

Supplement of:

Mapping mining-affected water pollution in China: Status, patterns, risks, and implications

Ziyue Yin¹, Jian Song², Dianguang Liu¹, Jianfeng Wu^{1,*}, Yun Yang², Yuanyuan Sun¹, Jichun Wu¹

¹ Key Laboratory of Surficial Geochemistry, Ministry of Education, Department of Hydrosciences, School of Earth Sciences and Engineering, Nanjing University, Nanjing 210023, China

² School of Earth Sciences and Engineering, Hohai University, Nanjing 211100, China

* Corresponding authors. Tel: +86 25 89680853; fax: +86 25 83686016

E-mail address: jfwu@nju.edu.cn (J.F. Wu)

16 ***S1 Database establishment***

17 The typical mine lists ([Table S1](#)) are presented in the [ESM2.xlsx](#) document. The sources (*i.e.*,
18 293 research papers) of high-quality data are listed in the section of ***References*** at the end of the
19 text.

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21 **S2 Risk assessment**

22 **Table S2.** The main parameters used for human health risk assessment.

Parameter	Description	Unit	Value		Source
			Adult	Children	
<i>IR</i>	Ingestion rate	L/d	2.50	0.78	[1], [2]
<i>EF</i>	Exposure frequency	d/yr	350	350	[1], [2]
<i>ED</i>	Exposure duration	yr	24	6	[2]
<i>ET</i>	Time of contact	h/d	0.58	1.00	[3], [4]
<i>SA</i>	Skin surface area	cm ²	19652	6365	[1], [2]
<i>CF</i>	Conversion factor	L/cm ³	0.001	0.001	[2], [5]
<i>BW</i>	Body weight	kg	70	15	[1], [3], [4]
<i>AT</i>	Averaging time ^a	d	8760	2190	<i>ED</i> × 365 d/yr
	Averaging time ^b		25550	25550	70 × 365 d/yr

23 Note: ^a averaging time used for non-carcinogenic risks (NCRs), and ^b averaging time used for carcinogenic risks
24 (CRs), which is equal to a lifetime (70 yr in the study) × 365 d/yr. The parameter values used in the study are
25 obtained from the following literature sources: [1] [Meng et al. \(2024\)](#); [2] [Shi et al. \(2023\)](#); [3] [Tong et al. \(2021\)](#);
26 [4] [Wang et al. \(2021\)](#); and [5] [Yuan et al. \(2023\)](#).

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Table S3. The values of main parameters including permeability coefficient of skin (K_p), reference dose (RfD_o), gastrointestinal digestion coefficient (ABS_{GI}), and slope factor (SF) for each element.

Parameter	K_p	RfD_o	ABS_{GI}	SF	Source
	(cm/h)	(mg/kg·d)	(-)	(kg·d/mg)	
Fe	0.001	0.7	0.2	-	[1], [2], [3], [4], [6]
Mn	0.001	0.024	0.04	-	[1], [2], [3], [4], [6]
Cr	0.002	0.003	0.025	0.5	[1], [3], [6], [7]
Ni	0.0002	0.02	0.04	-	[1], [2], [3], [4], [6], [7]
Cu	0.001	0.04	0.2	-	[1], [2], [3], [4], [6], [7]
Zn	0.0006	0.3	0.2	-	[1], [2], [3], [4], [5], [6]
As	0.001	0.0003	1	1.5	[1], [3], [7]
Cd	0.001	0.0005	0.05	0.38	[2], [3], [4], [6]
Pb	0.0001	0.0014	0.3	-	[1], [3], [6]

Note: The parameter values for each element are obtained from the following literature sources: [1] [Meng et al. \(2024\)](#); [2] [Shi et al. \(2023\)](#); [3] [Tong et al. \(2021\)](#); [4] [USEPA \(2002\)](#); [5] [USEPA \(2014\)](#); [6] [Wang et al. \(2021\)](#); and [7] [Zheng et al. \(2023\)](#).

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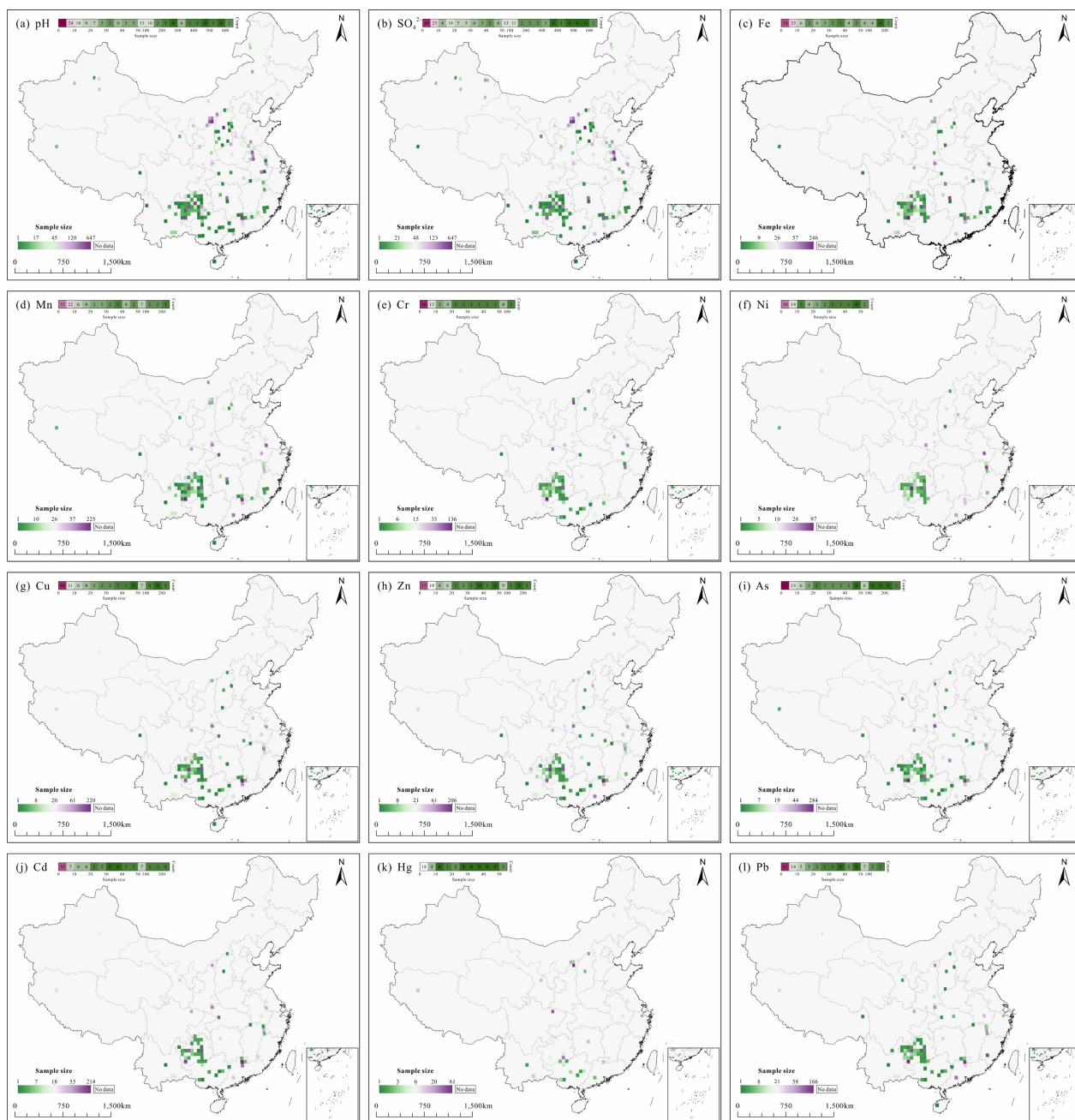
USEPA: Risk-based Concentration Table. U.S. Environment Protection Agency (Washington DC), 2002.

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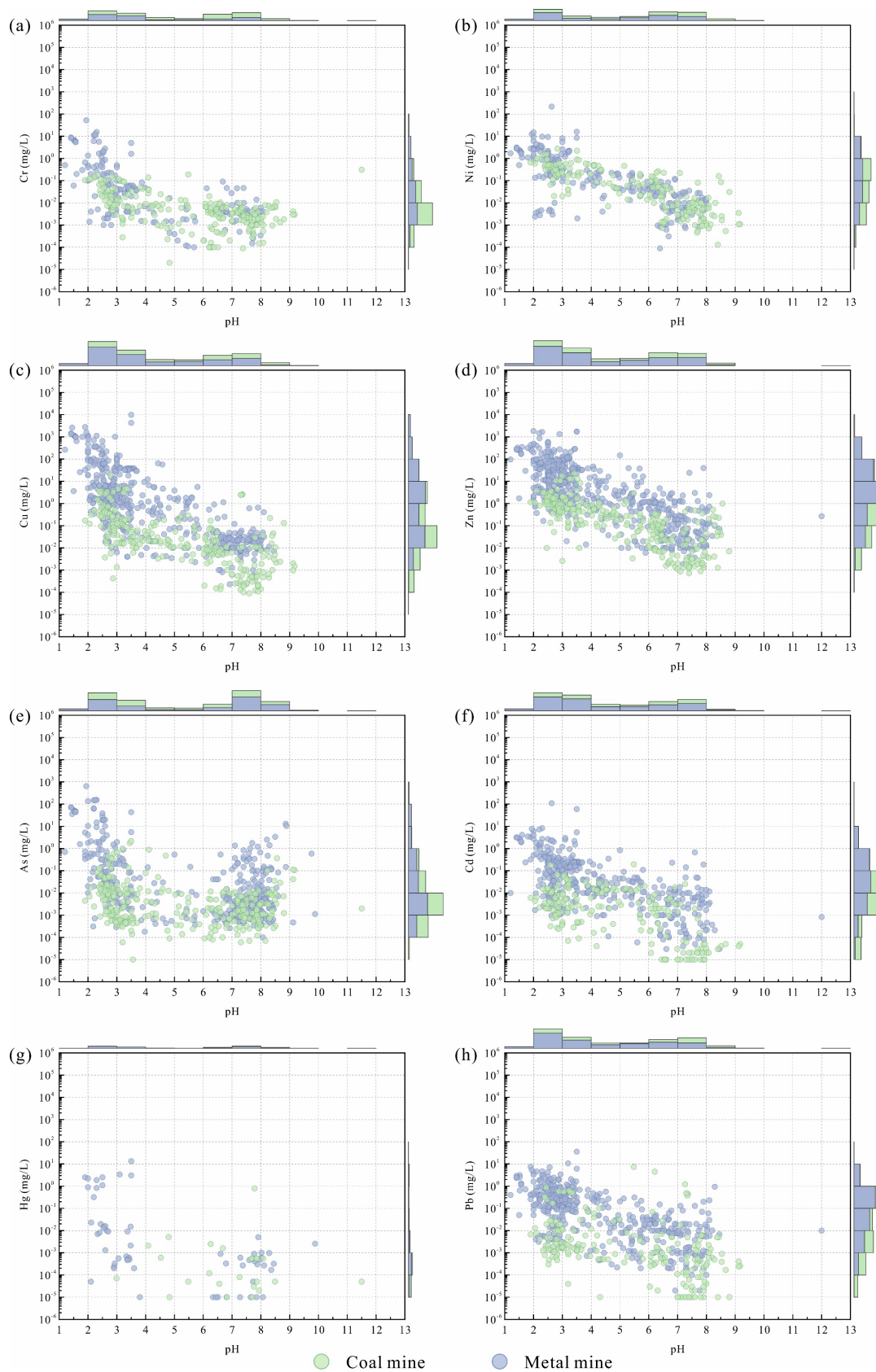


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61 **Figure S1.** Spatial distributions of the sample size of (a) pH, (b) SO_4^{2-} , (c) Fe, (d) Mn, (e) Cr, (f)

62 Ni, (g) Cu, (h) Zn, (i) As, (j) Cd, (k) Hg, and (l) Pb in mining-affected water on the 0.5° grid.

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64

65 **Figure S2.** The respective relationships of pH versus (a) Cr, (b) Ni, (c) Cu, (d) Zn, (e) As, (f) Cd,
 66 (g) Hg, and (h) Pb in coal and metal mines.

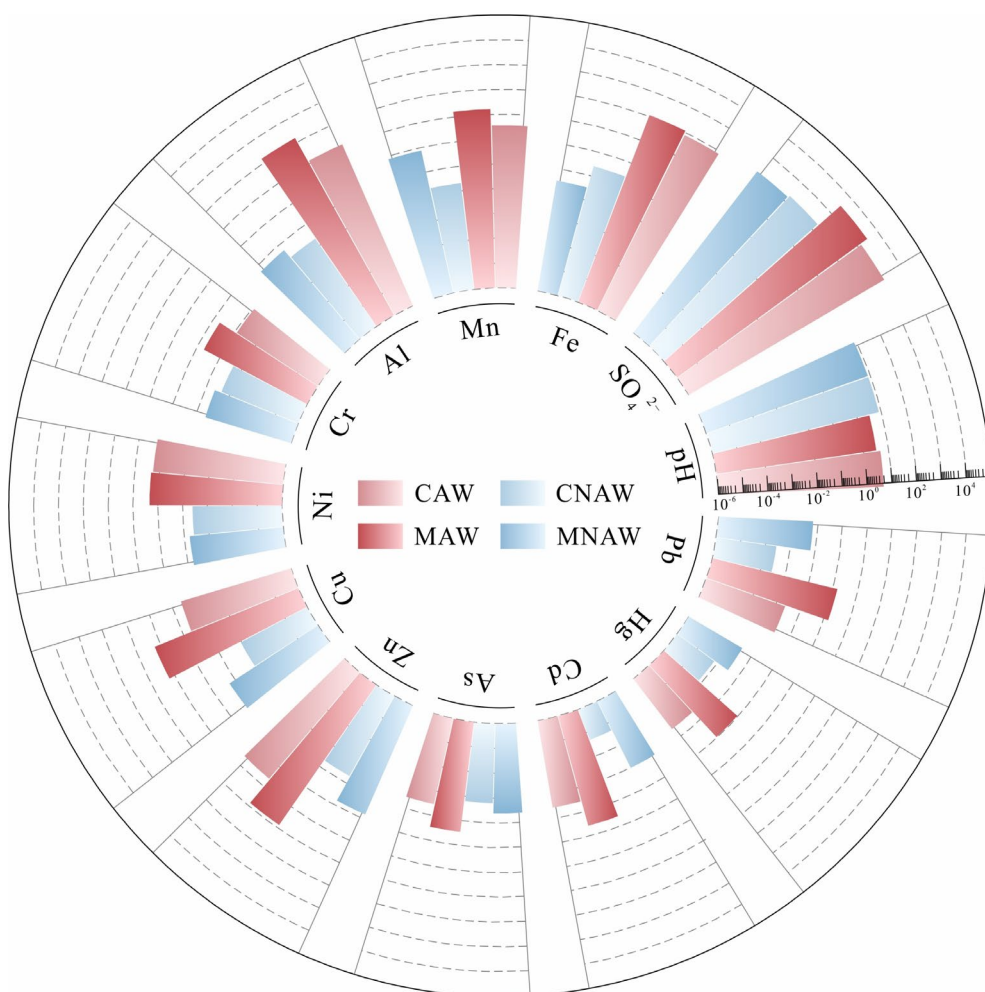


Figure S3. The comparison of multi-component concentrations (mg/L, except for pH) in coal and metal mines. CAW and MAW are the acid water of coal and metal mines; and CNAW and MNAW are the neutral/alkaline water of coal and metal mines, respectively.

73 **Table S4.** The categories of the Environmental Quality Standards for Surface Water (GB 3838-2002).

Item	Class I	Class II	Class III	Class IV	Class V
pH			6.0 – 9.0		
SO ₄	-	-	-	-	-
Fe	-	-	-	-	-
Mn	-	-	-	-	-
Cr	0.01	0.05	0.05	0.05	0.1
Ni	-	-	-	-	-
Cu	0.01	1.0	1.0	1.0	1.0
Zn	0.05	1.0	1.0	2.0	2.0
As	0.05	0.05	0.05	0.1	0.1
Cd	0.001	0.005	0.005	0.005	0.01
Hg	0.00005	0.00005	0.0001	0.001	0.001
Pb	0.01	0.01	0.05	0.05	0.1

Table S5. The categories of the Standard for Groundwater Quality (GB/T14848-2017).

Item	Class I	Class II	Class III	Class IV	Class V
pH		6.5 – 8.5		5.5 – 6.5 and 8.5 – 9.0	< 5.5 and > 9.0
SO ₄	50	150	250	350	> 350
Fe	0.1	0.2	0.3	2.0	> 2.0
Mn	0.05	0.05	0.1	1.5	> 1.5
Cr	0.005	0.01	0.05	0.1	> 0.1
Ni	0.002	0.002	0.02	0.1	> 0.1
Cu	0.01	0.05	1.0	1.5	> 1.5
Zn	0.05	0.5	1.0	5.0	> 5.0
As	0.001	0.001	0.01	0.05	> 0.05
Cd	0.0001	0.001	0.005	0.01	> 0.01
Hg	0.0001	0.0001	0.001	0.002	> 0.002
Pb	0.005	0.005	0.01	0.1	> 0.1

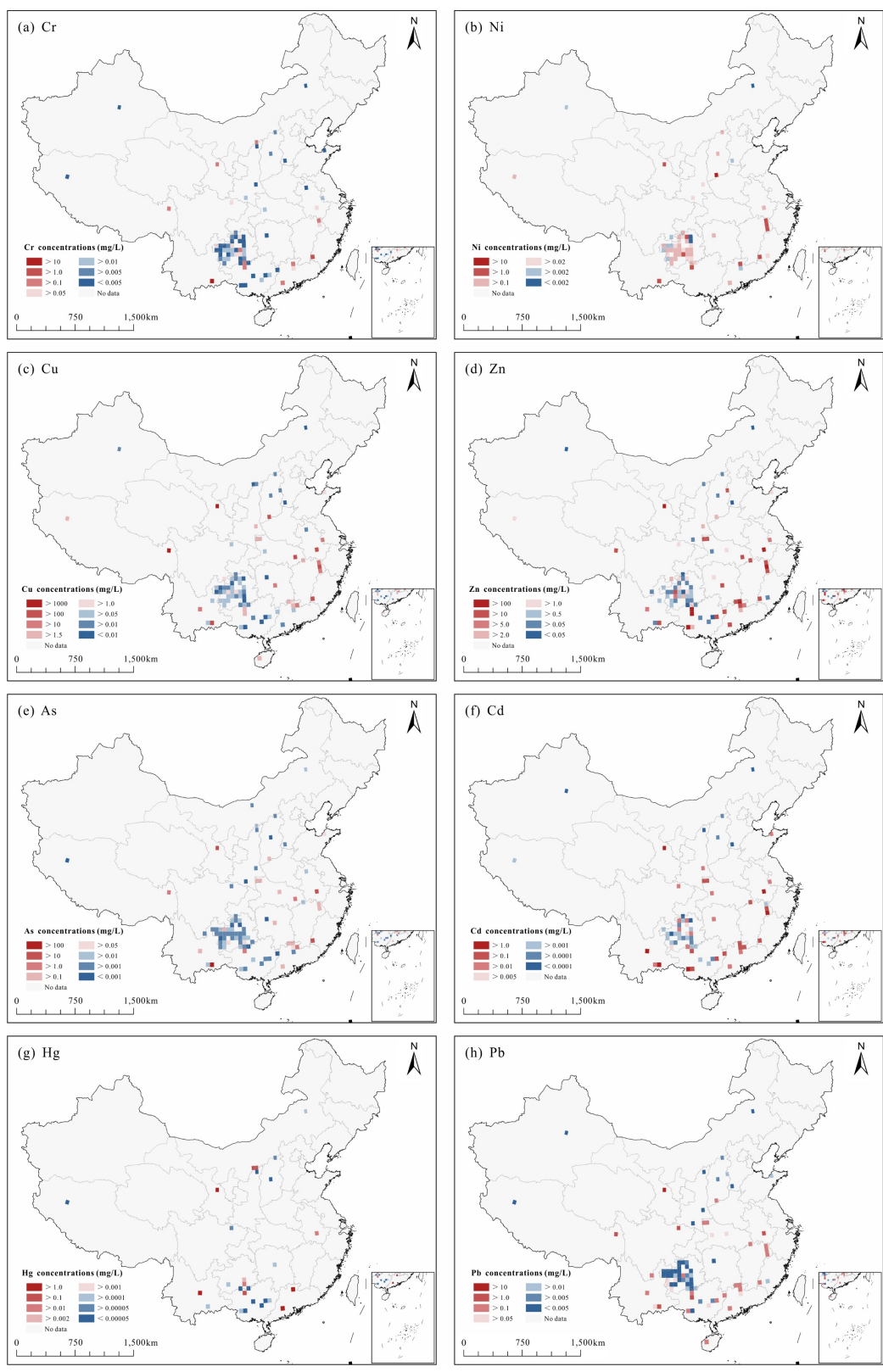
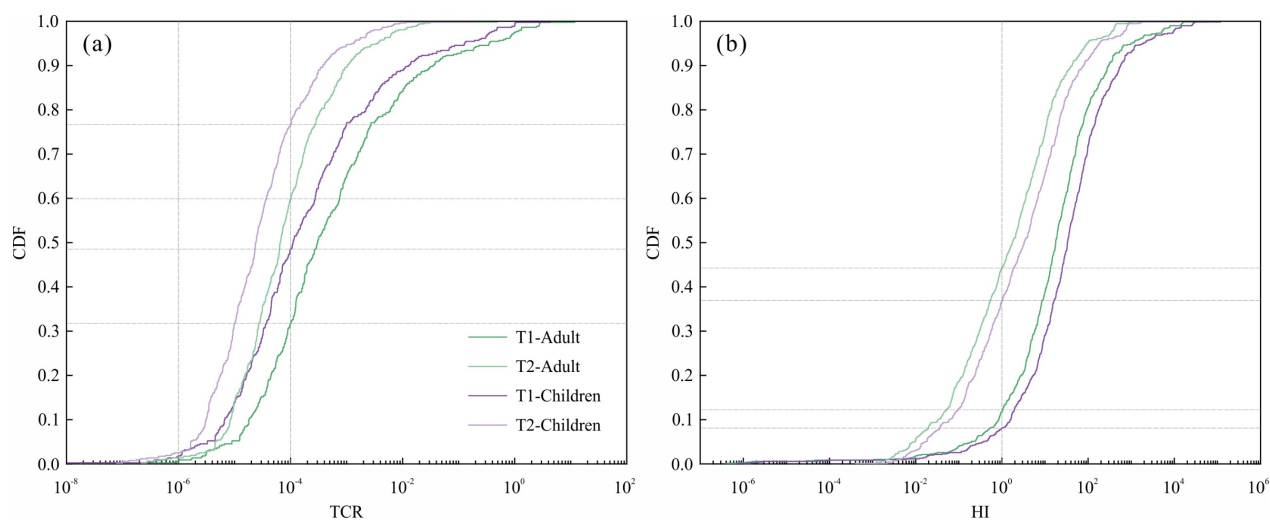


Figure S4. Spatial distributions of mean concentrations (mg/L) of single component (a) Cr, (b) Ni, (c) Cu, (d) Zn, (e) As, (f) Cd, (g) Hg, and (h) Pb in mining-affected water on the 0.5° grid.



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82 **Figure S5.** The cumulative distribution function (CDF) of (a) total carcinogenic risk (TCR) and (b)
83 hazard index (HI) in mining-affected water. T1 includes the mine drainage, mine water, and
84 leachate water, while T2 indicates the mining-affected surface water and groundwater.

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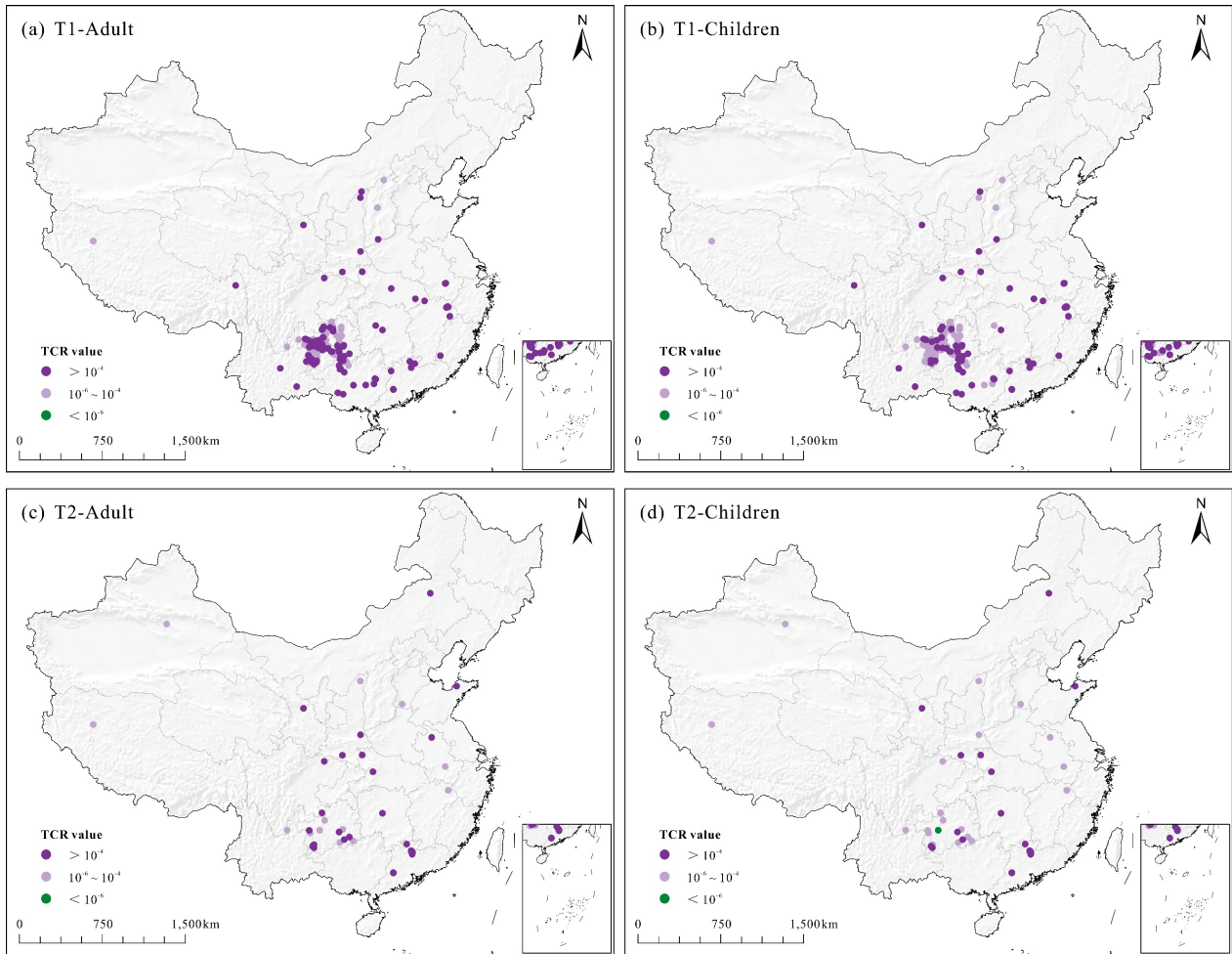


Figure S6. The spatial distributions of TCR levels for (a) T1-Adult, (b) T1-Children, (c) T2-Adult, and (d) T2-Children. T1 includes the mine drainage, mine water, and leachate water, while T2 indicates the mining-affected surface water and groundwater.

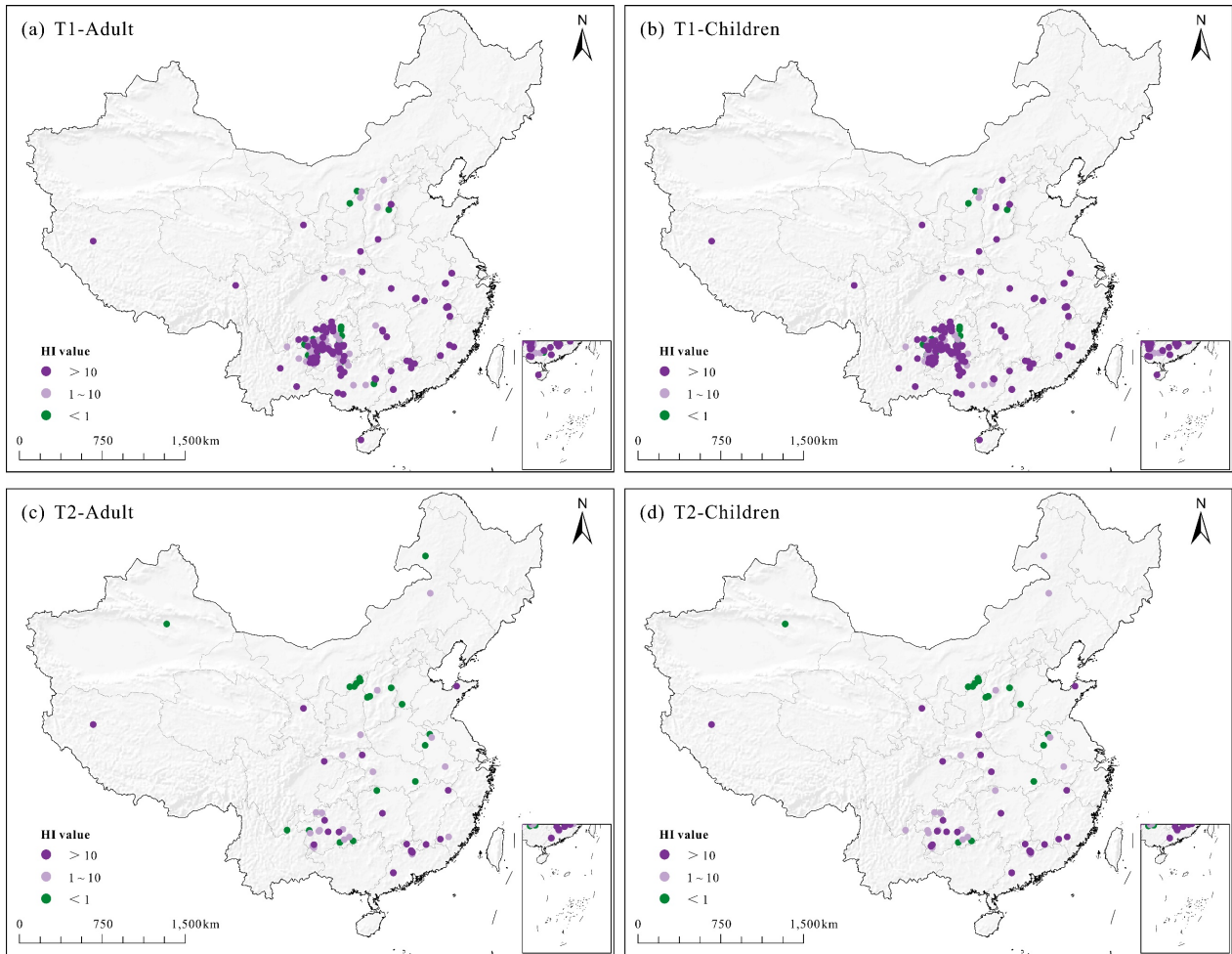


Figure S7. The spatial distributions of HI levels for (a) T1-Adult, (b) T1-Children, (c) T2-Adult, and (d) T2-Children. T1 includes the mine drainage, mine water, and leachate water, while T2 indicates the mining-affected surface water and groundwater.

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