Supplementary Materials

Water Quality in Surface Water: A Preliminary Assessment of Heavy Metal Contamination of the Mashavera River, Georgia

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Abbreviation
HPS: High precipitation season
LPS: Low precipitation season

Figure S1: Geo-accumulation Index (I_{geo}) values of heavy metals in sediments of samples sites.

a). Geo-accumulation (I_{geo}) in HPS

Sites	Pb	Cd	Cu	Ni	Hg	Zn	Mn	Fe
S1	-0.73	-0.62	-0.71	-1.80	-4.22	-0.48	-0.47	-0.66
S2	-1.06	-1.20	-0.81	-1.95	-4.95	-0.63	-0.62	-0.70
S3	2.63	1.78	3.99	-3.66	-3.10	0.82	-0.94	-0.68
S4	1.66	2.42	4.83	-2.82	-3.46	2.40	-0.93	-0.22
S5	-0.13	-0.18	0.81	-2.11	-4.26	-0.14	-0.21	-0.63
S6	-0.51	-0.31	0.26	-2.45	-4.80	-0.25	-0.61	-0.91
S7	-0.37	0.98	1.65	-2.59	-4.80	0.46	-0.65	-0.80
S8	0.18	2.06	2.83	-1.85	-4.03	1.31	-0.17	-0.62
S9	-1.16	1.86	2.77	-2.65	-5.16	1.91	-1.40	0.35
S10	-1.43	-2.10	-0.64	-2.18	-5.37	-0.82	-0.94	-0.46
S11	-1.69	-1.50	-1.19	-2.89	-6.04	-1.02	-1.28	-0.93
S12	-0.25	4.21	3.30	-1.59	-4.04	4.09	0.19	-0.61
S13	-0.41	2.52	2.20	-2.05	-4.37	2.27	-0.76	-0.71
S14	-0.53	1.92	2.24	-2.08	-5.17	1.69	-0.52	-0.67
S15	-0.64	1.95	2.29	-2.27	-5.05	1.75	-0.48	-0.75
S16	-0.06	2.44	2.59	-1.71	-4.10	1.74	-0.38	-0.60
S17	1.08	2.16	2.76	-1.94	-2.75	2.04	-0.58	-0.83

b) Geo-accumulation (I_{geo}) in LPS

Sites	Pb	Cd	Cu	Ni	Hg	Zn	Mn	Fe
S1	-1.07	-1.77	-1.07	-2.22	-5.35	-0.76	-0.79	-0.52
S2	-0.73	-1.38	-0.89	-2.13	-5.25	-0.62	-0.44	-0.46
S3	2.12	2.06	3.80	-3.53	-3.36	0.85	-0.81	-0.75
S4	1.30	2.13	4.60	-3.81	-3.35	2.11	-1.35	-0.13
S5	-0.64	-0.92	-0.24	-2.27	-5.35	-0.52	-0.52	-0.52
S6	-0.57	-0.77	-0.73	-3.10	-5.71	-0.56	-0.80	-1.06
S7	-0.21	1.43	2.20	-2.47	-5.09	0.87	-0.64	-0.69
S8	-0.20	1.53	2.45	-2.16	-4.77	0.97	-0.25	-0.54
S9	-1.24	2.90	2.67	-1.58	-4.64	2.85	-1.00	-0.03
S10	-1.35	-1.54	-0.96	-2.36	-5.71	-0.86	-0.86	-0.53
S11	-1.07	-1.53	-0.86	-1.76	-4.84	-0.72	-0.64	-0.55
S12	-0.35	3.76	2.63	-1.74	-4.51	3.71	-0.09	-0.71
S13	-0.82	2.67	0.99	-1.98	-4.91	2.70	-0.48	-0.49
S14	-0.85	1.06	2.11	-2.59	-5.57	1.32	-0.89	-0.91
S15	-0.75	1.35	1.91	-2.40	-5.25	1.17	-0.66	-0.85
S16	-0.21	1.67	1.95	-1.78	-4.41	0.86	-0.16	-0.72
S17	0.23	2.63	3.00	-1.48	-3.80	1.79	0.01	-0.64

Figure S2: Enrichment Factors (EF) of heavy metals in sediments of samples sites.

HPS - Pb	
Site	**EF**
S1	1.05471605
S2	0.86473282
S3	10.974
S4	4.0646824
S5	1.55816867
S6	1.45337243
S7	1.48379404
S8	1.93451923
S9	0.38660147
S10	0.56094218
S11	0.6525119
S12	1.41937947
S13	1.36409207
S14	1.21806452
S15	1.18929134
S16	1.61061611
S17	4.15622222

LPS-Pb	
Site	**EF**
S1	0.75498881
S2	0.91862366
S3	8.03141361
S4	2.97110733
S5	1.01369128
S6	1.54779221
S7	1.54353535
S8	1.40208617
S9	0.47726115
S10	0.62862302
S11	0.7740367
S12	1.41841432
S13	0.88175824
S14	1.15917647
S15	1.18332394
S16	1.57536082
S17	2.02695864

HPS-Cd	
Site	**EF**
S1	1.13435391
S2	0.78466497
S3	6.09666667
S4	6.85299456
S5	1.50888353
S6	1.67483871
S7	3.79476061
S8	7.0724359
S9	3.13512632
S10	0.35374732
S11	0.74452381
S12	31.3540175
S13	10.4218244
S14	6.63688999
S15	7.18530184
S16	9.09699842
S17	8.78444444

LPS-Cd	
Site	**EF**
S1	0.4646085
S2	0.58534767
S3	7.74310646
S4	5.28018171
S5	0.83770321
S6	1.34857143
S7	4.80740741
S8	4.63794407
S9	8.39278132
S10	0.55048909
S11	0.56293578
S12	24.5858483
S13	9.88952381
S14	4.33129412
S15	5.09671362
S16	5.79862543
S17	10.6420114

HPS-Cu	
Site	**EF**
S1	1.06960768
S2	1.02753746
S3	28.0577778
S4	36.5493043
S5	2.98238286
S6	2.48534376
S7	6.02613671
S8	12.0773504
S9	5.89839717
S10	0.97027837
S11	0.92089947
S12	16.6720764
S13	8.31599886
S14	8.30261924
S15	9.08486439
S16	10.0912059
S17	13.3441975

LPS-Cu	
Site	**EF**
S1	0.75557544
S2	0.81881004
S3	25.8103549
S4	29.3045618
S5	1.33750932
S6	1.38262626
S7	8.23748597
S8	8.75263291
S9	7.18188252
S10	0.81922247
S11	0.89251784
S12	11.2400114
S13	3.08903541
S14	9.00810458
S15	7.47517997
S16	7.0556701
S17	13.8065423

HPS-Cr	
Site	**EF**
S1	0.46358299
S2	0.42435963
S3	0.12298222
S4	0.07081428
S5	0.37785274
S6	0.34757902
S7	0.29988558
S8	0.43241453
S9	0.14361315
S10	0.32791815
S11	0.29656085
S12	0.48814638
S13	0.44396704
S14	0.32273504
S15	0.33035871
S16	0.48094787
S17	0.39333333

LPS-Cr	
Site	**EF**
S1	0.3554959
S2	0.41278853
S3	0.15239092
S4	0.04404619
S5	0.35784241
S6	0.21795094
S7	0.29665544
S8	0.36390023
S9	0.39583864
S10	0.30543266
S11	0.45588175
S12	0.47481671
S13	0.39996093
S14	0.25759477
S15	0.31762128
S16	0.49200458
S17	0.53337659

HPS-Ni	
Site	**EF**
S1	0.50045025
S2	0.4662775
S3	0.14021176
S4	0.1814028
S5	0.39639972
S6	0.38064516
S7	0.31790212
S8	0.47220023
S9	0.1383144
S10	0.33442499
S11	0.28508403
S12	0.55993261
S13	0.43670829
S14	0.41509269
S15	0.38622819
S16	0.51154168
S17	0.51094771

LPS-Ni	
Site	**EF**
S1	0.34007106
S2	0.34780519
S3	0.16099168
S4	0.08620303
S5	0.32764837
S6	0.26818182
S7	0.32251931
S8	0.35886355
S9	0.37690146
S10	0.31023768
S11	0.48078791
S12	0.54144727
S13	0.39358759
S14	0.3450173
S15	0.37736537
S16	0.53311098
S17	0.61643051

HPS-Hg	
Site	**EF**
S1	0.09410864
S2	0.05824936
S3	0.2065
S4	0.11714338
S5	0.08928193
S6	0.07474487
S7	0.06907317
S8	0.10410096
S9	0.02423472
S10	0.03663812
S11	0.03195833
S12	0.10307399
S13	0.08782097
S14	0.04889826
S15	0.05605774
S16	0.0978673
S17	0.29205

LPS-Hg	
Site	**EF**
S1	0.03880537
S2	0.04009462
S3	0.18008901
S4	0.11820102
S5	0.03880537
S6	0.04405844
S7	0.05244444
S8	0.05886621
S9	0.04528344
S10	0.03063205
S11	0.05683486
S12	0.07967263
S13	0.05160879
S14	0.04372941
S15	0.05251831
S16	0.08606701
S17	0.12345499

HPS-Zn	
Site	**EF**
S1	1.25130604
S2	1.16056247
S3	3.11768421
S4	6.78085777
S5	1.54440076
S6	1.74841797
S7	2.63905292
S8	4.22793522
S9	3.26166517
S10	0.85963259
S11	1.04100251
S12	28.8144705
S13	8.72968098
S14	5.68347917
S15	6.24638762
S16	5.60419057
S17	8.05988304

LPS-Zn	
Site	**EF**
S1	0.93810903
S2	0.99261573
S3	3.34262882
S4	5.19695149
S5	1.10483457
S6	1.55505126
S7	3.26209463
S8	3.14328679
S9	8.14884345
S10	0.88265178
S11	0.98684693
S12	23.6349441
S13	10.1443146
S14	5.1876161
S15	4.49257228
S16	3.3037439
S17	5.97177616

HPS -Mn	
Site	**EF**
S1	1.26552215
S2	1.17558449
S3	0.9204
S4	0.67219814
S5	1.47186393
S6	1.36462308
S7	1.22495776
S8	1.50837104
S9	0.32856033
S10	0.78954024
S11	0.8659944
S12	1.92166222
S13	1.06798255
S14	1.22357612
S15	1.33649529
S16	1.28559799
S17	1.31573856

LPS-Mn	
Site	**EF**
S1	0.91679432
S2	1.12611259
S3	1.0597105
S4	0.4720473
S5	1.10313462
S6	1.32152788
S7	1.14985146
S8	1.34731226
S9	0.56325215
S10	0.8786934
S11	1.03926606
S12	1.70422747
S13	1.11180866
S14	1.12202076
S15	1.26075228
S16	1.63153426
S17	1.72938314

Figure S3: Contamination Factors (CF) of heavy metals in sediments of the samples sites

	Pb	Cd	Cu	Cr	Ni	Hg	Zn	Mn	Fe
HPS	1.9	5.6	9.1	0.3	0.3	0.1	4.8	1.0	1.0
LPS	1.5	5.1	7.6	0.3	0.3	0.1	4.5	1.0	1.0

Figure S4: Spatial assessment of Pollution Load Index (PLI) for both seasons (Data for the geographical analysis)

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
HPS	0.8	0.7	1.1	1.2	0.9	0.8	0.9	1.1	1.0	0.6	0.6	1.4	1.1	1.0	1.0	1.1	1.2
LPS	0.7	0.7	1.1	1.1	0.7	0.6	0.9	1.0	1.2	0.6	0.7	1.3	1.0	0.8	0.9	1.0	1.2

Figure S5: Diurnal trends in heavy metal concentration for selected sample sites

Site	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
4	Morning	0.117	0.353	17.249	4.847	1.452	0.787	3.856
	Mid-day	0.290	1.003	145.429	138.903	1.023	1.161	4.082
	Evening	0.963	2.997	618.613	316.456	10.024	2.789	10.120

	LPS	Cr	Ni	Cu	Zn	As	Cd	Pb
4	Morning	39.391	70.957	15894.997	8838.074	600.656	0.028	125.037
	Mid-day	4.902	19.271	1867.622	3110.539	17.423	0.045	6.283
	Evening	28.409	34.963	5954.591	4191.604	304.812	0.038	57.062
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
3	Morning	0.597	0.979	91.287	33.639	11.451	0.424	8.628
	Mid-day	0.122	0.298	14.179	5.084	1.225	0.555	2.248
	Evening	0.104	0.349	16.111	4.770	1.416	0.765	3.704
	LPS	Cr	Ni	Cu	Zn	As	Cd	Pb
3	Morning	26.165	30.281	2252.744	567.977	157.023	0.019	68.372
	Mid-day	56.263	66.799	4972.116	1575.770	355.672	0.072	136.604
	Evening	1.795	4.795	487.455	68.806	23.852	0.079	3.848
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
8	Morning	0.646	0.470	4.057	3.623	0.756	0.193	3.471
	Mid-day	2.503	2.242	30.324	27.464	1.714	0.442	2.032
	Evening	1.889	1.606	30.146	23.480	1.442	0.247	1.303
	LPS	Cr	Ni	Cu	Zn	As	Cd	Pb
8	Morning	17.277	13.967	92.314	130.846	17.649	0.032	4.683
	Mid-day	11.994	10.754	136.393	120.006	13.482	0.180	6.891
	Evening	12.745	10.653	93.997	114.514	17.123	0.080	4.858
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
9	Morning	0.641	24.753	2334.527	24439.383	0.640	57.082	0.163
	Mid-day	0.691	27.917	3097.300	26979.263	0.651	79.207	0.216
	Evening	1.125	15.675	2379.326	14317.962	0.466	51.178	0.238
	LPS	Cr	Ni	Cu	Zn	As	Cd	Pb
9	Morning	3.420	331.501	33256.770	335121.122	9.079	0.855	0.937
	Mid-day	0.461	29.066	5836.962	38701.317	1.795	0.244	0.847
	Evening	BD	0.000	379.207	1348.929	BD	1.181	BD
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
14	Morning	1.326	0.798	34.561	21.310	0.762	0.221	1.679
	Mid-day	1.247	1.078	29.141	30.214	0.733	0.202	2.204
	Evening	0.278	0.145	5.143	4.174	0.158	0.054	0.575
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
15	Morning	1.061	0.734	53.004	19.585	0.919	0.224	3.493

	Mid-day	0.162	0.081	4.056	1.742	0.129	0.038	0.758
	Evening	0.344	0.216	7.274	4.084	0.207	0.055	0.538
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
16	Morning	0.348	0.220	7.356	4.115	0.218	0.056	0.557
	Mid-day	2.539	1.470	34.165	18.766	1.126	0.175	1.365
	Evening	0.313	0.184	5.058	4.542	0.130	0.050	0.831
	HPS	Cr	Ni	Cu	Zn	As	Cd	Pb
17	Morning	1.548	1.009	41.539	17.793	0.975	0.238	3.402
	Mid-day	2.462	1.539	36.656	21.491	1.099	0.222	3.116
	Evening	2.110	1.264	25.358	15.638	0.813	0.169	1.277

Figure S6: MI values for morning, midday and evening water samples for both seasons

MI Morning

Sample	**MI HPS**	**MI LPS**
S1	1.01946306	4.51938578
S2	0.69009494	5.76315488
S3	2.22124737	24.3464906
S4	0.80880173	84.5644719
S5	0.39010371	2.51449194
S6	0.45915012	1.35614643
S7	1.12321479	1.9432463
S8	0.49818256	2.56788064
S9	28.7764355	134.36456
S10	13.2827951	0.00148145
S11	0.0258598	0
S12	0.13013568	0.00040289
S13	0.12380118	0.00085299
S14	0.35616104	0.06130088
S15	0.5616525	0.01278798
S16	0.10523378	0.00889956
S17	0.56106594	0.00115697

MI Mid-day

Sample	**MI HPS**	**MI LPS**
S1	1.64822769	5.29056605
S2	0.67931006	4.73723094
S3	0.54547813	53.3296533

S4	1.03144452	4.64126739
S5	0.81816514	2.09020265
S6	0.29636308	1.34082231
S7	0.21895468	1.83899855
S8	0.58339399	2.38304775
S9	37.4307263	16.5806992
S10	0.2041104	0
S11	0.05229082	0
S12	0.16671248	0.00639164
S13	0.07530973	0.00076945
S14	0.40358944	0.00169505
S15	0.10538817	0.00658803
S16	0.35690006	0.00890301
S17	0.54777418	0.01714014

MI Evening

Sample	MI HPS	MI LPS
S1	3.47040858	5.35426633
S2	0.51837433	3.34279003
S3	0.78187978	3.13502105
S4	3.40373999	41.1306913
S5	0.16435992	2.36773497
S6	0.32056173	1.18704567
S7	0.48896864	2.26086045
S8	0.40635542	2.48743262
S9	23.3181259	1.03286903
S10	0.04565111	0
S11	0.02958847	0
S12	0.07800048	0.00662983
S13	0.07945935	0.00961826
S14	0.09774172	0.04512971
S15	0.10161181	0.00756052
S16	0.12004396	0.01141178
S17	0.30556659	0.02280242