Supplementary Material

Table S1 Classification of heavy metal contamination degree in soil based on I_{geo} values.

class	I_{geo} value	contamination degree
0	$I_{geo} \leq 0$	Practically uncontaminated
1	$0 < I_{geo} \leq 1$	Uncontaminated to moderately contaminated
2	$1 < I_{geo} \leq 2$	Moderately contaminated
3	$2 < I_{geo} \leq 3$	Moderately to heavily contaminated
4	$3 < I_{geo} \leq 4$	Heavily contaminated
5	$4 < I_{geo} \leq 5$	Heavily to extremely contaminated
6	$5 < I_{geo}$	Extremely contaminated

Table S2 Grading standards of PI and PLI.

PI		PLI	pollution levels
PI＜1	low pollution	PLI ＜ 1	Unpolluted
1 ≤ PI＜3	moderate pollution	1 ≤ PLI＜2	Unpolluted to moderately polluted
3 ≤ PI＜6	considerable pollution	2 ≤ PLI＜3	Moderately polluted
PI ≥ 6	very high pollution	3 ≤ PLI＜4	Moderately to highly polluted
		4 ≤ PLI＜5	Highly polluted
		PLI ≥ 5	Very highly polluted

Table S3 Hakanson ecological risk recommended thresholds.

E_r^i	Potential ecological risk grade	RI	Potential ecological risk of multiple metals
E_r＜40	Low ecological risk	RI＜150	Low ecological risk
40 ≤ E_r＜80	Moderate ecological risk	150 ≤ RI＜300	Moderate ecological risk
80 ≤ E_r＜160	Considerable ecological risk	300 ≤ RI＜600	Considerable ecological risk
160 ≤ E_r＜320	High ecological risk	600 ≤ RI＜1200	Very high ecological risk
E_r ≥320	Very high ecological risk at hand for the substance in question	RI ≥1200	Extremely high ecological risk

Table S4 Variance explained by extracted components in Principal Component Analysis of heavy metals in the soil of Nansi Lake Nature Reserve.

Ingredient	Eigenvalue	Initial component		load sum of squares	
		percent variance	Cumulative proportion	percent variance	Cumulative proportion
1	3.704	46.305	46.305	46.305	46.305
2	1.172	14.656	60.961	14.656	60.961
3	1.124	14.050	75.011	14.050	75.011
4	0.715	8.943	83.954		
5	0.649	8.113	92.067		
6	0.394	4.928	96.995		

7	0.210	2.626	99.621
8	0.030	0.379	100.000

Table S5 Mapping of bootstrap factors to base factors.

	Factor 1	Factor 2	Factor 3	Unmapped
Boot Factor 1	98	1	1	0
Boot Factor 2	0	98	2	0
Boot Factor 3	0	0	100	0