

Table SI 1. Names and characteristics of the Lake Sentani's sub-catchments and their rivers draining into the lake, Many catchment areas and rivers are known under different names.

Bungkang et al. (2014); Fauzi et al. (2014)				Handoko et al. (2014)	
Sub Catchments	Area (km ²)	Length of the river (m)	Slope (s)	Name of river	Debit m ³ s ⁻¹
1	17.1	5010	0.0581	Dogefu/Kanda	0.240
2	25.5	6281	0.0718		n/a
3	29.7	6822	0.0475		n/a
4	64.2	14099	0.053	Benali	0.144
Yahim	236.1	33670	0.0424	Doyo Kemiri	18.980 0.360
Kuruwaka	23.5	12165	0.1277	Belo Warno	0.620 5.470
Netar	24.8	12243	0.1034	Flavouw	0.360
Yakembeng	32.5	13061	0.0715	Yabawi	0.840
Harapan	18.9	9070	0.1072	Telaga maya	0.092
Expo	34.5	14877	0.0664	Espo	0.230
Tiaga Ria	24.4	7769	0.0667		n/a
Hendo	40.3	5815	0.0253		n/a
Belo	23.8	6733	0.0148	Jembatan 2	0.550
Waisyake	24.9	10598	0.0139		n/a

Table SI 2. The correlation coefficient of elements used for XRF calibration

No.	Elements	R ²
1	Al ₂ O ₃	0.8
2	CaO	0.09
3	MgO	0.93
4	MnO	0.86
5	TiO ₂	0.89
6	Fe ₂ O ₃	0.76
7	K ₂ O	0.92
8	SO ₃	0.68
9	SiO ₂	0.82

Table SI 3. Values of pH and porosity at location 1. We used these values for the Phreeqc and reaction rate calculations. Porosity is given as the ratio of the volume of pore water to the volume of bulk sediment.

Depth (cm)	pH	Porosity
1	6.8	0.983
3	6.8	0.968
5	6.8	0.953
7	6.9	0.949
9	6.9	0.968
12.5	6.8	0.988
17.5	6.8	0.949
22.5	6.8	0.933
27.5	6.8	0.922
32.5	6.8	0.93
37.5	6.7	0.971
47.5	6.6	0.943
52.5	6.6	0.964

Table SI 4. Main element concentrations in Lake Sentani sediment.

Location	Element											TOC	N	C	TC/TN
	Depth (cm)	SiO ₂ (%)	Al ₂ O ₃ (%)	TiO ₂ (%)	K ₂ O (%)	CaO (%)	MgO (%)	Fe ₂ O ₃ (%)	MnO (%)	SO ₃ (%)	Other (%)				
Location 1	1	59.41	18.28	0.68	1.04	1.48	4.02	4.12	0.71	2.57	7.69	11.49	1.24	12.02	9.70
	3	59.07	19.04	0.74	1.12	1.53	4.00	2.87	0.97	2.57	8.10	11.49	1.23	12.28	9.99
	5	58.90	18.45	0.71	0.96	1.61	4.11	2.62	1.06	2.77	8.80	15.79	1.50	16.38	10.92
	7	61.23	15.28	0.57	0.70	1.21	5.40	3.03	1.61	3.87	7.10	15.55	1.43	16.47	11.56
	11	60.96	17.93	0.67	1.00	1.52	4.64	2.95	0.91	2.17	7.23	9.92	0.95	11.06	11.58
	13	60.47	16.53	0.65	0.93	1.47	4.86	3.67	0.91	2.99	7.52	12.87	1.14	13.15	11.50
	15	60.92	16.32	0.61	0.90	1.21	4.57	4.27	0.99	3.49	6.73	13.02	1.15	13.48	11.77
	17	60.77	17.71	0.68	1.07	1.38	4.09	3.17	0.97	3.03	7.13	14.43	1.20	15.20	12.61
	19	58.04	19.16	0.74	1.19	1.44	3.54	4.26	0.71	2.84	8.08	12.11	1.01	12.98	12.88
	21	55.84	22.84	0.86	1.90	1.37	3.75	4.28	0.63	1.56	6.99	8.73	0.75	9.66	12.91
	27.5	60.07	19.99	0.70	1.51	1.10	2.76	5.20	0.53	2.49	5.65	8.66	0.78	9.69	12.36
	32.5	58.02	19.28	0.73	1.49	1.34	3.10	6.56	0.40	2.45	6.64	7.82	0.72	8.92	12.31
	37.5	60.71	17.40	0.62	1.17	1.28	3.12	6.88	0.36	2.61	5.85	8.47	0.76	9.51	12.50
	42.5	60.31	18.93	0.73	1.29	1.41	3.89	3.50	0.76	2.33	6.85	11.85	0.96	12.77	13.36
	average	59.62	18.37	0.69	1.16	1.38	3.99	4.10	0.82	2.69	7.17	11.58	1.06	12.40	11.85
Location 2	1	48.11	17.78	0.71	1.00	2.16	4.57	12.01	0.22	2.24	11.22	13.02	1.80	15.09	8.37
	3	43.59	15.03	0.60	0.86	1.69	6.89	18.76	0.25	2.75	9.58	13.50	1.91	16.17	8.45
	5	42.28	17.73	0.75	0.98	2.39	6.36	13.64	0.24	2.04	13.60	13.59	1.71	15.94	9.32
	7	42.33	14.51	0.61	0.76	1.64	5.02	19.41	0.25	3.74	11.73	14.55	1.87	16.38	8.76
	9	42.54	14.97	0.65	0.90	1.81	5.25	18.35	0.23	3.88	11.41	10.88	1.00	11.10	11.14
	11	44.26	15.86	0.67	0.91	1.71	4.38	16.34	0.26	3.76	11.86	15.41	1.82	17.20	9.43
	13	43.46	17.48	0.81	1.20	2.01	4.98	13.38	0.29	3.21	13.19	14.73	1.63	15.32	9.42
	15	46.98	18.13	0.78	1.15	2.05	4.49	11.10	0.28	2.80	12.24	14.17	1.56	15.28	9.80
	17	44.65	16.85	0.68	0.91	1.71	5.17	14.78	0.32	3.18	11.73	13.99	1.55	14.74	9.49
	19	42.23	17.90	0.77	1.02	2.03	5.47	13.40	0.32	2.78	14.08	14.13	1.57	14.91	9.53
	22.5	46.57	17.37	0.74	1.06	1.80	4.03	12.68	0.29	3.54	11.92	14.48	1.54	15.07	9.76
	27.5	42.71	16.43	0.79	1.13	1.97	5.44	14.53	0.29	3.33	13.39	15.68	1.57	16.24	10.33
	32.5	45.23	16.63	0.66	0.92	1.65	4.90	15.75	0.29	3.27	10.71	15.66	1.55	16.59	10.67
	average	44.23	16.67	0.71	0.98	1.89	5.15	14.93	0.27	3.12	12.05	14.14	1.62	15.39	9.57
Location 3	1	47.69	15.28	0.56	0.69	2.05	10.87	11.77	0.36	1.61	9.11	7.27	1.00	8.42	8.38
	3	48.50	14.72	0.48	0.62	1.60	9.26	15.70	0.29	1.66	7.16	6.79	0.87	7.78	8.99
	5	49.61	17.42	0.57	0.86	1.81	8.63	12.20	0.29	1.19	7.42	5.70	0.69	6.58	9.60
	7	45.68	16.19	0.53	0.69	1.94	11.86	13.80	0.29	0.99	8.02	6.38	0.70	7.30	10.42
	9	41.61	15.10	0.55	0.65	2.04	19.97	10.29	0.47	0.69	8.64	3.09	0.34	3.57	10.60
	11	45.32	11.72	0.42	0.43	1.89	20.08	11.42	0.43	1.12	7.18	5.76	0.66	6.55	9.99
	13	52.37	13.85	0.48	0.56	1.78	10.61	11.06	0.37	1.58	7.33	5.82	0.63	6.27	10.02
	15	49.13	13.18	0.48	0.62	1.72	13.37	12.74	0.37	1.51	6.88	6.33	0.74	7.71	10.41
	17	60.43	12.49	0.41	0.59	1.40	6.67	10.52	0.29	2.49	4.70	6.77	0.71	7.40	10.42
	19	53.15	12.49	0.46	0.50	1.84	10.33	10.92	0.38	2.12	7.80	7.81	0.85	8.80	10.36
	22.5	45.96	14.65	0.57	0.71	2.05	10.13	13.80	0.32	2.08	9.73	8.02	0.78	9.03	11.57
	27.5	49.19	14.82	0.58	0.74	1.84	6.46	13.92	0.28	2.74	9.43	9.77	0.89	11.07	12.38
	32	44.10	14.41	0.61	0.83	1.96	10.13	14.73	0.36	3.01	9.86	11.87	1.02	12.64	12.45
	average	48.67	14.33	0.51	0.65	1.84	11.41	12.53	0.35	1.75	7.94	7.03	0.76	7.93	10.43
Location 4	1	47.52	11.25	0.45	0.36	2.08	6.85	15.48	0.26	3.92	11.84	9.86	1.13	10.60	9.39
	3	48.39	12.67	0.47	0.44	1.95	10.31	12.98	0.38	2.41	9.99	8.43	0.91	9.39	10.34
	5	43.52	13.09	0.52	0.49	2.12	16.41	10.69	0.55	1.71	10.90	8.35	0.82	9.24	11.22
	7	45.41	12.29	0.49	0.39	2.12	14.73	9.25	0.69	2.45	12.17	11.26	1.08	12.56	11.64
	9	45.72	9.53	0.36	0.28	1.40	16.47	13.79	0.72	3.24	8.49	10.88	1.40	14.61	10.43
	11	45.90	12.07	0.47	0.35	2.10	16.84	6.12	1.17	3.08	11.90	11.47	1.18	12.77	10.80
	13	54.61	11.71	0.43	0.37	1.60	9.07	8.38	0.73	4.15	8.95	9.10	0.93	10.22	10.98
	15	56.28	13.28	0.49	0.43	1.96	8.64	5.31	0.79	3.18	9.63	9.02	0.95	10.48	11.00
	19	53.18	10.36	0.42	0.28	1.89	12.62	5.94	1.02	3.66	10.64	11.36	1.12	12.43	11.13
	22.5	51.19	10.54	0.44	0.32	1.80	11.66	8.30	0.81	4.11	10.84	11.43	1.08	13.36	12.39
	27.5	43.56	10.18	0.42	0.32	1.66	15.02	12.37	0.79	4.48	11.19	10.64	0.92	11.79	12.79
	32.5	47.05	11.34	0.47	0.44	1.52	9.97	13.21	0.64	5.14	10.22	13.33	1.09	14.84	13.55
	37.5	48.69	13.84	0.59	0.53	2.02	9.42	6.78	0.90	4.12	13.11	12.98	1.03	13.95	13.60
	average	48.54	11.70	0.46	0.38	1.86	12.15	9.89	0.73	3.51	10.76	10.62	1.05	12.02	11.48