

**PHYTOPLANKTON BIOMASS INCREASES IN A SILT-IMPACTED
AREA IN AN AMAZONIAN FLOOD-PLAIN LAKE OVER 15 YEARS**

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SUPPLEMENTARY MATERIAL

Table S1. Summary of linear mixed-effect regressions (LMER) testing differences in the Total phytoplankton biomass ($\text{mm}^3 \text{L}^{-1}$) and abiotic variables (fixed factors) (Residual light attenuation m^{-1} ; Turbidity, NTU; Total nitrogen, mg L^{-1} ; NTU; Total phosphorus, mg L^{-1} ; Air temperature, $^{\circ}\text{C}$; site depth, m) between impacted and non-impacted areas and among years (2005–2019), controlled for sites (random factor) and their interactions in Batata Lake. The table shows the degrees of freedom from the numerator (numDF) and denominator (denDF) after the Satterthwaite correction and the F and p-value associated with it. Marginal r^2 describes the proportion of variance explained by the fixed factors alone, and Conditional r^2 represents the proportion of variance explained by fixed and random factors. Significant p-values are in bold.

Variables	numDF	denDF	F-value	p-value
Total phytoplankton biomass (Marginal $r^2 = 0.17$; Conditional $r^2 = 0.29$)				
(Intercept)	1	340	0.2903	0.5904
year	1	340	7.8243	0.0054
impact	1	6	8.5724	0.0264
year:impact	1	340	1.1501	0.2843
Residual light attenuation (Marginal $r^2 = 0$; Conditional $r^2 = 0.02$)				
(Intercept)	1	340	0.0228	0.8802
year	1	340	0.1027	0.7488
impact	1	6	0.0243	0.8811
year:impact	1	340	0.3297	0.5662
Turbidity (Marginal $r^2 = 0.06$; Conditional $r^2 = 0.07$)				
(Intercept)	1	358	0.0025	0.9599
year	1	358	5.3509	0.0213
impact	1	6	10.4771	0.0178
year:impact	1	358	1.0143	0.3146
Total nitrogen (Marginal $r^2 = 0.01$; Conditional $r^2 = 0.05$)				
(Intercept)	1	346	0.0236	0.8780
year	1	346	0.0872	0.7680
impact	1	6	0.3984	0.5512
year:impact	1	346	2.1760	0.1411
Total phosphorus (Marginal $r^2 = 0.15$; Conditional $r^2 = 0.17$)				
(Intercept)	1	351	0.0017	0.9673
year	1	351	57.8517	0.0000
impact	1	6	3.3490	0.1170
year:impact	1	351	0.2884	0.5916

Variables	numDF	denDF	F-value	p-value
Air temperature (Marginal $r^2 = 0.04$; Conditional $r^2 = 0.05$)				
(Intercept)	1	358	0.0038	0.9509
year	1	358	11.5948	0.0007
impact	1	6	3.6021	0.1065
year:impact	1	358	0.9902	0.3204
Site depth (Marginal $r^2 = 0.06$; Conditional $r^2 = 0.16$)				
(Intercept)	1	358	0.2629	0.6084
year	1	358	0.4918	0.4836
impact	1	6	4.0581	0.0906
year:impact	1	358	0.8968	0.3443

Table S2. Annual mean, standard deviation (SD), and number of samples (n) per year of the variables selected in the models. AirT = Air temperature, z_{site} = Site depth, Turb = Turbidity, TN = Total nitrogen, TP = Total phosphorus, PhyBM = Total phytoplankton biomass, IA = impacted area, NIA = non-impacted area.

Year	AirT (°C)			z_{site} (m)			Turb (NTU)			K_{res} (m ⁻¹)			TN (mg L ⁻¹)			TP (µg L ⁻¹)			PhyBM (mm ³ L ⁻¹)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Impacted																					
2005	27.1	0.5	12	3.3	1.8	12	14.4	10.9	12	1.7	0.7	12	0.15	0.05	11	19.11	9.32	12	1.5	1.3	10
2006	26.7	1.0	14	4.0	2.4	14	11.6	14.6	14	1.9	0.6	12	0.30	0.11	14	19.90	14.39	14	1.3	1.5	11
2007	27.1	0.9	15	3.2	1.9	15	24.1	24.2	15	1.2	0.7	14	0.24	0.11	15	39.12	24.13	15	0.5	0.6	15
2008	26.7	1.1	15	3.5	2.2	15	23.3	23.5	15	1.4	0.8	13	0.24	0.06	15	12.62	5.93	14	1.4	1.9	15
2009	27.3	1.4	16	3.9	2.6	16	19.4	23.1	16	1.5	0.8	16	0.50	0.13	14	29.66	22.76	15	1.3	1.9	16
2010	27.2	0.5	12	3.3	1.6	12	15.2	20.2	12	2.0	0.4	11	0.25	0.05	10	33.45	15.01	12	0.9	1.1	12
2011	27.4	0.8	16	3.5	1.9	16	11.2	17.2	16	1.7	0.6	16	0.47	0.16	15	17.93	9.34	16	3.1	3.3	14
2012	27.3	0.8	16	4.3	2.0	16	6.8	8.9	16	1.9	0.7	15	0.40	0.21	16	15.63	12.66	14	2.2	3.3	16
2013	27.5	0.6	18	3.1	1.9	18	12.5	18.6	18	1.5	0.8	18	0.80	0.97	17	22.95	31.15	18	2.6	4.1	18
2014	28.0	1.1	15	3.5	1.8	10	12.8	14.9	10	1.2	0.9	10	0.30	0.15	10	17.34	8.75	10	1.9	1.7	9
2015	27.8	1.3	20	4.0	1.9	16	13.9	36.2	16	2.1	0.7	16	0.28	0.22	16	20.78	18.21	16	4.0	4.6	16
2016	27.7	0.9	15	2.4	1.4	14	31.4	42.8	14	1.5	0.8	14	0.16	0.09	10	2.85	1.99	12	2.8	3.8	14
2017	27.6	1.1	20	3.8	2.1	16	11.3	9.1	16	1.6	0.7	16	0.26	0.19	16	9.34	5.44	16	1.8	3.3	16
2018	27.3	0.8	20	3.1	1.6	16	7.7	6.9	15	1.6	0.8	16	0.29	0.11	16	4.47	4.06	16	4.2	5.8	16
2019	26.7	0.7	20	4.1	1.9	14	5.9	5.9	14	1.8	0.7	14	0.39	0.19	14	14.91	11.30	14	1.9	2.2	14
All years	27.3	0.9	244	3.5	1.9	220	15.4	19.4	219	1.6	0.7	213	0.30	0.19	209	18.9	13.1	214	2.1	2.7	212
Non-impacted																					
2005	27.3	0.7	10	3.9	2.5	10	8.4	9.9	10	1.3	0.8	7	0.54	0.18	9	25.78	17.94	9	4.2	3.2	8
2006	27.2	1.1	9	5.1	2.8	9	5.1	4.4	9	2.0	0.6	9	0.31	0.08	9	15.30	12.30	9	1.8	1.6	4
2007	27.4	0.9	10	4.7	2.3	10	7.7	4.8	10	1.9	0.7	10	0.28	0.12	10	44.92	26.57	10	2.2	2.4	8
2008	26.9	1.0	10	5.0	2.4	10	7.4	2.9	10	1.3	0.7	10	0.29	0.09	10	18.88	6.81	10	4.2	3.8	10
2009	27.7	1.3	10	4.8	3.5	10	21.5	28.7	10	1.7	1.0	9	0.53	0.18	10	47.86	35.95	10	4.3	4.3	10
2010	27.6	0.7	10	3.7	2.6	10	14.2	26.9	10	1.6	0.9	9	0.30	0.15	10	40.77	42.39	10	3.3	2.2	10
2011	27.7	0.7	10	5.0	2.8	10	6.5	6.6	10	1.8	0.6	10	0.46	0.18	10	31.27	18.03	10	9.0	8.0	10
2012	27.4	0.7	10	5.3	3.4	10	8.6	9.4	10	1.7	1.1	10	0.41	0.21	10	14.99	13.97	10	4.9	6.2	10
2013	27.6	0.6	10	5.6	2.0	10	4.1	2.7	10	1.6	1.0	10	0.76	1.27	10	13.75	5.74	10	10.8	8.6	10
2014	28.2	1.0	8	4.9	1.8	8	4.9	2.4	8	1.3	0.6	8	0.73	1.12	8	20.46	12.49	8	6.9	5.3	7
2015	28.0	1.3	10	5.4	3.2	10	31.1	48.6	10	1.7	1.2	10	0.40	0.31	10	40.47	39.38	10	5.7	5.6	10
2016	27.4	0.9	9	4.1	1.7	10	8.1	10.2	10	1.7	0.8	10	0.17	0.14	10	6.32	5.63	10	6.7	3.8	10

Year	AirT (°C)			z _{site} (m)			Turb (NTU)			K _{res} (m ⁻¹)			TN (mg L ⁻¹)			TP (µg L ⁻¹)			PhyBM (mm ³ L ⁻¹)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
2017	27.7	1.1	10	5.2	2.4	10	7.7	4.5	10	1.6	0.7	8	0.29	0.26	10	18.62	30.27	10	4.2	4.5	10
2018	27.3	0.9	10	4.8	2.1	10	10.0	12.6	10	1.6	1.0	8	0.28	0.12	10	9.13	8.87	10	7.0	7.0	10
2019	26.8	0.7	10	5.4	2.3	10	4.8	4.0	10	1.6	0.8	8	0.35	0.09	10	18.76	21.74	10	4.7	4.6	10
All years	27.4	0.9	146	4.8	2.5	147	9.7	11.5	147	1.6	0.8	136	0.4	0.3	146	23.9	19.3	146	5.1	4.6	137
IA and NIA	27.4	1.0	390	4.1	2.3	367	12.9	20.4	366	1.6	0.8	349	0.37	0.40	355	21.10	21.72	360	3.47	4.60	349