

Supplementary Table 1. Sampling locations, water parameters, chemical compositions and  $\delta^{13}\text{C}_{\text{DIC}}$  of the NHMW

Season	Sample	Tw	pH	EC	K <sup>+</sup>	Na <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	Si	NICB	DOC	TDS	$\delta^{13}\text{C}$
	□NO.	(°C)	□	( $\mu\text{s cm}^{-1}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	( $\mu\text{M}$ )	(%)	(mg L <sup>-1</sup> )	(mg L <sup>-1</sup> )	‰PDB
Dry	M1	8	6.95	90	42	100	286	98	68	117	77	950	108	-42	4.9	96	-9.354
	M2	7.9	7.95	50	31	41	195	87	52	139	71	300	36	1	3.6	49	-5.256
	M3	9.1	7.24	170	56	131	342	92	78	77	93	850	171	-13	6.4	94	-8.978
	M4	7.8	7.43	120	38	93	402	86	81	113	113	1100	136	-37	5.1	113	-9.493
	M5	8.3	7.35	110	31	53	414	76	22	120	84	975	126	-21	6.1	100	-
	M6	8.4	7.48	120	46	97	426	91	61	95	106	1050	143	-20	4.6	110	-9.312
	M7	8.6	6.55	70	38	103	202	79	14	85	59	525	200	-6	4.5	63	-7.259
	P1	8.8	7.5	110	88	288	173	91	124	322	77	310	272	-1	5.2	77	-5.729
	P2	8.5	7.55	120	90	297	186	87	142	279	72	275	277	10	5.4	74	-4.173
	P3	8.8	8.74	60	50	158	104	47	45	86	52	325	237	-10	4.2	49	-8.217
	P4	8.7	7.31	60	29	211	95	44	111	-	45	275	244	-	3.7	-	-7.515
	P5	7.6	7.4	40	28	96	89	31	25	148	32	150	195	-7	3.0	35	-7.440
	P6	7.6	6.97	40	29	110	80	30	21	91	27	225	254	-9	3.2	37	-
	P7	6.9	7	40	27	61	88	30	31	152	47	100	134	-17	2.6	32	-2.127
	P8	3.1	6.08	10	15	20	59	18	12	96	38	25	83	-10	2.3	18	-
	P9	4.7	6.2	30	28	88	152	13	53	163	47	80	98	13	2.9	34	-4.712
	R1	8.4	7.82	70	29	88	164	84	72	107	66	350	147	-8	3.9	53	-5.536
	R2	7.9	7.5	50	24	76	118	85	70	132	72	200	115	-8	3.1	42	-6.712
R3	7.4	7.74	40	19	72	81	79	26	138	79	100	150	-3	2.9	35	-9.447	
R4	7.3	7.62	90	38	98	266	81	53	102	67	610	177	-8	5.1	73	-9.171	
R5	7.1	7.17	70	32	133	160	64	49	82	46	450	225	-10	4.4	57	-7.857	
R6	9.3	8.34	70	23	95	184	79	30	100	47	525	206	-16	4.5	62	-9.230	

	R7	6.5	6.84	30	20	62	76	28	35	159	45	50	128	-15	2.4	28	-5.370
	R8	6.4	6.6	30	29	73	81	25	21	-	-	35	130	-	2.6	-	-7.073
	R9	6.7	6.7	30	18	38	75	35	21	87	48	100	122	-11	2.7	26	-5.692
	R10	9.9	8.66	60	24	108	148	82	30	73	53	435	203	-9	3.9	54	-8.794
	R11	8.8	7.68	50	22	89	119	69	68	103	40	-	199	-	3.8	-	-7.333
	S1	7.4	7.22	20	18	78	96	72	61	116	91	410	120	-79	3.2	55	-8.251
	S2	8.9	7.71	50	18	76	140	61	25	94	37	350	177	-10	3.7	46	-7.683
	S3	8.3	7.54	40	14	52	82	53	24	118	42	175	152	-19	3.3	33	-8.376
	TPH1	10	8.08	90	37	190	299	93	49	41	84	750	14	0	8.7	79	-7.986
	TPH2	9.8	7.98	90	48	112	313	104	156	48	77	760	13	-13	5.4	82	-8.974
	TPH3	8.8	8.53	60	30	88	169	78	62	109	71	325	138	-4	3.9	51	-9.098
	MSG1	8.4	6.6	40	17	10	98	97	49	105	73	150	78	-8	3.2	34	-
	MSG2	6.3	6.17	30	24	36	94	25	15	101	50	50	106	11	2.8	24	-
	PDG	27.7	6.6	60	39	182	128	28	6	24	21	625	352	-31	4.4	63	-13.430
	RSG	6.3	7.22	30	19	64	71	72	55	115	69	150	114	-24	2.9	35	-5.113
	SSG	7.8	6.65	40	16	77	73	73	64	129	85	85	120	-16	3.0	34	-4.634
Wet	M1	26.9	8.32	70	40	125	164	98	61	217	27	413	380	-8	3.1	67	-
	M2	29.5	7.99	130	59	73	315	108	76	36	33	113	233	70	6.2	41	-11.937
	M3	28	7.08	120	59	91	325	95	55	40	53	555	137	24	5.0	67	-12.377
	M4	25.3	7.8	110	42	58	360	87	36	39	94	458	226	28	5.2	66	-11.737
	M5	22.3	6.99	60	35	74	170	48	19	38	108	210	156	11	2.9	42	-11.857
	M6	24.4	7.62	180	53	173	580	111	48	50	89	585	171	46	6.7	86	-11.746
	M7	25.7	7.19	110	43	89	323	82	41	40	38	413	234	40	3.6	58	-11.818
	P1	27.6	7.82	110	66	255	176	91	157	208	95	233	247	8	4.0	66	-11.011
	P2	27.5	7.14	140	67	423	193	92	168	590	115	195	218	-12	4.3	94	-11.786
	P3	26.6	7.62	70	42	58	118	58	50	51	47	278	129	-5	3.1	39	-11.881

P4	24.4	7.61	80	45	77	127	56	94	49	113	180	302	-12	3.3	47	-13.218
P5	24.3	7.63	40	31	90	73	26	25	60	58	113	116	2	2.1	27	-13.637
P6	24	6.96	40	33	74	77	31	26	74	43	150	256	-4	2.1	33	-10.381
P7	25.8	7.86	40	37	90	91	27	36	65	87	105	147	-4	1.7	32	-7.252
P8	22.9	5.4	10	22	165	62	18	12	64	29	-	345	-	2.0	-	-
P9	23.9	6.95	50	40	84	152	31	103	159	108	53	209	-8	1.0	43	-8.298
R1	24.9	7.26	60	37	140	150	62	26	51	122	150	242	22	3.1	44	-10.629
R2	26.8	6.89	50	38	99	97	76	19	82	51	98	312	38	1.1	35	-10.593
R3	26.8	6.82	40	36	109	70	75	21	-	36	45	139	-	1.5	-	-10.639
R4	23.4	6.89	60	38	51	164	59	24	53	92	188	261	16	3.2	42	-10.639
R5	31.4	8.95	100	47	106	229	81	63	-	43	308	379	-	3.8	-	-11.469
R6	29.8	7.5	100	42	182	269	94	45	27	120	353	245	30	5.0	62	-11.170
R7	24.9	6.89	30	33	-	71	18	36	92	37	23	345	-	5.7	-	-11.449
R8	24.4	6.38	30	33	170	73	14	43	104	95	8	271	8	1.1	34	-11.459
R9	24.6	7.1	30	24	87	72	25	13	54	92	60	306	-1	1.9	31	-11.347
R10	29.6	7.94	80	32	37	175	94	31	24	119	330	357	-3	3.6	55	-11.132
R11	27.7	7.45	60	36	39	116	72	25	32	73	210	234	9	3.2	38	-11.227
S1	27.9	7.87	100	29	146	347	99	40	37	58	458	332	39	4.4	67	-11.877
S2	27	7.5	70	29	52	196	72	19	38	43	233	237	39	3.0	40	-12.193
S3	26.5	7.2	40	27	141	94	56	16	48	114	165	345	3	1.3	44	-11.144
TPH1	31.2	8.78	90	38	86	300	89	46	44	83	233	183	46	3.6	49	-8.431
TPH2	29.1	8.55	90	41	166	288	97	53	49	42	158	379	65	3.8	48	-10.674
TPH3	29.9	7.97	90	44	124	286	92	46	37	23	278	216	56	3.6	47	-10.680
MSG1	27.8	7.07	50	26	-	81	109	27	97	36	83	339	-	1.7	-	-7.335
MSG2	28.7	7.94	30	35	178	74	15	14	47	57	38	182	45	1.0	25	-10.613
PDG	27.6	7.2	70	43	325	176	6	10	24	122	368	303	12	3.1	61	-13.686

	RSG	27.6	6.86	40	35	174	62	65	32	77	113	68	340	13	1.2	40	-10.611
□	SSG	28.9	7.42	40	27	74	84	71	29	60	60	60	185	35	1.7	27	-11.603

Tw is Temperature of water; M=the Machuan River; P=the Poxi River; R=the Rangxi River; S=the Shuxi River; TPH= the Taiping Lake; MSG, RSG and SSG are the shallow groundwater located in the region of the Machuan, Rangxi and Shuxi rivers, respectively. PDG=deep groundwater located in head of the Poxi River.

$NICB = 100\% \times (TZ^+ - TZ^-) / TZ^+$  where  $TZ^+$  and  $TZ^-$  are cationic and anionic charge in  $\mu\text{eq L}^{-1}$ , respectively.

$TDS = K + Na + Ca + Mg + Cl + SO_4 + NO_3 + HCO_3 + SiO_2$ .