

**Effect of ecosystem degradation on the source of particulate organic matter in a karst lake:**

**A case study of the Caohai Lake, China**

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## ***Supporting information***

### **Supplementary Figures and Table**

**Figure S1** Photos of Caohai Lake before and after ecosystem degradation between 2019 and 2021.

**Figure S2** Contribution percentages (%) of sediment, submerged macrophytes, algae, and C3 plants to POM in the water of Caohai Lake. W and D represent the wet season and dry season, respectively.

**Table S1** Hydrochemical parameters of the lake's water (T, DO, EC, and pH), concentrations of POC, PON,  $\delta^{13}\text{C}_{\text{POC}}$ , and  $\delta^{15}\text{N}_{\text{PON}}$  in Caohai Lake during the wet season and dry season in 2019.

**Table S2** Hydrochemical parameters of the lake's water (T, DO, EC, and pH), concentrations of POC, PON,  $\delta^{13}\text{C}_{\text{POC}}$ ,  $\delta^{15}\text{N}_{\text{PON}}$  in Caohai Lake during the wet season and dry season in 2021.

**Table S3** Relative contribution percentages (%) of sediment, submerged macrophytes, algae, and C3 plants to POM in the water of Caohai Lake in 2019.

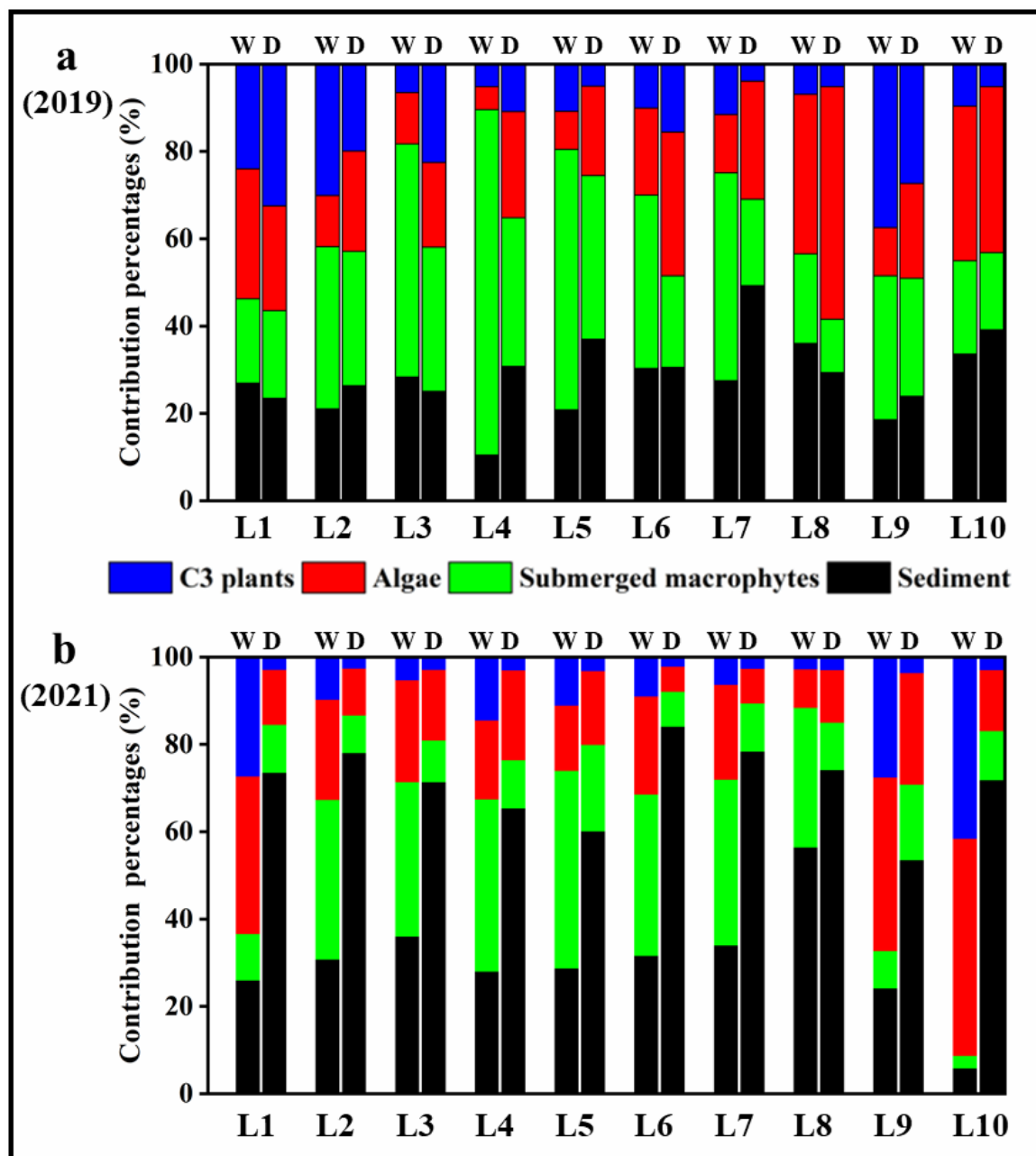
**Table S4** Relative contribution percentages (%) of sediment, submerged macrophytes, algae, and C3 plants to POM in the water of Caohai Lake in 2021.

**Table S5** The  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  (‰) of sediment (n=10) and submerged macrophytes (n=5) of Caohai Lake.

**Table S6** The  $\delta^{13}\text{C}_{\text{DIC}}$  (‰) in the water of Caohai Lake during the wet season and dry season in 2019.



**Figure S1** Photos of Caohai Lake before and after ecosystem degradation between 2019 and 2021



**Figure S2** Contribution percentages (%) of sediment, submerged macrophytes, algae, and C3 plants to POM before (a) and after (b) ecosystem degradation in the water of Caohai Lake. W and D represent the wet season and dry season, respectively.

**Table S1** Hydrochemical parameters of the lake's water (temperature, DO, EC, and pH), concentrations of POC, PON,  $\delta^{13}\text{C}_{\text{POC}}$ , and  $\delta^{15}\text{N}_{\text{PON}}$  in Caohai Lake during the wet season and dry season in 2019.

Season	Sample NO.	T (°C)	DO (mg/L)	EC (mS/cm)	pH	POC (mg/L)	$\delta^{13}\text{C}_{\text{POC}}$ (‰)	PON (mg/L)	$\delta^{15}\text{N}_{\text{PON}}$ (‰)
Wet season	L1	21.6	15.32	0.351	8.75	0.94	-25.0	0.20	5.0
	L2	21.9	6.38	0.351	8.49	1.00	-21.3	0.20	5.0
	L3	21.1	10.27	0.320	8.66	0.99	-19.9	0.12	1.9
	L4	20.4	9.73	0.325	8.54	1.62	-16.8	0.27	1.1
	L5	22.2	7.34	0.320	8.56	1.66	-18.8	0.25	2.4
	L6	21.4	8.33	0.387	8.48	1.21	-21.8	0.30	2.8
	L7	21.5	6.47	0.353	8.36	1.12	-20.4	0.28	2.8
	L8	20.5	6.19	0.420	8.1	1.36	-25.4	0.26	2.6
	L9	19.3	9.9	0.376	8.52	2.43	-21.7	0.55	6.0
	L10	19.6	5.52	0.408	8.23	2.69	-25.2	0.58	3.1
Dry season	L1	22.4	13.99	0.235	8.79	0.61	-24.3	0.16	6.1
	L2	22.5	13.13	0.206	9.09	0.42	-23.0	0.11	4.2
	L3	20.6	13.73	0.220	9.23	1.02	-22.4	0.21	4.4
	L4	22.2	12.77	0.247	9.14	0.71	-22.8	0.18	3.0
	L5	20.8	14.33	0.189	9.62	0.57	-22.3	0.15	1.8
	L6	20.4	12.99	0.242	8.91	1.28	-25.1	0.30	3.9
	L7	22.1	12.4	0.279	8.87	0.77	-24.9	0.19	1.3
	L8	21.1	11.03	0.289	8.39	1.61	-27.7	0.42	2.3
	L9	21.8	8.12	0.253	9.15	1.43	-23.3	0.34	5.2
	L10	22.2	12.77	0.247	9.23	1.37	-25.9	0.13	2.1

**Table S2** Hydrochemical parameters of the lake's water (temperature, DO, EC, and pH), concentrations of POC, PON,  $\delta^{13}\text{C}_{\text{POC}}$ , and  $\delta^{15}\text{N}_{\text{PON}}$  in Caohai Lake during the wet season and dry season in 2021.

Season	Sample NO.	T (°C)	DO (mg/L)	EC (mS/cm)	pH	POC (mg/L)	$\delta^{13}\text{C}_{\text{POC}}$ (‰)	PON (mg/L)	$\delta^{15}\text{N}_{\text{PON}}$ (‰)
Wet season	L1	22.3	7.43	0.215	8.77	0.85	-26.7	0.16	5.7
	L2	22.3	7.67	0.216	8.72	1.10	-22.4	0.17	2.8
	L3	22.4	5.89	0.250	8.17	1.56	-22.7	0.40	1.9
	L4	22.1	6.76	0.239	8.22	1.50	-21.6	0.22	3.4
	L5	22.3	7.67	0.216	8.72	1.51	-20.8	0.24	2.8
	L6	21.9	5.79	0.249	7.97	1.44	-22.3	0.24	2.7
	L7	22.1	6.45	0.239	8.37	2.19	-22.3	0.30	2.2
	L8	22.2	6.67	0.236	8.61	1.95	-21.9	0.25	0.6
	L9	21.9	8.67	0.303	8.55	1.27	-27.5	0.20	5.8
	L10	22.6	9.66	0.351	8.09	3.38	-31.2	0.44	8.8
Dry season	L1	6	8.02	0.475	8.28	1.31	-25.1	0.25	0.1
	L2	5.4	7.85	0.464	8.34	1.33	-25.5	0.24	-0.4
	L3	6.1	8.23	0.458	8.35	1.43	-25.9	0.34	-0.1
	L4	5.8	8.29	0.457	8.39	1.41	-25.9	0.23	0.3
	L5	5.6	8.02	0.475	8.28	1.03	-24.0	0.22	0.7
	L6	6.2	6.32	0.472	8.14	1.06	-24.7	0.28	-1.0
	L7	5.8	8.23	0.457	8.34	1.43	-24.4	0.24	-0.2
	L8	5.7	7.36	0.474	8.23	1.34	-25.1	0.23	0.0
	L9	6.3	7.63	0.466	8.19	1.29	-25.1	0.30	1.1
	L10	6.1	7.46	0.474	8.23	1.11	-25.2	0.19	0.2

**Table S3** Relative contribution percentages (%) of sediment, submerged macrophytes, algae, and C3 plants to POM in water of Caohai Lake in 2019.

Season	Sample	Algae	C3 plants	Sediment	Submerged macrophytes
Wet season	L1	29.75	23.98	26.89	19.38
	L2	11.70	30.13	21.01	37.16
	L3	11.77	6.54	28.33	53.36
	L4	5.26	5.14	10.43	79.17
	L5	8.69	10.83	20.82	59.67
	L6	19.92	10.06	30.28	39.75
	L7	13.34	11.57	27.47	47.62
	L8	36.54	6.92	35.99	20.55
	L9	11.03	37.47	18.51	32.99
	L10	35.40	9.62	33.58	21.39
Dry season	L1	23.95	32.49	23.47	20.09
	L2	22.96	19.93	26.32	30.78
	L3	19.41	22.52	25.04	33.03
	L4	24.31	10.86	30.75	34.08
	L5	20.46	5.06	36.96	37.52
	L6	32.96	15.55	30.53	20.96
	L7	27.08	3.90	49.23	19.79
	L8	53.29	5.16	29.36	12.18
	L9	21.72	27.33	23.90	27.05
	L10	38.02	5.17	39.11	17.69

**Table S4** Relative contribution percentages (%) of sediment, submerged macrophytes, algae, and C3 plants to POM in water of Caohai Lake in 2021.

Season	Sample	Algae	C3 plants	Sediment	Submerged macrophytes
Wet season	L1	36.08	27.38	25.92	10.62
	L2	22.95	9.79	30.71	36.55
	L3	23.35	5.35	35.94	35.37
	L4	18.09	14.53	27.93	39.45
	L5	14.93	11.17	28.69	45.22
	L6	22.42	9.08	31.56	36.95
	L7	21.68	6.43	33.93	37.96
	L8	8.84	2.85	56.40	31.92
	L9	39.72	27.64	24.06	8.57
	L10	49.72	41.63	5.75	2.90
Dry season	L1	12.58	2.97	73.47	10.97
	L2	10.74	2.69	77.98	8.59
	L3	16.20	2.93	71.32	9.56
	L4	20.56	3.09	65.33	11.02
	L5	16.90	3.25	60.07	19.78
	L6	5.75	2.22	84.03	7.99
	L7	7.94	2.71	78.30	11.04
	L8	12.05	3.02	74.09	10.84
	L9	25.56	3.71	53.43	17.31
	L10	13.95	3.01	71.78	11.26



**Table S5** The  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  (‰) of sediment (n=10) and submerged macrophytes (n=5) of Caohai Lake.

Source	Sample	$\delta^{13}\text{C}$	$\delta^{15}\text{N}$
		(‰)	(‰)
Sediment	L1	-22.9	5.3
	L2	-25.5	4.3
	L3	-20.4	3.1
	L4	-22.4	2.0
	L5	-25.0	3.1
	L6	-20.7	2.6
	L7	-25.2	2.6
	L8	-23.2	2.8
	L9	-24.3	5.1
	L10	-23.1	2.6
Submerged macrophytes	<i>Potamogeton lucens</i> L.	-13.5	-0.6
	<i>Myriophyllum verticillatum</i> L.	-15.0	-0.1
	<i>Potamogeton wrightii</i> Morong	-15.2	-0.2
	<i>Potamogeton maackianus</i> A. Bennett	-15.4	0.3
	<i>Najas graminea</i> Del	-15.4	0.4

**Table S6** The  $\delta^{13}\text{C}_{\text{DIC}}$  (‰) in the water of Caohai Lake during the wet season and dry season in 2019.

Season	Sample	$\delta^{13}\text{C}_{\text{DIC}}$ (‰)
Wet season	L1	-9
	L2	-15.7
	L3	-13.8
	L4	-10.9
	L5	-13
	L6	-9.1
	L7	-6.8
	L8	-6.3
	L9	-3.7
	L10	-7.5
Dry season	L1	-4.9
	L2	-3
	L3	0.6
	L4	-0.3
	L5	-3.5
	L6	-2.7
	L7	-0.5
	L8	-2.4
	L9	-2.6
	L10	-0.8