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*Supplement of*

## **Human land uses enhance sediment denitrification and N<sub>2</sub>O production in Yangtze lakes primarily by influencing lake water quality**

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**Table S1** The geographic location, morphology and watershed land uses of 20 Yangtze lakes in China.

Lake	Sampling sites	Geographic location			Lake morphology			Watershed land uses			
		Longitude	Latitude	Elevation	Mean depth	Surface area	Volume	Vegetation	Water body	HDL	NDVI
		(°E)	(°N)	(m)	(m)	(km <sup>2</sup> )	(10 <sup>8</sup> m <sup>3</sup> )	(%)	(%)	(%)	
1. Lake Baidanghu	3	117.38	30.82	10.04	3.06	39.67	1.21	25.80	10.18	64.02	0.53
2. Lake Bohu	4	116.43	30.15	12.62	4.41	180.40	7.94	19.73	21.11	59.16	0.51
3. Lake Caizihu	3	117.08	30.83	10.34	1.67	172.10	2.87	35.51	8.85	55.64	0.54
4. Lake Chaohu	4	117.50	31.57	8.37	2.69	769.55	20.70	19.00	9.99	71.00	0.45
5. Lake Chenyaohu	3	117.63	30.88	12.00	2.20	20.01	0.72	18.26	14.63	67.11	0.52
6. Lake Cihu	3	115.07	30.20	16.00	1.75	8.20	0.17	38.15	11.36	49.79	0.45
7. Lake Haikouhu	3	115.23	30.04	19.00	3.70	12.90	0.48	34.31	14.46	51.24	0.51
8. Lake Huangdahu	4	116.39	30.03	12.69	3.94	299.20	11.79	21.47	21.90	56.63	0.34
9. Lake Linghu	3	117.06	30.53	11.00	1.90	4.50	No data	1.35	18.64	80.00	0.39
10. Lake Longganhu	4	116.19	29.94	12.98	3.78	316.20	11.96	27.04	19.08	53.89	0.52
11. Lake Makouhu	3	115.43	29.96	13.00	2.80	2.90	0.11	31.79	14.38	53.83	0.47
12. Lake Poganghu	4	117.14	30.63	12.11	1.52	60.00	0.91	31.49	10.41	58.11	0.54
13. Lake Shengjinhu	4	117.10	30.36	10.79	1.26	78.48	0.99	56.47	9.92	33.60	0.57
14. Lake Taibaihu	3	115.80	29.97	13.38	3.20	25.10	0.80	30.96	8.89	60.16	0.58
15. Lake Wuchanghu	4	116.73	30.28	11.99	3.43	100.50	3.45	10.63	15.21	74.16	0.49
16. Lake Wushanhu	3	115.57	29.92	18.20	3.10	16.10	0.50	13.51	12.30	74.18	0.48
17. Lake Yandonghu	3	114.57	30.53	18.00	3.00	8.66	No data	5.65	42.51	51.65	0.39
18. Lake Yanxihu	3	114.48	30.58	20.40	1.90	11.80	0.22	4.00	33.80	61.10	0.38
19. Lake Yanglanhu	3	114.88	30.39	16.00	2.50	4.23	No data	13.32	18.07	68.61	0.41
20. Lake Yiaihu	3	114.90	30.44	19.00	1.80	3.21	0.06	2.48	23.26	74.27	0.38

HDL: Human-dominated land uses; NDVI: Normalised difference vegetation index.

**Table S2** The average of water quality, sediment characteristics and plant community structure of 20 Yangtze lakes in China.

Lake	Water quality						Sediment characteristics						Plant community		
	Cond	ORP	DO	NO <sub>3</sub> <sup>-</sup>	NH <sub>4</sub> <sup>+</sup>	TN	TC	TOC	pH	Moisture	Bulk density	STN	STC	Richness	Biomass
	(μS cm)	(mv)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(%)	(g/cm <sup>3</sup> )	(mg/g)	(mg/g)		(kg/m <sup>2</sup> )
1. Lake Baidanghu	173.33	152.67	6.91	0.53	0.18	2.18	8.47	2.61	5.52	59.58	0.88	0.27	16.73	0.33	1.98
2. Lake Bohu	223.25	137.25	7.55	0.09	0.22	0.33	16.45	2.89	7.36	60.68	0.85	0.41	10.70	0.00	0
3. Lake Caizihu	127.67	82.00	6.60	0.49	0.08	1.09	9.67	2.49	6.43	60.97	0.83	0.31	13.79	0.00	0
4. Lake Chaohu	286.50	107.50	6.33	0.65	0.13	1.27	17.42	4.73	6.66	26.58	0.64	0.20	5.39	0.00	0
5. Lake Chenyaohu	265.33	40.23	5.19	0.82	0.24	1.54	20.11	6.60	5.90	65.40	0.88	0.24	36.82	0.00	0
6. Lake Cihu	338.67	82.33	6.30	0.22	0.21	0.48	18.55	3.44	7.93	62.01	0.89	0.18	53.54	0.00	0
7. Lake Haikouhu	304.67	153.33	8.13	0.52	0.02	0.31	16.70	2.53	8.01	66.14	0.87	0.34	53.88	1.00	2.43
8. Lake Huangdahu	258.25	140.25	7.52	0.2	0.22	0.40	19.90	3.30	7.47	62.68	0.86	0.20	23.37	0.50	1.19
9. Lake Linghu	354.33	-80.67	4.58	0.17	0.5	2.65	21.63	4.14	7.79	66.31	0.94	1.54	43.23	0.00	0
10. Lake Longganhu	280.50	132.44	5.65	0.33	0.34	0.44	23.90	5.14	7.67	57.23	0.84	0.57	14.54	0.00	0
11. Lake Makouhu	325.00	110.33	4.65	1.5	0.11	1.18	31.40	6.26	7.58	66.85	0.88	0.38	16.90	0.00	0
12. Lake Poganghu	216.50	64.75	5.02	0.11	0.12	1.11	21.93	5.34	6.72	68.50	0.92	0.22	25.82	0.25	1.71
13. Lake Shengjinhu	170.75	117.00	6.01	0.76	0.05	0.46	17.60	2.47	8.06	66.60	0.87	0.26	22.66	0.00	0
14. Lake Taibaihu	170.00	133.33	4.59	0.53	0.14	0.67	21.54	5.15	6.58	51.68	0.81	0.30	17.89	0.00	0
15. Lake Wuchanghu	147.50	135.00	5.79	0.71	0.2	1.27	10.65	3.56	5.84	71.33	0.91	1.74	30.17	0.00	0
16. Lake Wushanhu	323.00	98.00	4.51	0.25	0.17	1.36	24.06	5.84	7.09	64.62	0.93	0.44	22.91	0.00	0
17. Lake Yandonghu	197.33	77.73	7.90	0.45	0.12	0.33	16.21	4.06	7.76	56.29	0.87	0.77	26.96	1.00	1.99
18. Lake Yanxihu	193.67	129.00	6.69	0.65	0.23	0.95	24.08	4.75	8.19	61.54	0.89	0.51	22.87	0.00	0
19. Lake Yanglanhu	338.33	74.33	5.11	0.86	0.3	1.12	23.70	4.12	7.74	64.79	0.87	0.87	26.09	0.00	0
20. Lake Yaihu	359.67	136.33	4.53	0.19	0.28	2.87	25.09	5.31	7.94	55.50	0.8	0.42	19.29	0.00	0

**Table S3** The sediment denitrification rate, N<sub>2</sub>O production rate and relative N<sub>2</sub>O production (Mean±SD) of 20 Yangtze lakes in China.

Lake	Potential denitrification rate	Background denitrification rate	N <sub>2</sub> O production rate	Relative N <sub>2</sub> O production
	(ng N g <sup>-1</sup> h <sup>-1</sup> )	(ng N g <sup>-1</sup> h <sup>-1</sup> )	(ng N g <sup>-1</sup> h <sup>-1</sup> )	
1. Lake Baidanghu	32.04±3.40	4.25±1.69	0.32±0.26	0.07±0.06
2. Lake Bohu	20.19±11.32	0.97±0.24	0.05±0.05	0.05±0.05
3. Lake Caizihu	24.91±21.28	6.31±2.69	0.71±0.41	0.13±0.08
4. Lake Chaohu	11.24±2.55	2.01±1.05	0.23±0.24	0.12±0.11
5. Lake Chenyaohu	67.34±20.24	1.74±1.03	0.31±0.18	0.19±0.09
6. Lake Cihu	80.61±10.12	0.92±0.16	0.16±0.08	0.19±0.11
7. Lake Haikouhu	55.10±9.68	0.98±0.77	0.10±0.02	0.34±0.49
8. Lake Huangdahu	24.99±5.38	0.67±0.21	0.12±0.03	0.19±0.05
9. Lake Linghu	60.39±17.08	18.95±13.16	0.52±0.49	0.02±0.01
10. Lake Longganhu	20.17±3.33	1.39±0.61	0.09±0.08	0.09±0.09
11. Lake Makouhu	125.37±7.52	2.11±1.22	0.51±0.33	0.35±0.30
12. Lake Poganghu	19.02±12.01	3.58±2.92	0.69±1.20	0.12±0.14
13. Lake Shengjinhu	37.17±28.88	0.93±0.52	0.13±0.08	0.15±0.03
14. Lake Taibaihu	70.99±7.98	3.66±0.80	0.34±0.34	0.11±0.13
15. Lake Wuchanghu	84.17±77.14	1.67±1.05	0.12±0.09	0.08±0.04
16. Lake Wushanhu	45.62±16.27	2.59±1.36	0.25±0.23	0.11±0.12
17. Lake Yandonghu	11.72±6.46	0.95±0.19	0.07±0.04	0.08±0.06
18. Lake Yanxihu	34.41±33.78	2.12±2.01	0.15±0.05	0.62±0.99
19. Lake Yanglanhu	53.08±49.93	1.79±1.41	0.30±0.21	0.25±0.25
20. Lake Yiaihu	54.49±31.98	2.21±1.41	0.20±0.19	0.08±0.04