

**Table S1.** Basic geometric values of the study catchments/sub-catchments.

Catchments	Area (km <sup>2</sup> )	Perimeter (Km)	Elevation Min (m).	Elevation Max (m).	Catch./Sub-catchments	Area (km <sup>2</sup> )	Perimeter (Km)	Elevation (m) Max.	Elevation (m) Min.
C1	142.2	100.74	4	149	C45	213.32	74.42	525	1066
C2	359.93	129.46	75	743	C46	141.73	79.51	542	985
C3	248.18	82.30	59	896	C47	493.04	138.80	552	1311
C4	279.98	96.77	63	895	C48	578.38	169.50	550	1607
C5	164.18	76.38	93	341	C49	588.56	122.97	688	1619
C6	402.45	76.38	27	462	C50	593.41	155.53	689	1632
C7	101.74	52.08	198	498	C51	224.78	101.46	637	1351
C8	298.59	102.36	185	677	Sub-c52	33.89	42.77	52	13867
C9	629.91	151.21	201	1023	Sub-c53	18.59	28.3176	51	110
C10	305.46	97.02	193	900	Sub-c54	26.55	27.9802	68	301
C11	282.1	92.06	190	949	Sub-c55	31.16	26.0775	67	323
C12	309.35	141.82	173	1030	Sub-c56	20.76	23.4857	65	317
C13	124.25	70.30	190	656	Sub-c57	20.33	32.4494	79	130
C14	104.69	46.42	189	460	Sub-c58	51.36	38.6446	78	410
C15	119.73	54.10	178	908	Sub-c59	67.92	34.9485	78	452
C16	220.16	92.87	189	897	Sub-c60	37.64	32.8741	128	852
C17	428.17	114.84	111	854	Sub-c61	13.3	18.6094	121	229
C18	514.34	145.07	118	1077	Sub-c62	72.16	42.4348	127	417
C19	373.8	95.34	119	891	Sub-c63	81.78	46.1221	162	460
C20	816.69	192.45	83	1077	Sub-c64	11.69	16.1497	140	431
C21	365.12	96.41	339	790	Sub-c65	17.58	21.4768	164	872
C22	135.17	61.98	322	902	Sub-c66	33.1	32.2093	164	430
C23	444.58	115.23	314	999	Sub-c67	4.34	10.8194	193	424
C24	361.97	130.47	276	999	Sub-c68	84.07	59.8674	189	747
C25	213.53	93.89	312	954	Sub-c69	13.69	20.269	166	249
C26	519.08	139.82	314	999	Sub-c70	32.53	26.6774	171	864
C27	161.52	60.16	300	533	Sub-c71	70.38	38.4752	196	424
C28	449.87	117.35	375	796	Sub-c72	43.46	44.4359	233	348
C29	831.56	165.87	373	965	Sub-c73	59.78	35.6301	235	407
C30	155.53	87.14	339	588	Sub-c74	13.17	22.4469	251	318
C31	236.84	90.43	330	565	Sub-c75	92.26	46.4214	689	1632
C32	192.76	75.80	322	525	Sub-c76	42.73	35.9171	239	394
C33	875.74	171.59	293	731	Sub-c77	82.99	43.0718	255	371
C34	102.59	66.04	460	729	Sub-c78	34.87	28.7054	288	357
C35	100.49	46.04	438	680	Sub-c79	66.21	37.1364	265	554
C36	447.32	115.62	523	1055	Sub-c80	45.56	62.1239	317	1049
C37	598.67	130.13	524	1198	Sub-c81	26.22	35.4655	345	710
C38	136.3	63.00	493	775	Sub-c82	14.16	18.8835	352	504
C39	241.86	78.82	496	893	Sub-c83	14.95	22.2239	361	627
C40	173.27	81.77	526	924	Sub-c84	82.52	53.7031	351	430
C41	193.36	87.94	525	956	Sub-c85	73.34	63.7351	350	465
C42	733.39	184.05	416	1290	Sub-c86	37.73	34.3131	326	395
C43	254.23	100.50	433	759	Sub-c87	47.42	33.265	324	418
C44	136.54	63.51	486	944	Sub-c88	18.16	18.0179	322	412

Catchments	Area (km²)	Perimeter (Km)	Elevation Min (m).	Elevation Max (m).	Catch./Sub- catchments	Area (km²)	Perimeter (Km)	Elevation (m) Max.	Elevation (m) Min.
Sub-c89	59.47	38.8377	301	377	Sub-c118	17.01	32.1494	612	828
Sub-c90	20.76	31.529	298	350	Sub-c119	21.92	27.3741	508	596
Sub-c91	46.26	42.2823	331	445	Sub-c120	10.19	17.4765	504	553
Sub-c92	9.29	13.4584	349	410	Sub-c121	21.03	28.6116	451	538
Sub-c93	13	17.8339	410	525	Sub-c122	57.61	36.9401	449	557
Sub-c94	19.15	21.5299	415	503	Sub-c123	16.2	22.7883	472	540
Sub-c95	16.78	17.1732	421	498	Sub-c124	30.41	24.7175	413	562
Sub-c96	15.8	19.393	438	542	Sub-c125	51.1	44.824	415	559
Sub-c97	19.8	20.7229	445	566	Sub-c126	18.23	18.3078	403	547
Sub-c98	52.75	44.9551	451	650	Sub-c127	41.33	37.2231	373	552
Sub-c99	51.19	33.9996	458	642	Sub-c128	37.05	27.8489	389	547
Sub-c100	13.88	23.4076	481	547	Sub-c129	22.48	24.286	372	516
Sub-c101	54.76	49.3362	510	1007	Sub-c130	14.06	16.1708	359	432
Sub-c102	64.52	58.0039	532	774	Sub-c131	70.58	42.0085	334	503
Sub-c103	8.43	17.9213	538	600	Sub-c132	23.35	26.9649	318	375
Sub-c104	23	21.2219	505	713	Sub-c133	44.97	32.5152	288	639
Sub-c105	15.56	21.9776	491	711	Sub-c134	20.06	28.4348	306	405
Sub-c106	18.79	20.5577	481	607	Sub-c135	30.74	29.9919	312	399
Sub-c107	17.52	18.3282	398	461	Sub-c136	65.6	45.9602	274	381
Sub-c108	25.56	24.0397	398	534	Sub-c137	57.33	37.4968	375	796
Sub-c109	55.85	35.5821	380	512	Sub-c138	57.1	42.3958	352	513
Sub-c110	13.25	17.4812	417	513	Sub-c139	59.16	40.0155	381	555
Sub-c111	60.46	41.3162	436	544	Sub-c140	28.84	24.3807	422	558
Sub-c112	43.95	35.0185	467	585	Sub-c141	16.49	28.2183	460	643
Sub-c113	16.17	23.8879	501	578	Sub-c142	15.64	21.0214	469	672
Sub-c114	32.75	36.9717	517	646	Sub-c143	13.07	22.9834	507	684
Sub-c115	54.48	48.5742	537	771	Sub-c144	12.77	16.1529	500	668
Sub-c116	11.3	21.0697	673	848	Sub-c145	11.4	17.2902	477	620
Sub-c117	32.17	28.0842	644	868	Sub-c146	13.4	19.3075	461	601

**Table S2.** Hi (hypsothetic index) values calculated over the study area.

Catch.	Hi	Class	Catch.	Hi	Class	Sub-Catch.	Hi	Class
1	0.49	2	50	0.49	2	98	0.48	2
2	0.48	2	51	0.49	2	99	0.47	2
3	0.48	2	Sub-Catch.	Hi	Class	100	0.50	1
4	0.48	2	52	0.66	1	101	0.49	2
5	0.48	2	53	0.41	2	102	0.49	2
6	0.46	2	54	0.49	2	103	0.47	2
7	0.48	2	55	0.48	2	104	0.49	2
8	0.49	2	56	0.51	1	105	0.50	1
9	0.49	2	57	0.30	3	106	0.47	2
10	0.49	2	58	0.49	2	107	0.50	1
11	0.49	2	59	0.47	2	108	0.49	2
12	0.49	2	60	0.49	2	109	0.48	2
13	0.48	2	61	0.50	1	110	0.51	1
14	0.48	2	62	0.49	2	111	0.49	2
15	0.48	2	63	0.48	2	112	0.49	2
16	0.48	2	64	0.49	2	113	0.49	2
17	0.48	2	65	0.49	2	114	0.50	1
18	0.49	2	66	0.49	2	115	0.49	2
19	0.47	2	67	0.49	2	116	0.49	2
20	0.48	2	68	0.48	2	117	0.50	1
21	0.49	2	69	0.51	1	118	0.49	2
22	0.48	2	70	0.48	2	119	0.49	2
23	0.48	2	71	0.49	2	120	0.26	3
24	0.48	2	72	0.51	1	121	0.49	2
25	0.48	2	73	0.49	2	122	0.49	2
26	0.49	2	74	0.49	2	123	0.50	1
27	0.49	2	75	0.94	2	124	0.50	1
28	0.49	2	76	0.48	2	125	0.49	2
29	0.49	2	77	0.49	2	126	0.48	2
30	0.50	2	78	0.50	1	127	0.49	2
31	0.49	2	79	0.49	2	128	0.48	2
32	0.49	2	80	0.48	2	129	0.49	2
33	0.48	2	81	0.49	2	130	0.49	2
34	0.49	2	82	0.49	2	131	0.50	1
35	0.49	2	83	0.49	2	132	0.41	2
36	0.49	2	84	0.50	1	133	0.49	2
37	0.49	2	85	0.49	2	134	0.50	1
38	0.49	2	86	0.50	1	135	0.50	1
39	0.49	2	87	0.49	2	136	0.49	2
40	0.49	2	88	0.48	2	137	0.49	2
41	0.49	2	89	0.49	2	138	0.49	2
42	0.48	2	90	0.32	3	139	0.49	2
43	0.48	2	91	0.49	2	140	0.49	2
44	0.49	2	92	0.47	2	141	0.49	2
45	0.49	2	93	0.48	2	142	0.49	2

46	0.46	2	94	0.51	1	143	0.49	2
47	0.49	2	95	0.49	2	144	0.48	2
48	0.48	2	96	0.50	1	145	0.50	1
49	0.49	2	97	0.51	1	146	0.50	1

**Table S3.** Values of Bs (drainage basin shape) index in the calculated catchments and sub-catchments over the study area.

Catch.	Bs	Class	Catch.	Bs	Class	Catch.	Bs	Class
1	4.46	1	50	1.32	3	99	1.92	3
2	2.99	3	51	3.61	2	100	2.50	3
3	2.52	3	52	4.04	1	101	3.70	2
4	2.51	3	53	3.21	2	102	4.84	1
5	1.78	3	54	1.14	3	103	5.97	1
6	3.75	2	55	1.88	3	104	2.14	3
7	2.51	3	56	2.22	3	105	2.67	3
8	2.50	3	57	7.6	1	106	1.72	3
9	1.74	3	58	2.41	3	107	1.54	3
10	1.39	3	59	1.69	3	108	1.85	3
11	1.78	3	60	1.87	3	109	2.18	3
12	3.98	2	61	3.22	2	110	3.16	2
13	2.46	3	62	1.47	3	111	1.60	3
14	1.98	3	63	1.49	3	112	3.74	2
15	0.66	3	64	1.59	3	113	3.33	2
16	1.37	3	65	3.60	2	114	5.25	1
17	1.07	3	66	2.39	3	115	6.50	1
18	2.81	3	67	2.89	3	116	6.35	1
19	2.32	3	68	3.61	2	117	2.02	3
20	2.26	3	69	2.93	3	118	4.68	1
21	0.66	3	70	1.46	3	119	3.75	2
22	2.04	3	71	1.10	3	120	2.83	3
23	2.62	3	72	3.34	2	121	5.18	1
24	3.55	2	73	2.12	3	122	2.37	3
25	3.11	2	74	4.22	1	123	5.1	1
26	0.87	3	75	2.05	3	124	1.35	3
27	1.51	3	76	2.23	3	125	3.47	2
28	1.86	3	77	1.16	3	126	1.32	3
29	1.94	3	78	1.93	3	127	2.31	3
30	5.07	1	79	1.2	3	128	2.21	3
31	3.3	2	80	4.9	1	129	2.81	3
32	2.14	3	81	5.28	1	130	1.58	3
33	1.83	3	82	3.32	2	131	2.76	3
34	3.22	2	83	2.86	3	132	3.49	2
35	1.71	3	84	3.16	2	133	0.96	3
36	0.99	3	85	6.65	1	134	3.95	2
37	2.39	3	86	2.06	3	135	3.40	2
38	1.59	3	87	1.21	3	136	2.85	3
39	2.41	3	88	1.54	3	137	2.03	3

40	4.03	1	89	2.72	3	138	3.26	2
41	3.87	2	90	5.05	1	139	2.02	3
42	4.08	1	91	3.67	2	140	1.78	3
43	3.62	2	92	1.80	3	141	3.61	2
44	2.57	3	93	1.51	3	142	2.07	3
45	1.61	3	94	1.73	3	143	3.28	2
46	3.64	2	95	1.50	3	144	2.26	3
47	2.38	3	96	1.16	3	145	3.08	2
48	3.83	2	97	1.88	3	146	2.04	3
49	2.53	3	98	1.94	3			

**Table S4.** Vf (valley-floor width to valley-height ratio) values calculated over the study area.

Catch.	Vf	Class	Catch.	Vf	Class	Sub-Catch.	Vf	Class
1	11.03	3	50	25	3	98	15	3
2	24	3	51	1.95	2	99	4.44	3
3	8.57	3	Sub-catch.	Vf	Class	100	15.45	3
4	20	3	52	5.2	3	101	2.66	3
5	3.69	3	53	20	3	102	17.5	3
6	4	3	54	4.35	3	103	1.88	2
7	2.06	3	55	7.8	3	104	11.66	3
8	0.95	1	56	0.58	1	105	6.66	3
9	1.28	1	57	15	3	106	10	3
10	1.19	1	58	21	3	107	7.5	3
11	4.70	3	59	24	3	108	3	3
12	3.12	3	60	5.55	3	109	5.78	3
13	6.66	3	61	15.45	3	110	0.89	1
14	13.33	3	62	13.71	3	111	4.47	3
15	8.8	3	63	12.5	3	112	1.26	2
16	4.61	3	64	1.6	2	113	14.28	3
17	15.33	3	65	1.90	2	114	4.44	3
18	8.83	3	66	17.66	3	115	6.66	3
19	50	3	67	2.57	3	116	7.08	3
20	40	3	68	2.62	3	117	3.33	3
21	6.15	3	69	12	3	118	20	3
22	18.57	3	70	2.60	3	119	2	2
23	3.73	3	71	3.07	3	120	2.4	2
24	9.52	3	72	1.25	1	121	8.57	3
25	11.42	3	73	8	3	122	2.12	2
26	2.94	3	74	6.95	3	123	2.5	3
27	2.85	3	75	16.6	3	124	5.33	3
28	11	3	76	5.88	3	125	4.21	3
29	8	3	77	10.52	3	126	18.88	3
30	4.44	3	78	6.15	3	127	5.26	3
31	4.44	3	79	38	3	128	1.77	2
32	4.11	3	80	1.58	2	129	2.22	2
33	5	3	81	5	3	130	5.88	3

34	1.51	2	82	10	3	131	11.42	3
35	4.34	3	83	4	3	132	5	3
36	2	2	84	25	3	133	3.05	3
37	2.12	2	85	11.42	3	134	3.33	3
38	1.22	1	86	20.33	3	135	1.76	2
39	2.43	2	87	20	3	136	4	3
40	5.71	3	88	14	3	137	5	3
41	2.4	2	89	4.2	3	138	2.35	2
42	4	3	90	8	3	139	22.72	3
43	2.35	2	91	16.66	3	140	1	1
44	3.54	3	92	6.85	3	141	1.25	2
45	5.83	3	93	11.42	3	142	10	3
46	8.57	3	94	6.86	3	143	18.4	3
47	1.76	2	95	15.55	3	144	13.33	3
48	2.36	2	96	3.78	3	145	8.4	3
49	2.20	2	97	14	3	146	6.15	3

**Table S5.** Smf (mountain-front sinuosity index) values calculated over the study area.

No.	Smf	Class	No.	Smf	Class	No.	Smf	Class	No.	Smf	Class
1	2.71	3	22	2.97	3	43	-	-	64	2.64	3
2	1.43	1	23	2.84	3	44	1.54	2	65	2.86	3
3	1.89	2	24	1.89	2	45	0.94	1	66	1.61	2
4	1.28	1	25	1.68	2	46	1.02	1	67	2.57	3
5	1.67	2	26	2.75	3	47	1.62	3	68	1.70	2
6	1.62	2	27	2.81	3	48	2.99	3	69	1.52	2
7	2.70	3	28	2.77	3	49	3.25	3	70	-	-
8	1.08	1	29	2.04	2	50	2.80	3	71	1.54	2
9	1.03	1	30	2.24	2	51	2.75	3	72	2.61	3
10	1.36	1	31	2.90	3	52	1.59	2	73	2.83	3
11	1.90	2	32	2.71	3	53	1.64	2	74	2.58	3
12	2.59	3	33	1.97	2	54	2.48	2	75	2.52	3
13	2.58	3	34	2.08	2	55	1.68	2	76	1.60	2
14	2.30	2	35	2.40	2	56	1.54	2	77	1.67	2
15	3.10	3	36	3.05	3	57	1.65	2	78	2.96	3
16	2.73	3	37	2.98	3	58	1.57	2	79	1.53	2
17	2.48	2	38	2.68	3	59	2.52	3	80	1.74	2
18	3.10	3	39	2.64	3	60	2.77	3	81	2.05	2
19	2.05	2	40	1.91	2	61	2.53	3	82	1.71	2
20	1.42	1	41	1.82	2	62	1.61	2	83	2.41	2
21	2.95	3	42	2.46	2	63	2.55	3			