

Supplementary Material
for

***Ecological safety and spatial distribution of mercury and arsenic in Qinghai spruce
ecosystems in remote plateau mountains, northwest China***

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Table S1

Contamination categories based on enrichment factor and potential ecological risk.

Enrichment factor (EF)			Potential ecological risk			
			Individual metal (Er)		Multi-metals (RI)	
Level	Value	Categorisation	Value	Classification	Value	Classification
0	EF<1	No	Er<40	Low	RI<150	Low
1	1≤EF<3	Minor	40≤Er<80	Moderate	150≤RI<300	Moderate
2	3≤EF<5	Moderate	80≤Er<160	Strong	300≤RI<600	Very strong
3	5≤EF<10	Moderately severe	160≤Er<320	Very strong	600≤RI	High strong
4	10≤EF<25	Severe	320≤Er	High strong		
5	25≤EF<50	Very severe				
6	50<EF	Extremely severe				

Table S2

Pearson correlation coefficients between Hg, As and other parameters in surface soils.

	pH	OM	CaCO ₃	EC	TN	TP	Hg	As	Fe
Hg	-0.462*	0.670**	0.094	0.025	0.771**	0.163	1	-0.299	-0.356
As	-0.029	-0.159	-0.283	-0.001	-0.149	0.410*	-0.299	1	0.410*

* $p < 0.05$; ** $p < 0.01$.**Table S3**

The Pearson correlation coefficient between Hg and As in moss (M-Hg and M-As), total soil Hg and As (S-Hg and S-As) and soil properties.

	pH	OM	CaCO ₃	EC	TN	TP	S-Hg	S-As	M-Hg
M-Hg	-0.229	0.255	-0.194	-0.210	0.323	-0.086	0.406*	-0.218	1
M-As	-0.182	-0.032	-0.308	-0.194	-0.008	0.151	0.234	0.064	0.626**

* $p < 0.05$; ** $p < 0.01$.**Table S4**

The Pearson correlation coefficient between altitude and the BCF of Hg and As in plant tissues.

	Bark	Litterfall	Foliage	Cone	Moss	<i>caragana jubata</i>	<i>salix gilashanica</i>
Altitude (Hg)	-0.453*	0.021	-0.499*	-0.18	-0.441*	-0.412	0.031
Altitude (As)	-0.506*	0.268	-0.461*	0.473*	0.344	0.528**	0.903

* $p < 0.05$; ** $p < 0.01$.

Table S5

Enrichment factor (EF) and potential ecological risk (Er and RI) of Hg and As in topsoil.

Sample No.	Hg				As				Muti-metals (RI)	Eco-risk factor grade
	EF	Level	Individual metal (Er)	Eco-risk factor grade	EF	Level	Individual metal (Er)	Eco-risk factor grade		
S01	1.42	1	82.0	Strong	0.43	0	6.23	Low	88.2	Low
S02	2.27	1	94.8	Strong	0.66	0	6.89	Low	102	Low
S03	2.40	1	101	Strong	0.39	0	4.08	Low	105	Low
S04	1.99	1	82.2	Strong	0.53	0	5.44	Low	87.6	Low
S05	1.51	1	61.6	Moderate	0.83	0	8.48	Low	69.9	Low
S06	2.26	1	88.2	Strong	0.39	0	3.85	Low	92.0	Low
S07	2.08	1	84.2	Strong	0.42	0	4.27	Low	88.5	Low
S08	3.24	2	121	Strong	0.41	0	3.79	Low	125	Low
S09	2.09	1	89.9	Strong	0.38	0	4.13	Low	94.1	Low
S10	1.99	1	78.8	Moderate	0.23	0	2.28	Low	81.1	Low
S11	2.48	1	109	Strong	0.27	0	3.00	Low	112	Low
S12	3.32	2	131	Strong	0.35	0	3.51	Low	135	Low
S13	2.38	1	97.6	Strong	0.42	0	4.26	Low	102	Low
S14	1.95	1	78.2	Moderate	0.29	0	2.87	Low	81.1	Low
S15	2.15	1	88.3	Strong	0.37	0	3.79	Low	92.2	Low
S16	3.46	2	140	Strong	0.39	0	3.89	Low	144	Low
S17	1.18	1	55.1	Moderate	0.38	0	4.42	Low	59.5	Low
S18	1.32	1	53.5	Moderate	0.44	0	4.45	Low	57.9	Low
S19	1.09	1	47.5	Moderate	0.44	0	4.80	Low	52.3	Low
S20	2.10	1	85.9	Strong	0.42	0	4.31	Low	90.2	Low
S21	1.84	1	82.0	Strong	0.38	0	4.26	Low	86.2	Low
S22	0.62	0	28.8	Low	0.48	0	5.57	Low	34.4	Low
S23	0.73	0	36.3	Low	0.40	0	4.92	Low	41.2	Low
S24	1.07	1	46.5	Moderate	0.38	0	4.11	Low	50.6	Low
S25	1.55	1	66.8	Moderate	0.29	0	3.14	Low	69.9	Low
S26	2.18	1	74.7	Moderate	0.28	0	2.42	Low	77.1	Low
S27	0.82	0	36.2	Low	0.73	0	8.11	Low	44.4	Low
S28	1.42	1	59.9	Moderate	0.64	0	6.71	Low	66.6	Low
mean	1.89	1	78.6	Moderate	0.43	0	4.57	Low	83.2	Low