SPATIAL AND TEMPORAL DYNAMICS OF PHYTOPLANKTON IN A HIGHLY IMPACTED TROPICAL MONTANE RIVER

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Supplementary Material

Table S1. Median values and range (in parentheses) of limnological variables in the dry and wet periods in the Piabanha River. Seasonal periods were compared by Mann-Whitney test. Significant values are in bold (N = 18; $p < 0.05$).

Variables	**U statistic**	***p* value**	**Dry**	**Wet**
Precipitation (mm)	72.000	**p = 0.004**	42 (5–51)	120 (23–136)
Flow (m^3/s)	0.000	**p < 0.001**	4.5 (3.1–5.7)	13.8 (3.9–49.0)
Depth (m)	119.500	p = 0.181	0.5 (0.1–1.5)	0.6 (0.2–2.2)
Water temperature (°C)	57.500	**p < 0.001**	20 (16–22)	21 (18–26)
Turbidity (NTU)	136.000	p = 0.420	6.7 (0.7–25)	8.5 (1.2–40)
Electrical conductivity (µS/cm)	108.000	p = 0.090	170 (16–266)	119 (15–266)
Dissolved oxygen (mg/L)	83.000	**p = 0.013**	7.9 (3.3–13.8)	5.8 (2.4–9.3)
pH	145.500	p = 0.612	7.1 (6.0–7.7)	7.2 (6.0–7.5)
TN (µM)	142.000	p = 0.537	350 (12–789)	271 (14–699)

Variables	**U statistic**	***p* value**	**Dry**	**Wet**
TP (µM)	80.000	**p = 0.010**	21 (1–51)	6 (0.1–17)
Total phytoplankton (mm^3/L)	126.000	p = 0.261	0.144 (0.001–1.353)	0.214 (0.004–1.231)
Cyanobacteria (mm^3/L)	97.000	**p = 0.041**	0.010 (0.000–0.281)	0.043 (0.001–0.226)
Diatoms (mm^3/L)	157.000	p = 0.887	0.029 (0.000–0.121)	0.028 (0.000–0.188)
Phytoflagellates (mm^3/L)	134.000	p = 0.381	0.016 (0.000–0.923)	0.001 (0.000–1.058)
Green algae (mm^3/L)	119.000	p = 0.179	0.022 (0.000–0.119)	0.032 (0.000–0.521)
Phytoplankton richness (taxa/sample)	134.000	p = 0.383	19 (6–28)	21 (6–31)
Phytoplankton diversity (bits/ind)	150.000	p = 0.716	2.2 (0.7–3.0)	2.4 (1.7–3.4)
Total zooplankton (ind/L)	150.000	p = 0.716	1,752 (0–146,126)	2,365 (40–50,740)
Cladocerans (ind/L)	147.000	p = 0.601	0 (0–33)	0 (0–200)
Copepods (ind/L)	144.000	p = 0.568	37 (0–10,367)	30 (0–1,690)
Rotifers (ind/L)	139.000	p = 0.476	1635 (0–145,766)	2,200 (10–50,500)

Table S2. Median values and range (in parentheses) of abiotic variables at different sampling points of the Piabanha River. Points 1, 2 and 3 = upper course, 4 and 5 = middle course, and 6 = lower course. Sampling points were compared by Kruskal-Wallis test. Significant values are in bold and different letters indicate significant differences among sampling points (N = 6; $p < 0.05$).

Variable	Chi-Square (df = 5)	p-value	P1	P2	P3	P4	P5	P6
Depth (m)	22,504	**0.001**	0.3^{ac} (0.1–0.5)	0.2^{ac} (0.2–0.3)	0.5^{ac} (0.3–1.5)	0.6^{ac} (0.2–0.7)	0.7^{ad} (0.4–1.5)	1.0^{bd} (0.5–2.2)
Water Temperature (ºC)	13,290	**0.021**	17^{a} (16–20)	21^{ab} (19–25)	21^{b} (19–26)	21^{ab} (18–25)	20^{ab} (18–26)	21^{ab} (20–25)
Turbidity (NTU)	20,798	**< 0.001**	1.2^{a} (0.7–5.1)	8.4^{ab} (1.4–11.2)	6.2^{ab} (4.5–9.4)	5.9^{ab} (1.8–11.7)	15.8^{b} (2.1–26.7)	24.9^{b} (6.4–40.0)
Eletrical conductivity (µS/cm)	21,239	**< 0.001**	16^{a} (15–21)	183^{b} (121–236)	212^{b} (144–266)	189^{b} (83–228)	123^{ab} (38–171)	144^{ab} (39–151)
Dissolved Oxygen (mg/L)	6,700	0.244	7.9 (3.8–9.3)	6.6 (3.3–9.3)	8.8 (3.1–13.8)	4.6 (2.4–7.9)	7.5 (3.5–8.9)	7.2 (3.1–78)
pH	15,329	**0.009**	6.8^{abc} (6.0–7.5)	7.0^{ab} (7.0–7.2)	7.1^{abc} (7.1–7.4)	7.1a^{bc} (6.8–7.2)	7.4a^{bc} (7.1–7.7)	7.5^{ac} (7.3–7.6)
Total nitrogen (µM)	18,691	**0.002**	14.1^{a} (12.4–29.0)	208.4^{ab} (168.1–508.4)	493.1^{b} (304.3–789.3)	352.5^{b} (80.6–632.4)	350.9^{b} (121.6–612.5)	331.7^{ab} (189.5–432.6)
Total phosphorus (µM)	15,843	**0.007**	1.0^{a} (0.1–2.0)	12.6^{ab} (1.8–38.7)	14.9^{b} (11.4–34.8)	8.6^{ab} (4.7–30.9)	5.2^{ab} (2.0–51.2)	14.0^{b} (3.4–33.7)

Table S3. Median values and ranges (in parentheses) of biotic variables at different sampling points in the Piabanha River. Points 1, 2 and 3 = upper course, 4 and 5 = middle course, and 6 = lower course. Sampling points were compared by Kruskal-Wallis test. Significant values are in bold and different letters indicate significant differences among sampling points (N = 6; $p < 0.05$). Tphyto = total biovolume of phytoplankton (mm^3/L), Cyano = cyanobacteria (mm^3/L), Diat = diatoms (mm^3/L), Phyto = phytoflagellates (mm^3/L), Green = Green algae (mm^3/L), (Richn = phytoplankton richness (taxa/sample), Diver = phytoplankton diversity (bits/ind), Tzoo = total abundance of zooplankton (ind/L), Roti = Rotifers (ind/L), Clad = Cladocerans (ind/L), Cope = Copepods (ind/L).

Variable	Chi-Square (df = 5)	p-value	P1	P2	P3	P4	P5	P6
TPhyto	17,216	**0.004**	0.013[a]	0.340[b]	0.184[ab]	0.167[ab]	0.263[b]	0.175[ab]
			(0.001–0.044)	(0.114–0.953)	(0.085–1.231)	(0.067–0.215)	(0.096–1.353)	(0.091–0.943)
Cyan	12,336	**0.030**	0.005[a]	0.049[ab]	0.043[ab]	0.039[ab]	0.066[b]	0.054[ab]
			(0.001–0.018)	(0.032–0.208)	(0.004–0.281)	(0.008–0.080)	(0.008–0.226)	(0.004–0.293)
Diat	11,544	**0.042**	0.001[a]	0.067[ab]	0.046[ab]	0.056[ab]	0.034[ab]	0.075[b]
			(0.000–0.008)	(0.000–0.188)	(0.002–0.066)	0.000–0.081)	(0.002–0.136)	(0.013–0.511)
Phyto	6,771	0.238	0.001	0.059	0.001	0.007	0.040	0.005
			(0.000–0.009)	(0.003–0.329)	(0.000–1.045)	(0.000–0.036)	(0.000–0.923)	(0.000–0.002)
Green	13,589	**0.018**	0.005[a]	0.055[b]	0.075[b]	0.045[ab]	0.050[ab]	0.042[ab]
			(0.000–0.020)	(0.018–0.521)	(0.013–0.101)	(0.015–0.166)	(0.015–0.221)	(0.006–0.086)
Richn	7,449	0.189	15	25	20	22	21	19
			(6–18)	(6–31)	(15–31)	(9–27)	(13–28)	(7–29)
Diver	0,682	0.984	2.1	2.2	2.1	2.4	2.3	2.4
			(1.5–2.7)	(1.6–2.7)	(1.7–3.3)	(1.4–2.9)	(1.6–2.4)	(0.7–3.4)
TZoo	6,827	0.234	570	1,265	5,937	1,676	1,951	2,015
			(40–14,667)	(50–50,740)	(1,467–146,126)	(1,120–5,340)	(0–30,797)	(0–3,220)

Variable	Chi-Square (df = 5)	p-value	P1	P2	P3	P4	P5	P6
Roti	10,189	0.070	150	1,235	4,737	1,651	1,848	1,930
			(10-4,283)	(33-50,500)	(1,467-145,766)	(1,120-5,300)	(0-30,707)	(0-3,200)
Clad	4,525	0.477	0	8	0	0	19	5
			(0–17)	(0–200)	(0–120)	(0–40)	(0–40)	(0–33)
Cope	7,447	0.189	373	8	30	17	95	63
			(0–10,367)	(0–40)	(0–1,690)	(0–60)	(0–525)	(0–180)