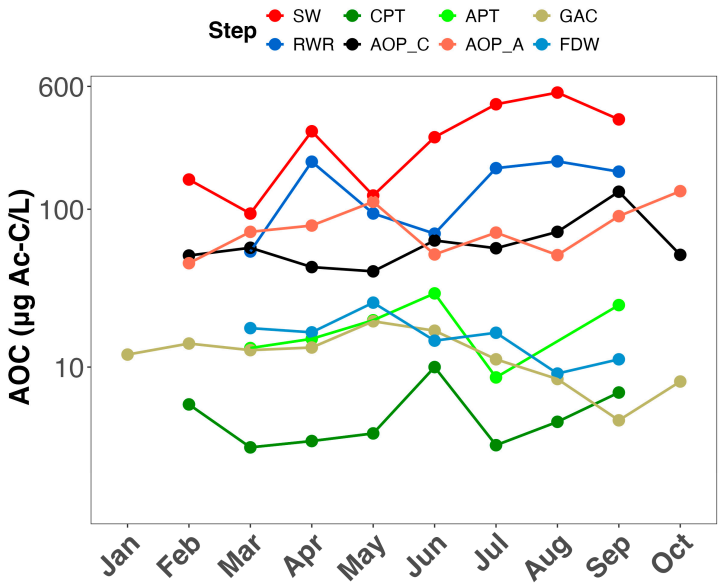

Figure S1. Seasonal trends of assimilable organic carbon (AOC) throughout the year in the full treatment process. Abbreviations: SW: source water; RWR: raw water reservoir; CPT: conventional pre-treatment; AOP_C: advanced oxidation process in the conventional line; AOP_A: advanced oxidation process in the advanced line; GAC: granular activated carbon filtration; FDW: final drinking water.

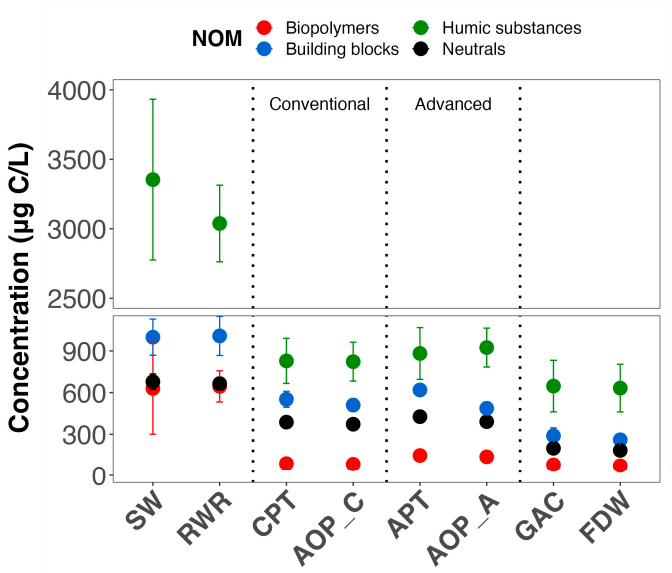

Figure S2. Natural organic matter (NOM) fractions concentration during the treatment process. Error bars represent seasonal variation observed across sampling periods. Abbreviations: SW: source water; RWR: raw water reservoir; CPT: conventional pre-treatment; AOP_C: advanced oxidation process in the conventional line; AOP_A:

advanced oxidation process in the advanced line; GAC: granular activated carbon filtration; FDW: final drinking water.

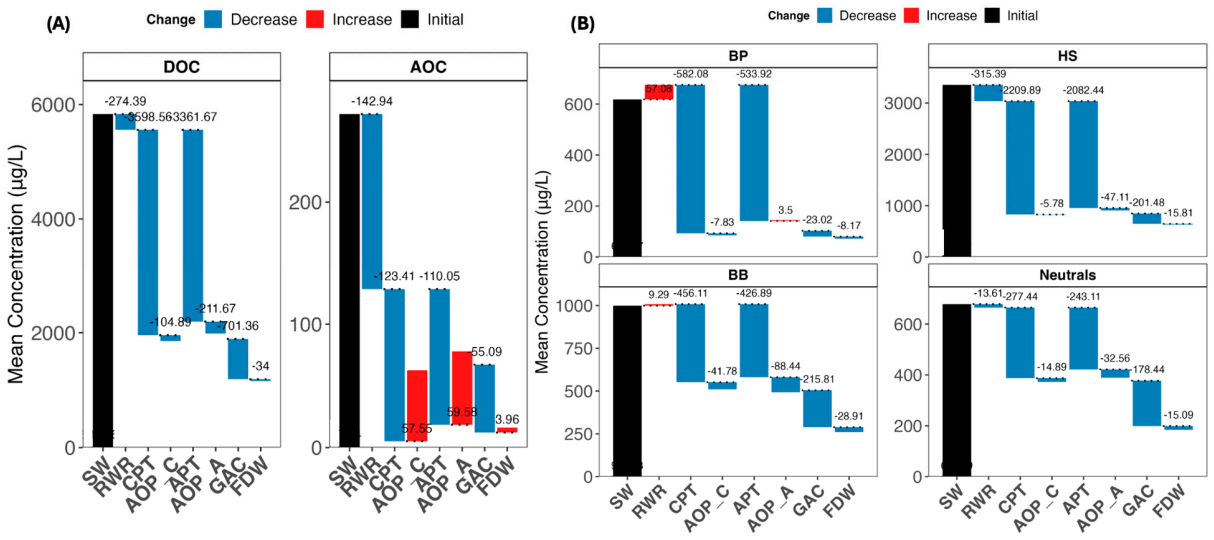

Figure S3. Waterfall plots showing the evolution of (A) dissolved organic carbon (DOC) and assimilable organic carbon (AOC), and (B) natural organic matter (NOM) fractions concentration during the treatment process: biopolymers (BP), humic substances (HS), building blocks (BB), and neutrals. Initial surface water (SW) concentrations are shown in black, decreases in blue, and increases in red. The change at each treatment stage was calculated relative to the preceding step, using effluent concentrations and accounting for the flow split between branches (70% through the conventional pre-treatment, and 30% through the advanced pre-treatment). The final combined concentration before GAC was estimated as a weighted average. Dotted lines represent the effluent concentration of the preceding step for visual reference. Abbreviations: SW: source water; RWR: raw water reservoir; CPT: conventional pre-treatment; AOP_C: advanced oxidation process in the conventional line; AOP_A: advanced oxidation process in the advanced line; GAC: granular activated carbon filtration; FDW: final drinking water.

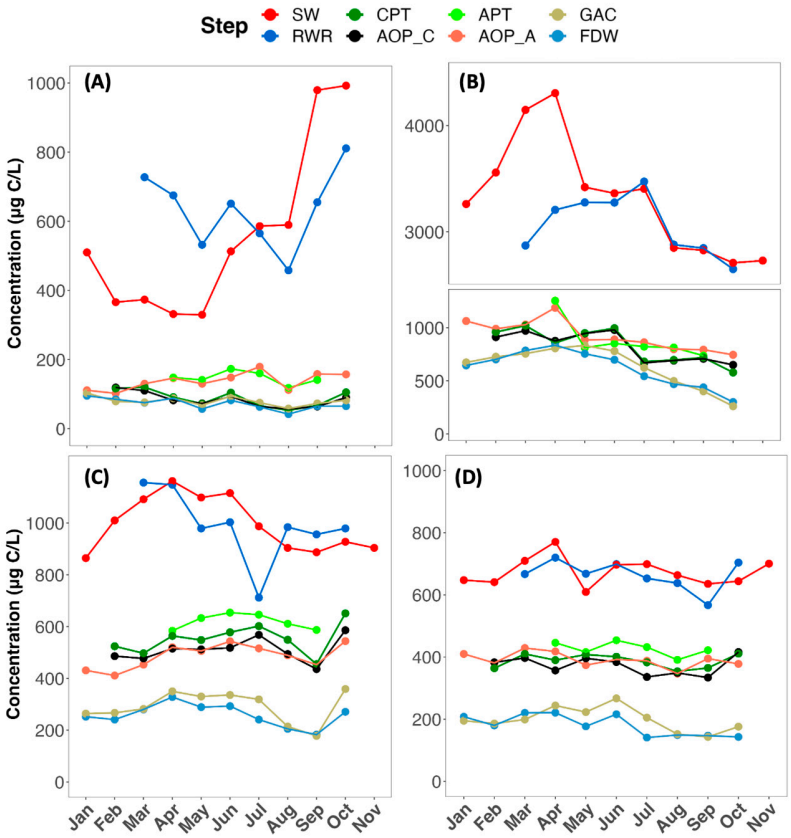

Figure S4. Seasonal trends of natural organic matter (NOM) fractions throughout the year in the full treatment process. (A) biopolymers; (B) humic substances; (C) building blocks; (D): neutrals. Abbreviations: SW: source water; RWR: raw water reservoir; CPT: conventional pre-treatment; AOP_C: advanced oxidation process in the conventional line; AOP_A: advanced oxidation process in the advanced line; GAC: granular activated carbon filtration; FDW: final drinking water.

Table S2. Significance values between the different sample groups based on the PERMANOVA analysis. Abbreviations: SW: source water; RWR: raw water reservoir; CPT: conventional pre-treatment; AOP_C: advanced oxidation process in the conventional line; AOP_A: advanced oxidation process in the advanced line; GAC: granular activated carbon filtration; FDW: final drinking water.
S = Significant
N.S. = Not significant

		Significance based on PERMANOVA		
Compared samples		p-value	R^2	
SW	RWR	0.126	0.201	N.S.
RWR	CPT	0.001	0.557	S
CPT	AOP_C	0.003	0.922	S
AOP_C	AOP_A	0.020	0.484	S
GAC	FDW	0.759	0.022	N.S.

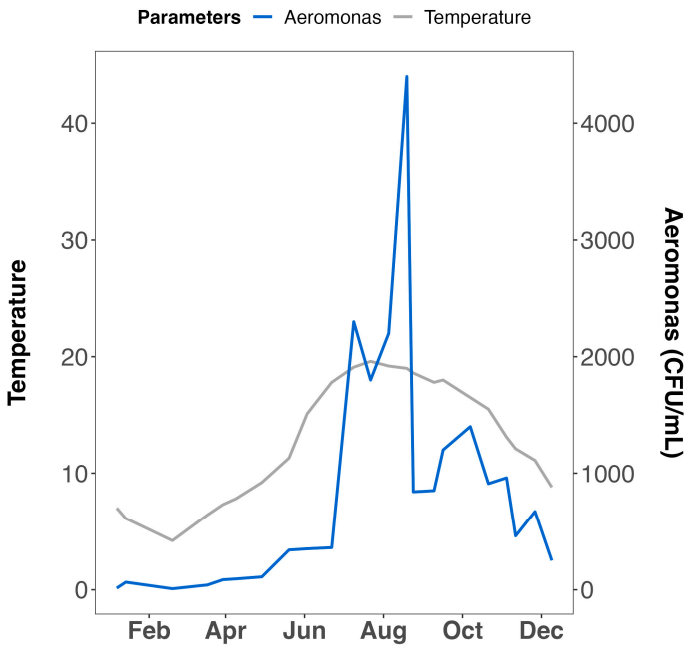

Figure S5. Increase of Aeromonas count (right y-axis) in the distribution network and with the temperature of the water (left y-axis) throughout the year.