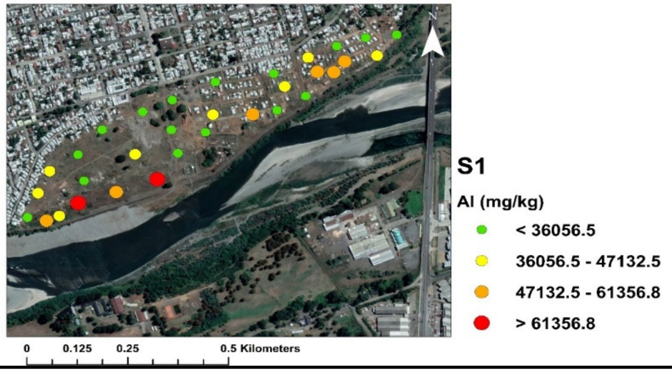
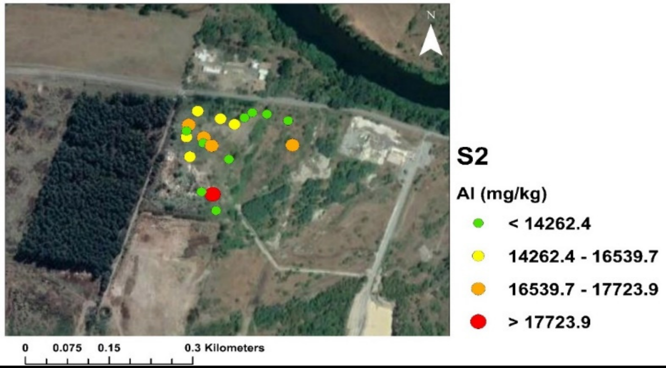
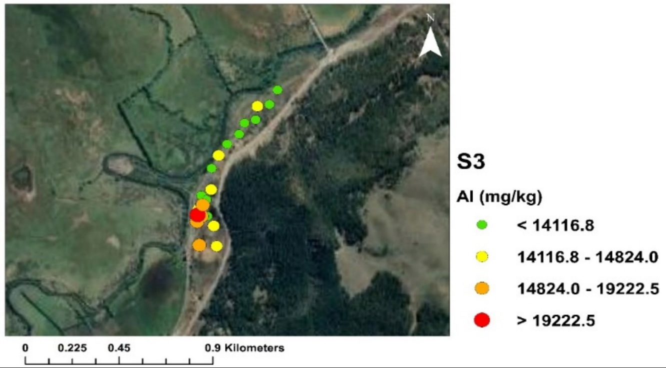
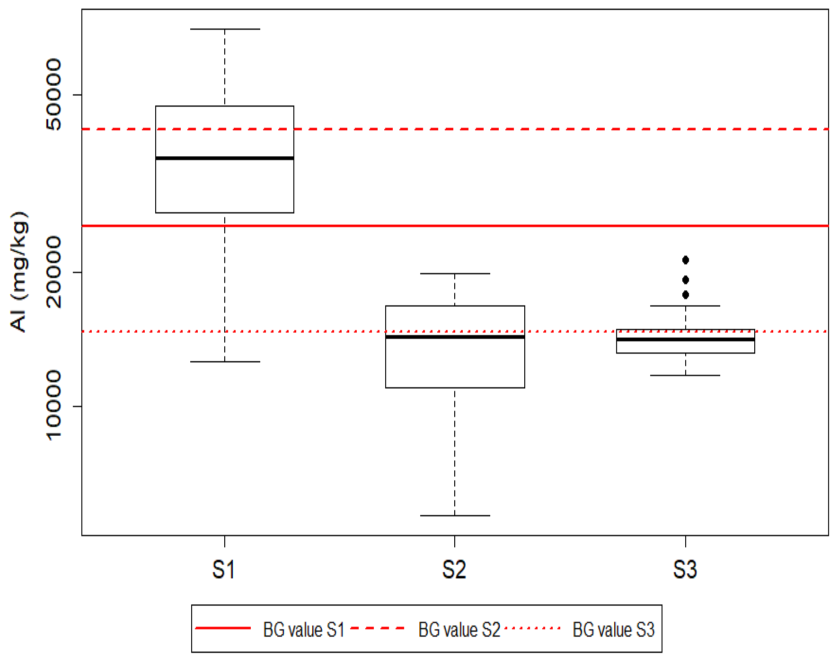
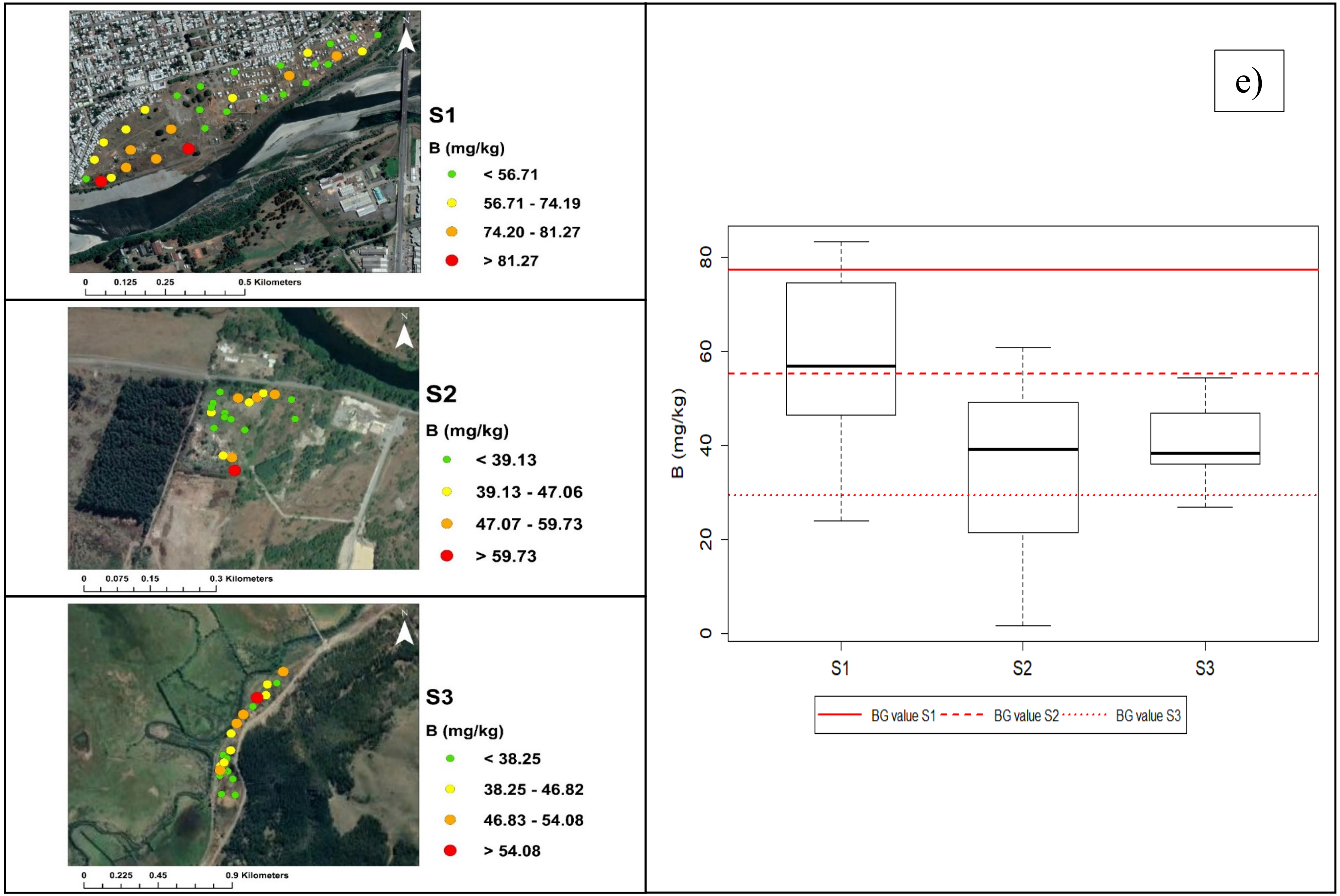
Supplementary material



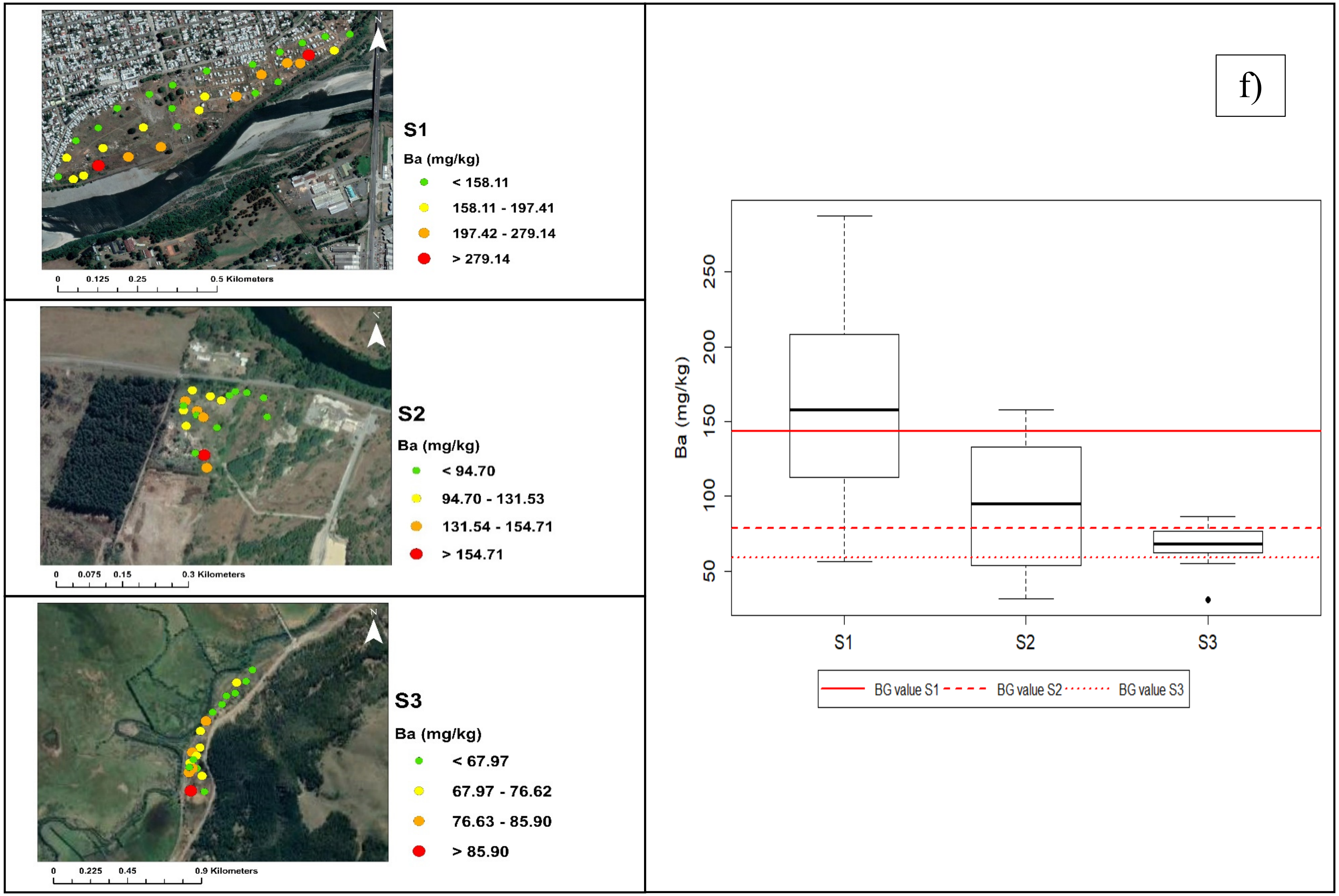


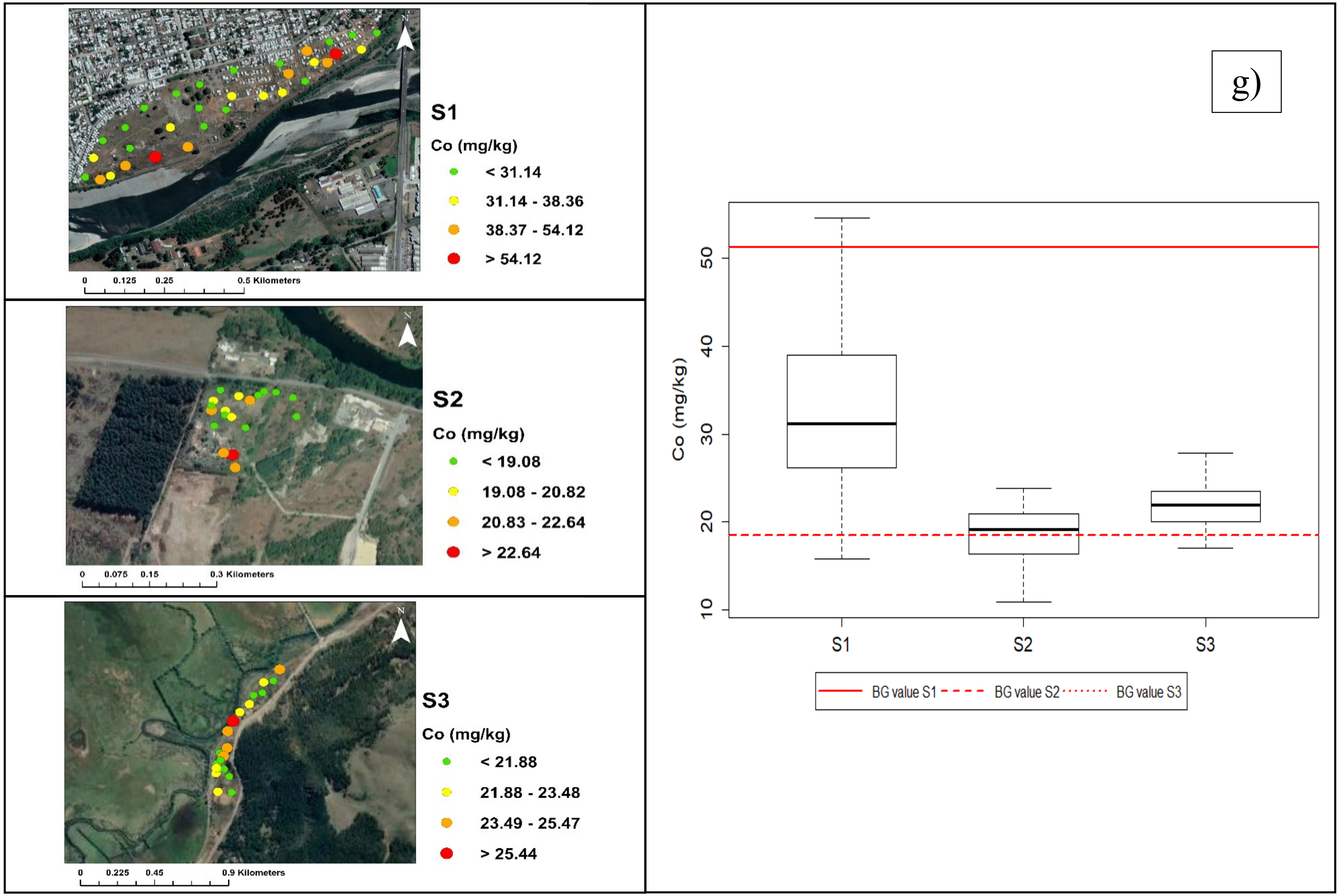




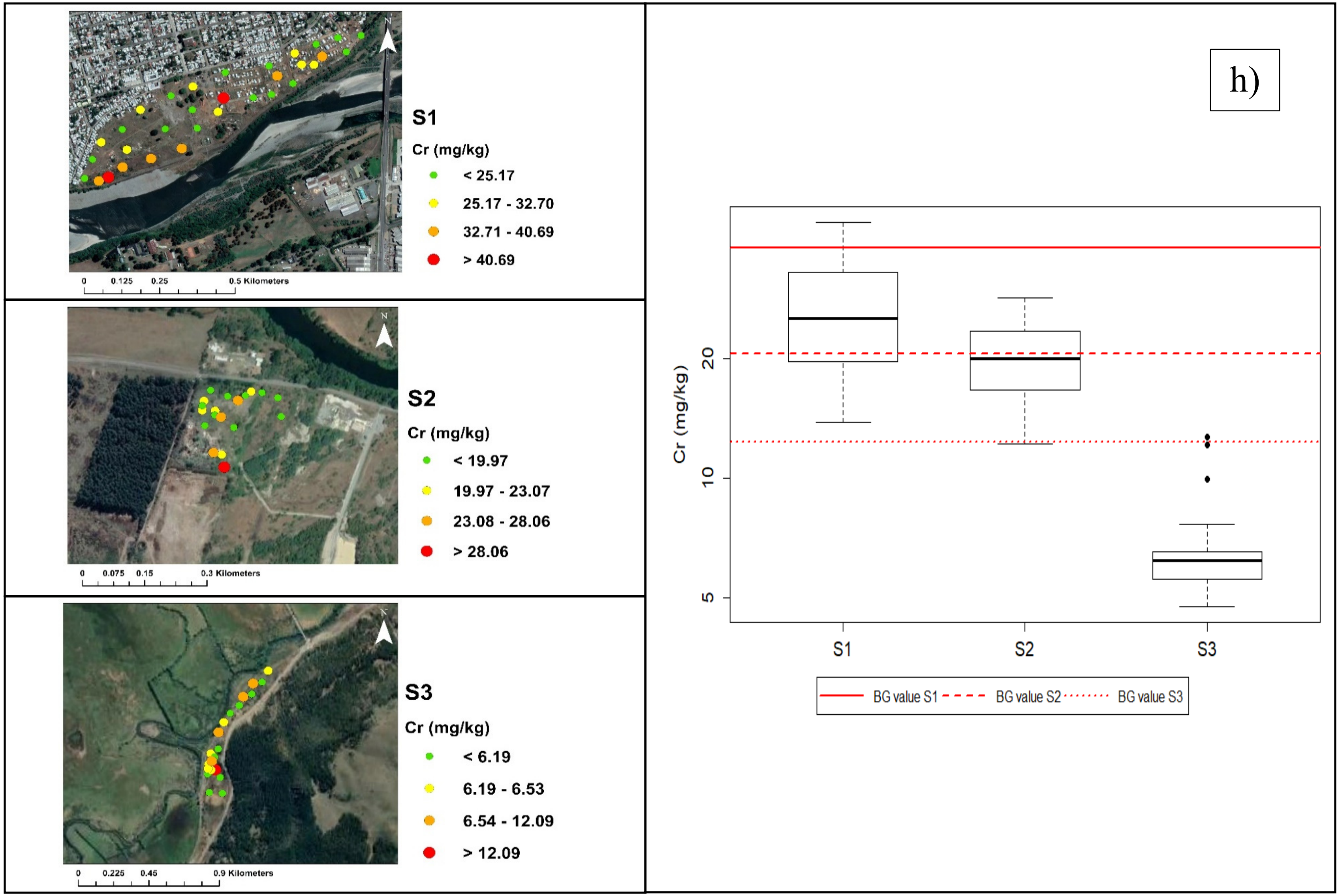


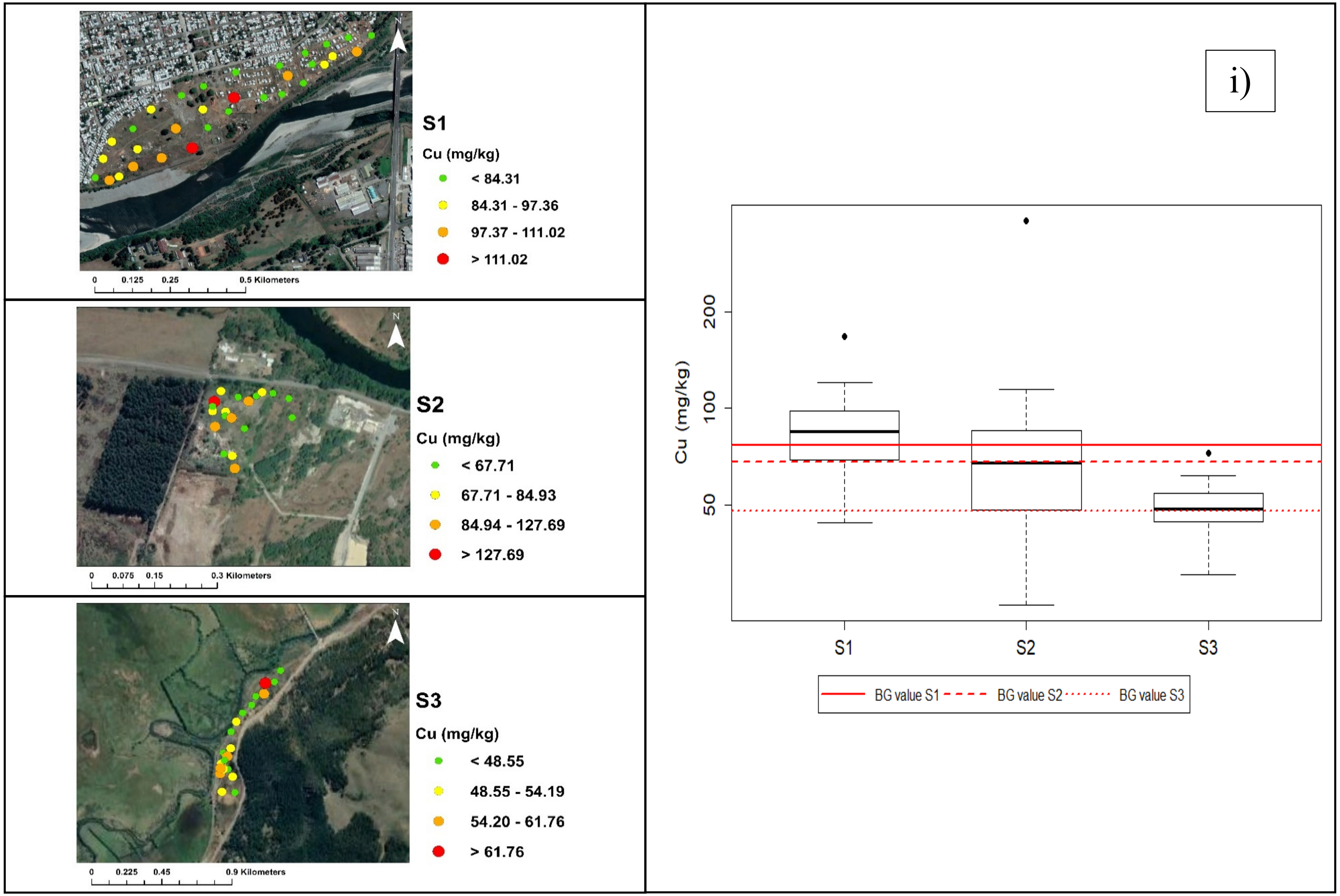
S1
B (mg/kg)
< 56.71
56.71 - 74.19
74.20 - 81.27
> 81.27
0 0.125 0.25 0.5 Kilometers
S2
B (mg/kg)
< 39.13
39.13 - 47.06
47.07 - 59.73
> 59.73
0 0.075 0.15 0.3 Kilometers
S3
B (mg/kg)
< 38.25
38.25 - 46.82
46.83 - 54.08
> 54.08
0 0.225 0.45 0.9 Kilometers
e)
B (mg/kg)
0
20
40
60
80
S1
S2
S3
BG value S1
BG value S2
BG value S3


S1
Ba (mg/kg)
< 158.11
158.11 - 197.41
197.42 - 279.14
> 279.14
0 0.125 0.25 0.5 Kilometers
S2
Ba (mg/kg)
< 94.70
94.70 - 131.53
131.54 - 154.71
> 154.71
0 0.075 0.15 0.3 Kilometers
S3
Ba (mg/kg)
< 67.97
67.97 - 76.62
76.63 - 85.90
> 85.90
0 0.225 0.45 0.9 Kilometers
f)
Ba (mg/kg)
50
100
150
200
250
S1
S2
S3
BG value S1
BG value S2
BG value S3

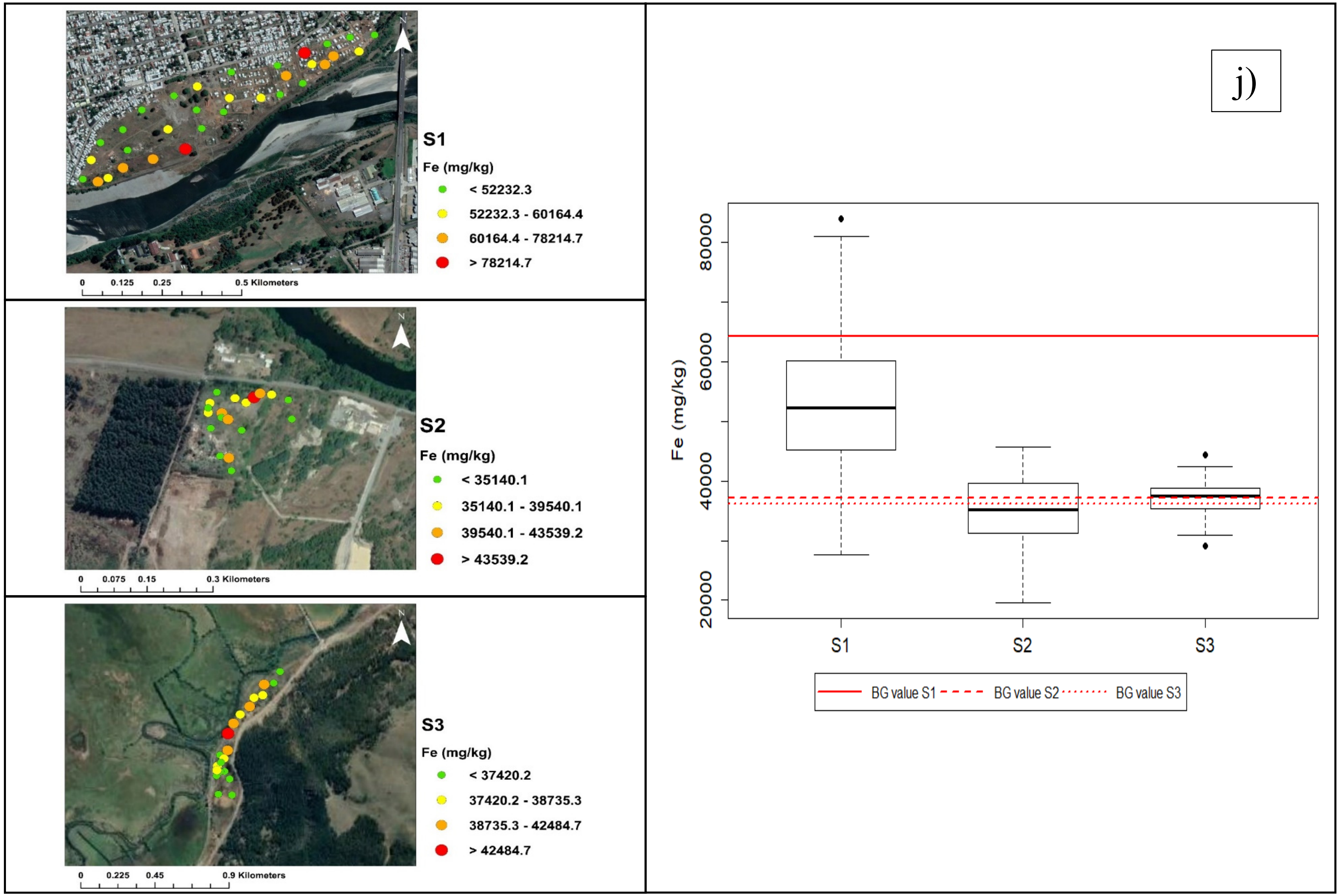


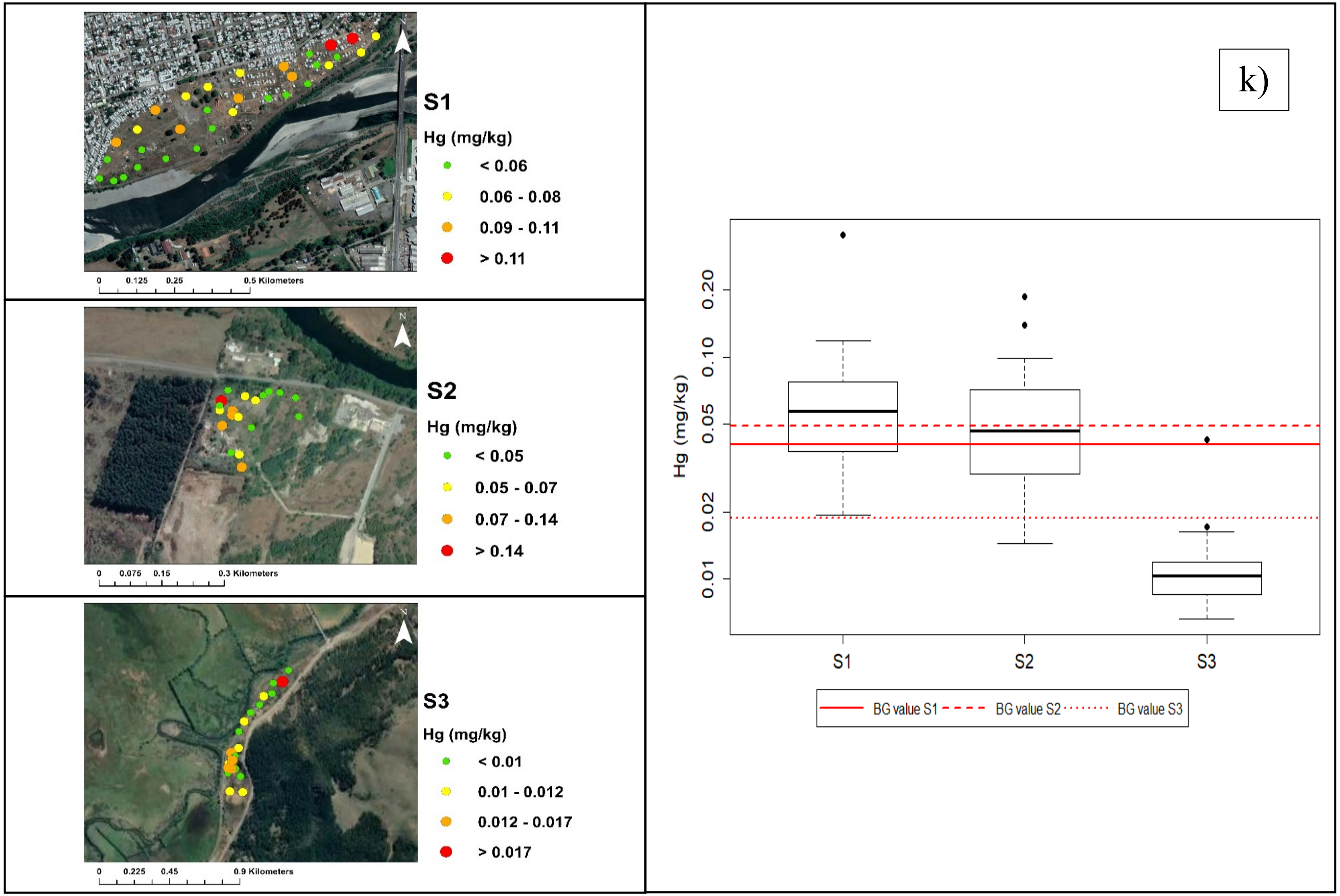
S1
Co (mg/kg)
< 31.14
31.14 - 38.36
38.37 - 54.12
> 54.12
0 0.125 0.25 0.5 Kilometers
S2
Co (mg/kg)
< 19.08
19.08 - 20.82
20.83 - 22.64
> 22.64
0 0.075 0.15 0.3 Kilometers
S3
Co (mg/kg)
< 21.88
21.88 - 23.48
23.49 - 25.47
> 25.44
0 0.225 0.45 0.9 Kilometers
g)
Co (mg/kg)
10
20
30
40
50
S1
S2
S3
BG value S1
BG value S2
BG value S3

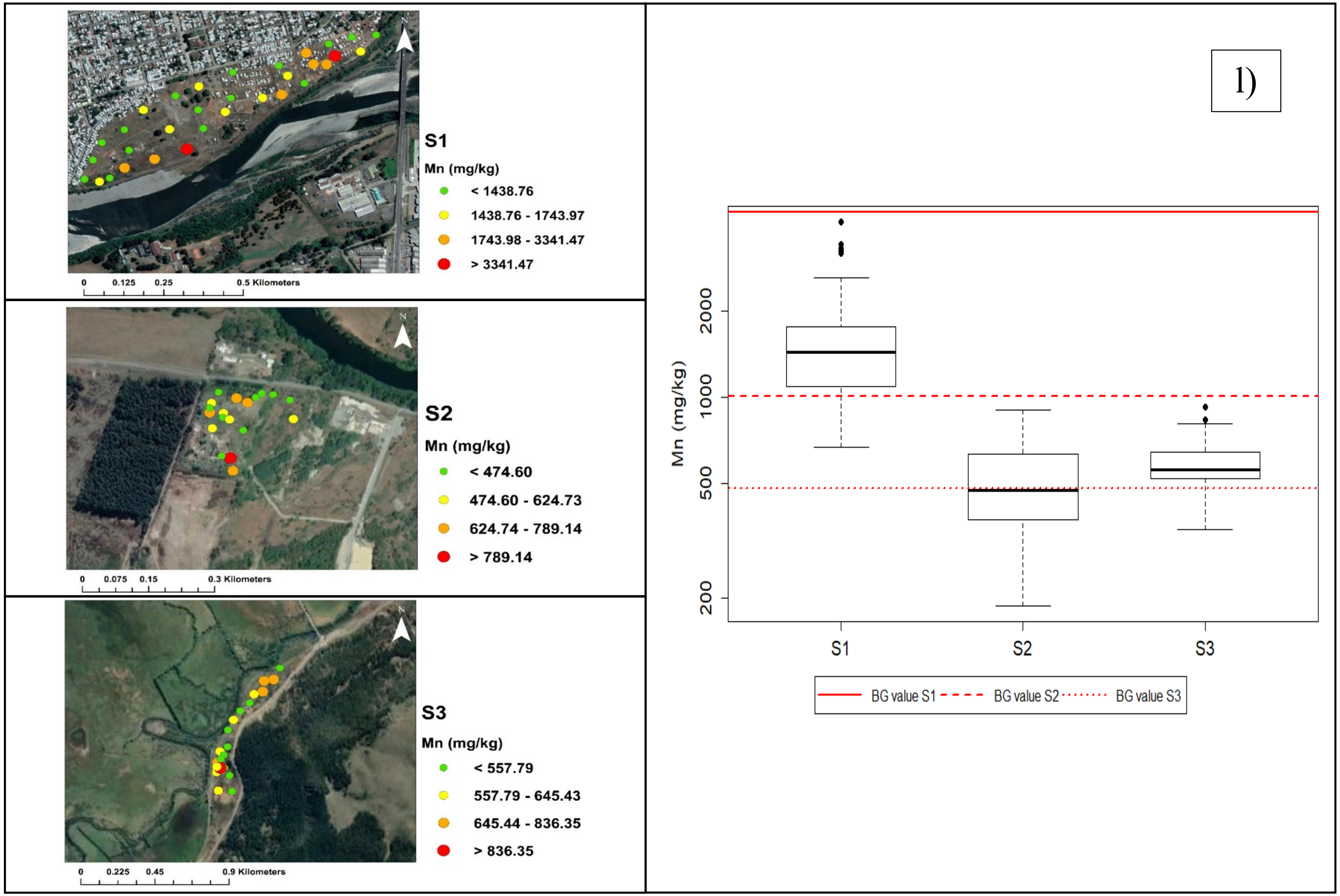

S1
Cr (mg/kg)
< 25.17
25.17 - 32.70
32.71 - 40.69
> 40.69
0 0.125 0.25 0.5 Kilometers
S2
Cr (mg/kg)
< 19.97
19.97 - 23.07
23.08 - 28.06
> 28.06
0 0.075 0.15 0.3 Kilometers
S3
Cr (mg/kg)
< 6.19
6.19 - 6.53
6.54 - 12.09
> 12.09
0 0.225 0.45 0.9 Kilometers
h)
Cr (mg/kg)
5
10
20
S1
S2
S3
BG value S1
BG value S2
BG value S3

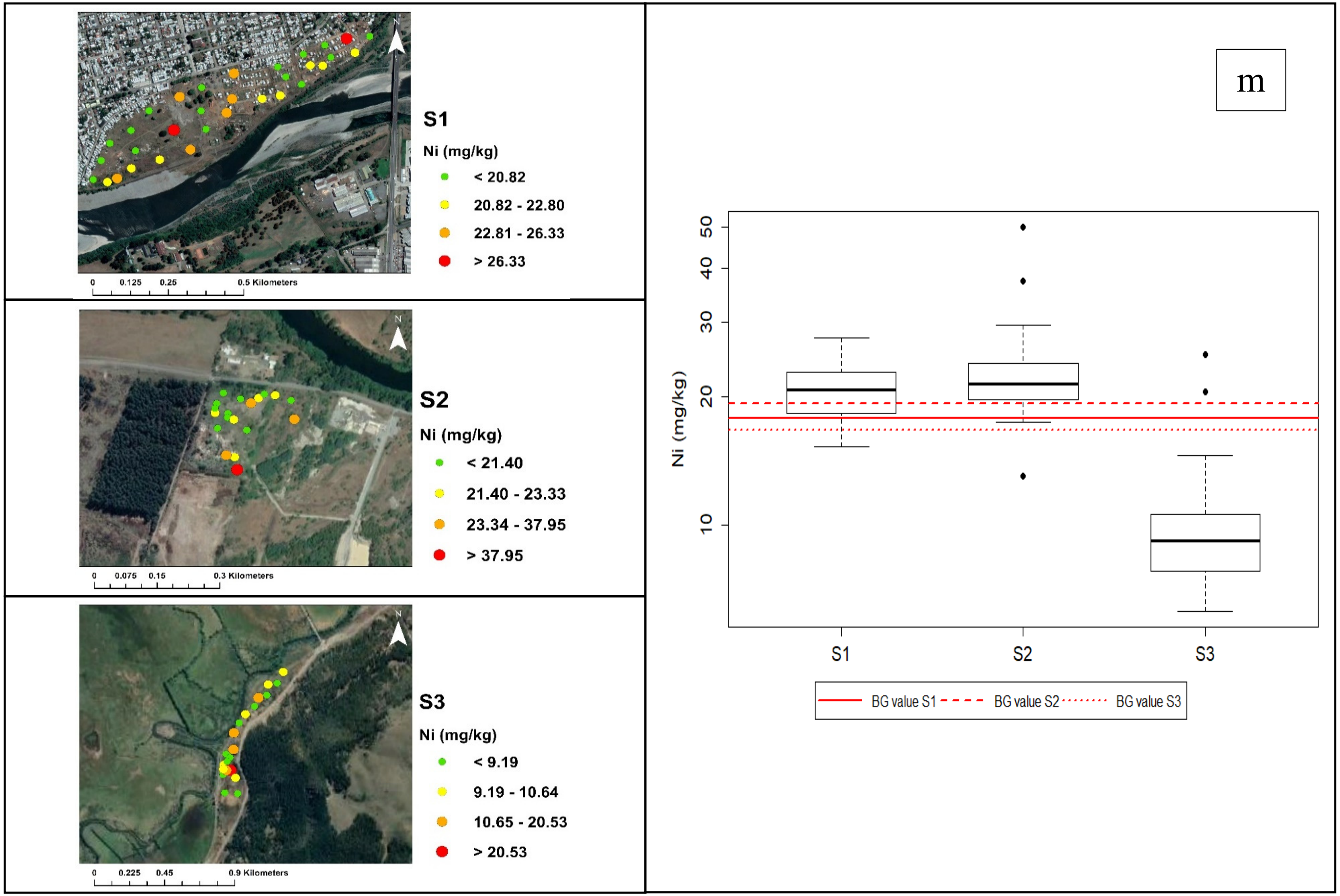


S1
Cu (mg/kg)
< 84.31
84.31 - 97.36
97.37 - 111.02
> 111.02
0 0.125 0.25 0.5 Kilometers
S2
Cu (mg/kg)
< 67.71
67.71 - 84.93
84.94 - 127.69
> 127.69
0 0.075 0.15 0.3 Kilometers
S3
Cu (mg/kg)
< 48.55
48.55 - 54.19
54.20 - 61.76
> 61.76
0 0.225 0.45 0.9 Kilometers
i)
Cu (mg/kg)
50
100
200
S1
S2
S3
BG value S1
BG value S2
BG value S3

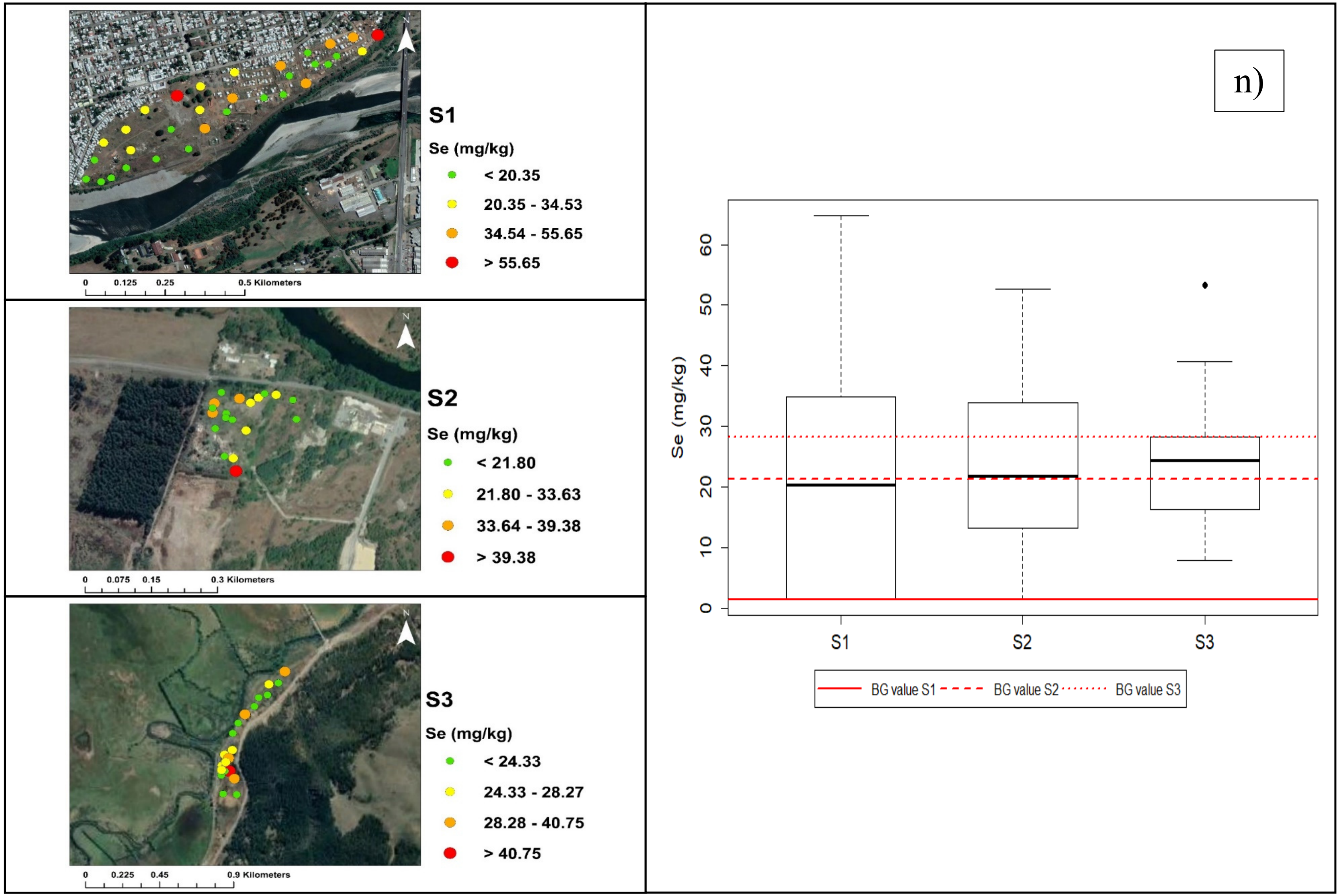

S1
Fe (mg/kg)
< 52232.3
52232.3 - 60164.4
60164.4 - 78214.7
> 78214.7
0 0.125 0.25 0.5 Kilometers
S2
Fe (mg/kg)
< 35140.1
35140.1 - 39540.1
39540.1 - 43539.2
> 43539.2
0 0.075 0.15 0.3 Kilometers
S3
Fe (mg/kg)
< 37420.2
37420.2 - 38735.3
38735.3 - 42484.7
> 42484.7
0 0.225 0.45 0.9 Kilometers
j)
Fe (mg/kg)
20000
40000
60000
80000
S1
S2
S3
BG value S1
BG value S2
BG value S3

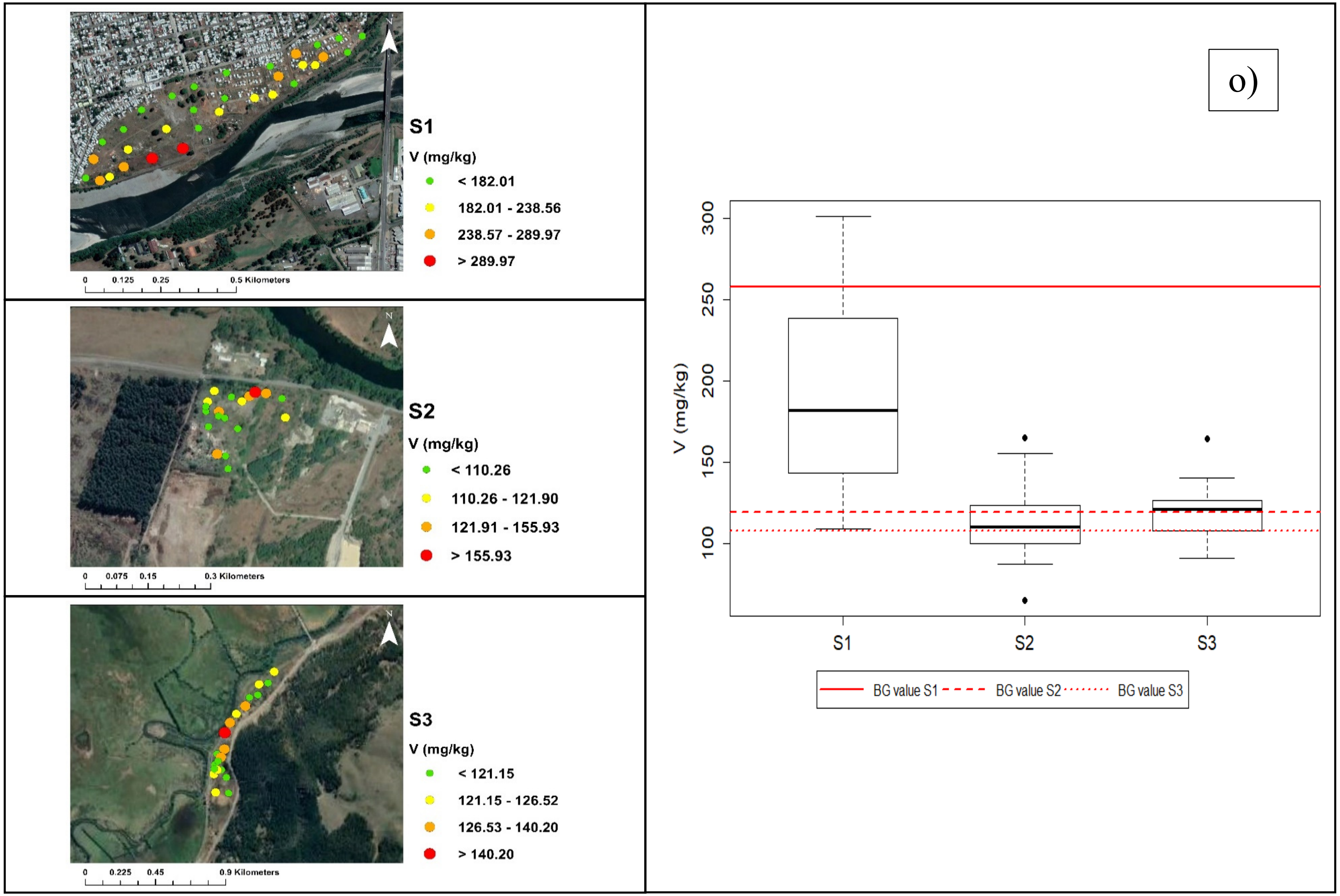

S1
Hg (mg/kg)
< 0.06
0.06 - 0.08
0.09 - 0.11
> 0.11
0 0.125 0.25 0.5 Kilometers
S2
Hg (mg/kg)
< 0.05
0.05 - 0.07
0.07 - 0.14
> 0.14
0 0.075 0.15 0.3 Kilometers
S3
Hg (mg/kg)
< 0.01
0.01 - 0.012
0.012 - 0.017
> 0.017
0 0.225 0.45 0.9 Kilometers
k)
Hg (mg/kg)
0.01
0.02
0.05
0.10
0.20
S1
S2
S3
BG value S1
BG value S2
BG value S3


S1
Mn (mg/kg)
< 1438.76
1438.76 - 1743.97
1743.98 - 3341.47
> 3341.47
0 0.125 0.25 0.5 Kilometers
S2
Mn (mg/kg)
< 474.60
474.60 - 624.73
624.74 - 789.14
> 789.14
0 0.075 0.15 0.3 Kilometers
S3
Mn (mg/kg)
< 557.79
557.79 - 645.43
645.44 - 836.35
> 836.35
0 0.225 0.45 0.9 Kilometers
1)
Mn (mg/kg)
200
500
1000
2000
S1
S2
S3
BG value S1
BG value S2
BG value S3



S1
Ni (mg/kg)
< 20.82
20.82 - 22.80
22.81 - 26.33
> 26.33
0 0.125 0.25 0.5 Kilometers
S2
Ni (mg/kg)
< 21.40
21.40 - 23.33
23.34 - 37.95
> 37.95
0 0.075 0.15 0.3 Kilometers
S3
Ni (mg/kg)
< 9.19
9.19 - 10.64
10.65 - 20.53
> 20.53
0 0.225 0.45 0.9 Kilometers
m
Ni (mg/kg)
10
20
30
40
50
S1
S2
S3
BG value S1
BG value S2
BG value S3


S1
Se (mg/kg)
< 20.35
20.35 - 34.53
34.54 - 55.65
> 55.65
0 0.125 0.25 0.5 Kilometers
S2
Se (mg/kg)
< 21.80
21.80 - 33.63
33.64 - 39.38
> 39.38
0 0.075 0.15 0.3 Kilometers
S3
Se (mg/kg)
< 24.33
24.33 - 28.27
28.28 - 40.75
> 40.75
0 0.225 0.45 0.9 Kilometers
n)
Se (mg/kg)
0
10
20
30
40
50
60
S1
S2
S3
BG value S1
BG value S2
BG value S3



S1
V (mg/kg)
< 182.01
182.01 - 238.56
238.57 - 289.97
> 289.97
0 0.125 0.25 0.5 Kilometers
S2
V (mg/kg)
< 110.26
110.26 - 121.90
121.91 - 155.93
> 155.93
0 0.075 0.15 0.3 Kilometers
S3
V (mg/kg)
< 121.15
121.15 - 126.52
126.53 - 140.20
> 140.20
0 0.225 0.45 0.9 Kilometers
o)
V (mg/kg)
100
150
200
250
300
S1
S2
S3
BG value S1
BG value S2
BG value S3

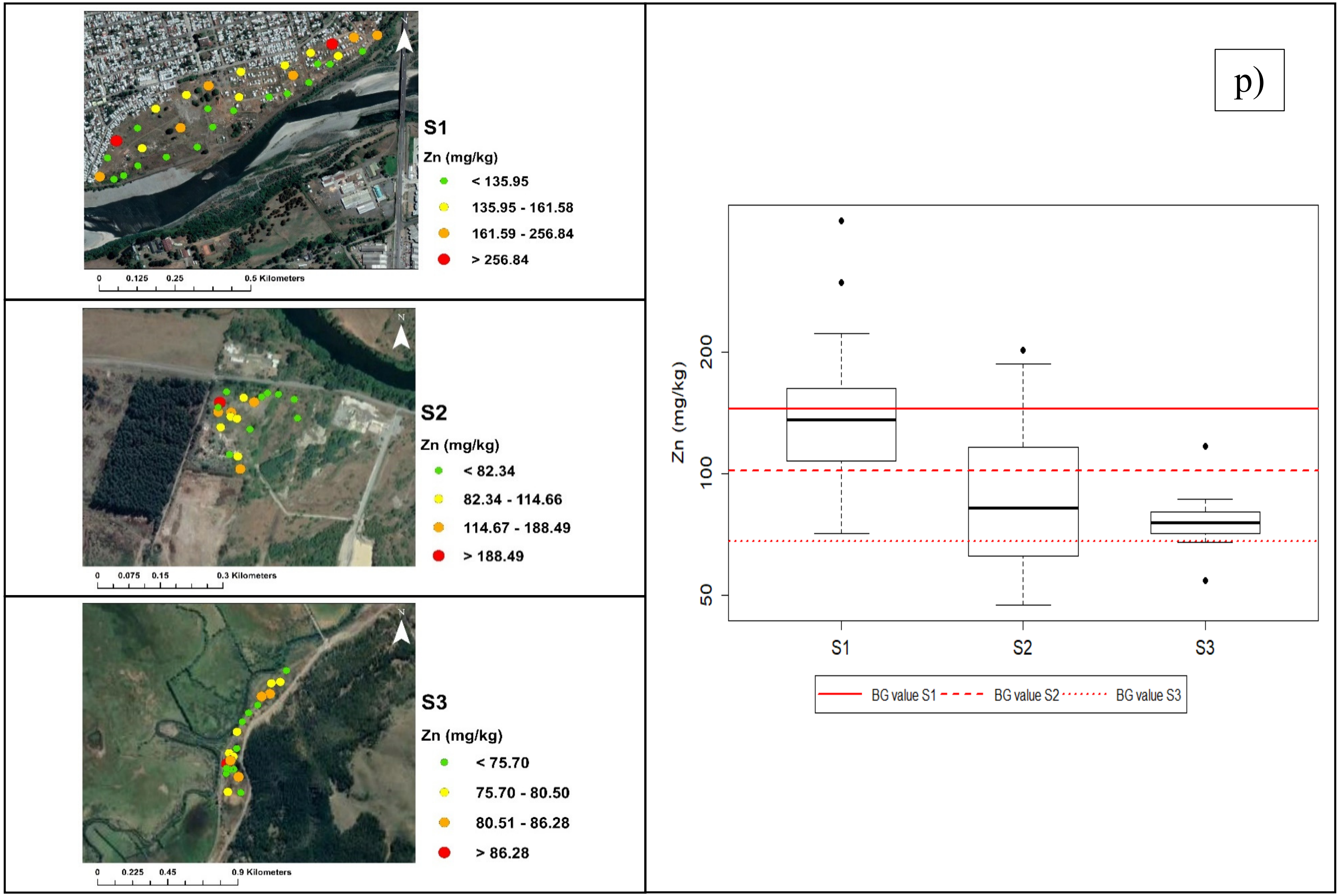

S1
Zn (mg/kg)
< 135.95
135.95 - 161.58
161.59 - 256.84
> 256.84
0 0.125 0.25 0.5 Kilometers
S2
Zn (mg/kg)
< 82.34
82.34 - 114.66
114.67 - 188.49
> 188.49
0 0.075 0.15 0.3 Kilometers
S3
Zn (mg/kg)
< 75.70
75.70 - 80.50
80.51 - 86.28
> 86.28
0 0.225 0.45 0.9 Kilometers
p)
Zn (mg/kg)
50
100
200
S1
S2
S3
BG value S1
BG value S2
BG value S3

Figure S1. Left: Spatial distribution Al (d), B (e), Ba (f), Co (g), Cr (h), Cu (i), Fe (j), Hg (k), Mn (l), Ni (m), Se (n), V (o) y Zn (p) in soils of studied sites; Right: Box-Whisker plots of trace elements concentations ($mgkg^{-1}$) in simples extracted in sites S1 (n=32), S2 (n=20) y S3 (n=21). Red lines are the BG values for S1, S2 and S3.

Table S1. Detection limit for trace elments ($mgkg^{-1}$).

Elements	Unit	Detección limit
Al	$mgkg^{-1}$	1.6
As	$mgkg^{-1}$	1.7
B	$mgkg^{-1}$	0.74
Ba	$mgkg^{-1}$	2.1
Cd	$mgkg^{-1}$	1.0
Co	$mgkg^{-1}$	0.80
Cr	$mgkg^{-1}$	1.8
Cu	$mgkg^{-1}$	2.1
Fe	$mgkg^{-1}$	1.8
Hg	$mgkg^{-1}$	0.01
Mn	$mgkg^{-1}$	2.5
Ni	$mgkg^{-1}$	2.2
Pb	$mgkg^{-1}$	2.1
Se	$mgkg^{-1}$	2.8
V	$mgkg^{-1}$	0.68
Zn	$mgkg^{-1}$	3.2

Table S2. Grade standards for potential ecological risks.

Eri		PERI	
Eri < 40	Low potential ecological risk	PERI < 150	Low ecological risk
40 ≤ Eri < 80	Moderate potential ecological risk	150 ≤ PERI < 300	Moderate ecological risk
80 ≤ Eri < 160	Considerable potential ecological risk	600 ≤ PERI < 600	Considerable ecological risk
160 ≤ Eri < 320	High potential ecological risk	PERI ≥ 300	Very high ecological risk
Eri ≥ 320	Very High potential ecological risk		

Tabla S3. Values of parameters used in the equations concerning human health risk.

Parameters	Definition	Unidad	Values		References
			Adult	Children	
IngR	Ingestion Rate	mg/day	100	200	US EPA (2002)
EF	Exposure Frequency	day/year	350	350	US EPA (2002)
ED	Exposure Duration	year	24	6	US EPA (2002)
BW	Body Weight	kg	70	15	US EPA (2002)
AT	Average Time	day	365×ED (non-carcinogenic) 365×70 (carcinogenic)		US EPA (2002)
SL	Adhesion Factor	mg/cm^2	0.07	0.2	US EPA (2002)
SA	Exposed Surface Area	cm^2	5700	2800	US EPA (2002)
InhR	Inhalation Rate	m^3/day	20	7.6	Liu et al.,2018[1]
PEF	Particulate Emission Factor	m^3/kg	1.36×10^9	1.36×10^9	US EPA (2002)

[1] Liu, K., Shang, Q., & Wan, C. (2018). Sources and Health Risks of Heavy Metals in PM2.5 in a Campus in a Typical Suburb Area of Taiyuan, North China. *Atmosphere*, *9*(2), 46. https://www.mdpi.com/2073-4433/9/2/46

Table S4. Values to determine the Hazard Quotient and Carcinogenic Risk.

Element	ABS_{GI}	RfC	RfD (mg/kg/day)			SF (mg/kg/day)		
		(mg/m³)	Ingestion	Dermal	Inhalation	SFO (Ingestion)	DSF (Dermal)	ISF (Inhalation)
As	1	1.5E-05	3.0E-04	3.0E-04	4.3E-06	4.3E-03	1.5E+00	1.5E+00
Ba	0.07	5.0E-04	2.0E-01	1.4E-02	1.4E-04			
Cd	2.5 E-02	1.0E-05	1.0E-03	2.5E-05	2.9E-06	1.8E-03	6.3E+00[d]	2.5E+02
Co	1	6.0E-06	3.0E-04	3.0E-04	1.7E-06			
Cr	2.5 E-02	1.0E-04	3.0E-03	7.5E-05	2.9E-05	8.4E-02	5.0E-01	2.0E+01
Cu	1	1.4E-01[a]	4.0E-02	4.0E-02	4.0E-02			
Hg	0.07	3.0E-04	1.6E-04[b]	1.1E-05	8.6E-05			
Ni	0.04	1.4E-05	1.1E-02	4.4E-04	4.0E-06	2.6E-04	9.1E-01	2.3E+01
Pb	1		3.5E-03[c]	3.5E-03	3.5E-03[c]	1.2E-05	8.5E-03	8.5E-03
V	2.6 E-02	1.0E-04	5.0E-03	1.3E-04	2.9E-05			
Zn	1	1.1E+00[a]	3.0E-01	3.0E-01	3.0E-01			

USEPA. (2020). *Regional Screening Level (RSL) Resident Soil Table (TR=1E-06, HQ=1).*

[a] Cesaro et al. (2019)

[b] Cal EPA, 2018.

[c] Gabarrón et al. (2017); Liu et al. (2018); Oh et al. (2015).

[d] Reyes et al. (2021).

References

California Environmental Protection Agency (CalEPA). (2018). *Revised Toxicity Criteria Rule Appendix 1 – Tables A and B.* August.

[a] Cesaro, A., Belgiorno, V., Gorrasi, G., Viscusi, G., Vaccari, M., Vinti, G., Jandric, A., Dias, M. I., Hursthouse, A., & Salhofer, S. (2019). A relative risk assessment of the open burning of WEEE. *Environ Sci Pollut Res Int*, *26*(11), 11042-11052. https://doi.org/10.1007/s11356-019-04282-3

[b] Cal/EPA. (2018). *Human Health Risk Assessment - Appendix D*. February.

[c] Gabarrón, M., Faz, A., & Acosta, J. A. (2017). Soil or Dust for Health Risk Assessment Studies in Urban Environment. *Archives of Environmental Contamination and Toxicology*, *73*(3), 442-455. https://doi.org/10.1007/s00244-017-0413-x

[d] Reyes, A., Cuevas, J., Fuentes, B., Fernández, E., Arce, W., Guerrero, M., & Letelier, M. V. (2021). Distribution of potentially toxic elements in soils surrounding abandoned mining waste located in Taltal, Northern Chile. *Journal of Geochemical Exploration*, *220*, 106653. https://doi.org/10.1016/j.gexplo.2020.106653

Table S5 . Spearman´s correlation matrix for the trace elements in soils of site S1.

	pH	Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
pH	1	**-0.57**[a]	**0.36**[b]	**-0.50**[a]	**-0.43**[b]	**-0.51**[a]	**-0.57**[a]	**-0.54**[a]	**-0.38**[b]	**-0.65**[a]	**0.38**[b]	**-0.46**[a]	0.12	0.30	**0.59**[a]	**-0.60**[a]	0.02
Al		1	-0.04	**0.75**[a]	**0.92**[a]	**0.91**[a]	**0.93**[a]	**0.78**[a]	**0.67**[a]	**0.89**[a]	**-0.37**[b]	**0.76**[a]	0.27	**-0.49**[a]	**-0.85**[a]	**0.92**[a]	-0.20
As			1	-0.02	0.07	0.07	-0.03	-0.03	0.26	-0.02	0.18	0.03	0.07	-0.02	0.08	-0.05	-0.02
B				1	**0.74**[a]	**0.72**[a]	**0.75**[a]	**0.72**[a]	**0.79**[a]	**0.72**[a]	-0.21	**0.54**[a]	0.13	-0.27	**-0.65**[a]	**0.81**[a]	0.07
Ba					1	**0.90**[a]	**0.88**[a]	**0.77**[a]	**0.72**[a]	**0.79**[a]	-0.32	**0.72**[a]	0.28	**-0.44**[b]	**-0.75**[a]	**0.90**[a]	-0.18
Cd						1	**0.97**[a]	**0.79**[a]	**0.65**[a]	**0.91**[a]	-0.31	**0.84**[a]	0.22	**-0.39**[b]	**-0.75**[a]	**0.90**[a]	-0.18
Co							1	**0.77**[a]	**0.63**[a]	**0.92**[a]	**-0.36**[b]	**0.83**[a]	0.20	**-0.45**[b]	**-0.82**[a]	**0.94**[a]	-0.19
Cr								1	**0.65**[a]	**0.73**[a]	-0.22	**0.60**[a]	0.18	-0.24	**-0.63**[a]	**0.76**[a]	0.01
Cu									1	**0.63**[a]	-0.13	**0.35**[b]	0.21	-0.17	**-0.53**[a]	**0.71**[a]	0.14
Fe										1	-0.29	**0.83**[a]	0.25	**-0.37**[b]	**-0.76**[a]	**0.85**[a]	-0.02
Hg											1	-0.19	0.13	**0.77**[a]	**0.48**[a]	**-0.45**[a]	**0.67**[a]
Mn												1	0.32	**-0.44**[b]	**-0.68**[a]	**0.73**[a]	-0.11
Ni													1	-0.15	-0.07	0.15	0.00
Pb														1	**0.68**[a]	**-0.56**[a]	**0.61**[a]
Se															1	**-0.89**[a]	0.18
V																1	-0.18
Zn																	1

[a] Correlation is significant at the 0.01 level.

[b] Correlation is significant at the 0.05 level.

Table S6. Spearman´s correlation matrix for the trace elements in soils of site S2.

	pH	Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
pH	1	0.43	**0.47**[b]	0.14	**0.84**[a]	0.21	**0.49**[b]	**0.44**[b]	**0.65**[a]	0.23	**0.63**[a]	0.38	-0.02	**0.70**[a]	0.37	-0.12	**0.81**[a]
Al		1	0.20	0.14	**0.66**[a]	0.35	**0.51**[b]	**0.46**[b]	**0.65**[a]	**0.61**[a]	**0.57**[a]	**0.69**[a]	0.03	0.39	-0.11	0.22	**0.62**[a]
As			1	0.37	0.34	0.22	0.27	0.28	0.28	0.36	0.25	0.12	-0.10	0.38	0.25	0.16	0.30
B				1	0.33	**0.83**[a]	**0.64**[a]	**0.58**[a]	0.34	**0.65**[a]	0.04	**0.51**[b]	0.41	0.33	**0.53**[b]	0.40	0.29
Ba					1	0.40	**0.68**[a]	**0.58**[a]	**0.78**[a]	0.40	**0.79**[a]	**0.69**[a]	-0.01	**0.69**[a]	0.30	-0.09	**0.93**[a]
Cd						1	**0.80**[a]	**0.69**[a]	0.32	**0.49**[b]	0.05	**0.77**[a]	**0.65**[a]	0.16	**0.54**[b]	0.29	**0.45**[b]
Co							1	**0.84**[a]	**0.56**[a]	**0.53**[b]	0.29	**0.75**[a]	**0.52**[b]	0.41	0.35	0.29	**0.67**[a]
Cr								1	**0.53**[b]	0.42	0.20	**0.61**[a]	**0.63**[a]	0.39	0.34	0.32	**0.59**[a]
Cu									1	**0.62**[a]	**0.74**[a]	**0.57**[a]	-0.02	**0.78**[a]	0.10	0.27	**0.76**[a]
Fe										1	0.25	0.44	0.09	**0.51**[b]	0.09	**0.63**[a]	0.30
Hg											1	**0.55**[b]	-0.28	**0.71**[a]	0.09	-0.27	**0.80**[a]
Mn												1	0.34	0.36	0.38	-0.01	**0.75**[a]
Ni													1	-0.15	0.33	0.19	0.08
Pb														1	0.21	0.13	**0.71**[a]
Se															1	-0.20	0.38
V																1	-0.08
Zn																	1

[a] Correlation is significant at the 0.01 level.

[b] Correlation is significant at the 0.05 level.

Table S7. Spearman´s correlation matrix for the trace elements in soils of site S3.

	pH	Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
pH	1	-0.42	0.09	0.11	-0.36	0.22	0.39	-0.02	-0.16	0.24	-0.42	-0.20	-0.05	-0.29	-0.12	0.33	**-0.58**[a]
Al		1	-0.02	0.10	**0.55**[b]	0.03	0.00	-0.08	0.38	-0.07	0.40	0.19	-0.01	0.22	-0.26	0.09	0.03
As			1	**0.57**[a]	**-0.47**[b]	-0.10	0.04	**0.51**[b]	-0.05	0.03	-0.10	-0.13	0.40	0.20	0.37	-0.05	-0.12
B				1	-0.11	0.29	0.42	0.33	0.34	**0.46**[b]	0.19	0.26	0.17	**0.45**[b]	0.04	0.38	0.18
Ba					1	**0.45**[b]	0.31	-0.13	**0.45**[b]	0.18	0.32	0.21	-0.09	0.23	-0.05	0.38	0.17
Cd						1	**0.77**[a]	0.19	**0.49**[b]	**0.89**[a]	-0.17	0.22	0.00	0.10	-0.16	**0.85**[a]	0.07
Co							1	0.18	0.38	**0.77**[a]	-0.41	-0.12	0.11	0.35	0.17	**0.92**[a]	-0.23
Cr								1	-0.14	0.29	-0.02	0.06	**0.63**[a]	-0.01	0.31	0.15	0.01
Cu									1	**0.48**[b]	0.09	**0.53**[b]	-0.06	0.31	-0.06	0.35	0.42
Fe										1	-0.25	0.29	0.16	0.20	-0.07	**0.78**[a]	0.11
Hg											1	**0.59**[a]	-0.04	-0.06	-0.30	-0.29	0.31
Mn												1	-0.02	-0.24	-0.40	-0.06	**0.47**[b]
Ni													1	0.21	**0.49**[b]	0.06	-0.03
Pb														1	**0.51**[b]	0.25	0.34
Se															1	-0.05	0.08
V																1	-0.16
Zn																	1

[a] Correlation is significant at the 0.01 level.

[b] Correlation is significant at the 0.05 level.

Tabla S8. PCA results of the rotated component for trace elements in soils S1, S2 and S3.

Element	S1 (n=32)				S2 (n=20)					S3 (n=21)					
	Principal Component				Principal Component					Principal Component					
	PC1	PC2	PC3	PC4	PC1	PC2	PC3	PC4	PC5	PC1	PC2	PC3	PC4	PC5	PC6
pH	**-0.68**	0.02	**0.43**	0.28	**0.52**	0.13	0.17	-0.08	**0.69**	0.31	**-0.66**	0.07	0.00	-0.38	-0.32
Al	**0.94**	-0.19	0.09	0.09	0.29	**0.87**	-0.22	0.21	0.10	-0.01	0.07	-0.11	0.08	-0.14	**0.92**
As	-0.05	-0.12	0.00	**0.90**	0.00	0.14	0.06	0.18	**0.88**	-0.04	0.00	0.40	**0.87**	-0.03	-0.03
B	**0.85**	0.14	-0.02	0.11	0.09	0.32	**0.62**	**0.51**	0.22	0.28	0.03	-0.17	**0.84**	-0.07	0.10
Ba	**0.88**	-0.16	0.09	0.13	**0.60**	**0.65**	0.11	-0.12	0.37	0.38	**0.42**	**-0.43**	-0.27	0.07	**0.50**
Cd	**0.96**	-0.07	0.01	0.09	-0.05	**0.63**	**0.67**	0.32	0.02	**0.93**	0.20	-0.13	0.12	-0.04	-0.03
Co	**0.96**	-0.09	0.00	0.00	0.17	**0.70**	**0.43**	**0.41**	0.16	**0.90**	-0.17	-0.03	0.06	0.25	0.11
Cr	**0.81**	0.08	-0.09	0.25	0.20	0.39	**0.66**	0.29	0.17	-0.01	-0.06	**0.83**	0.37	-0.03	-0.18
Cu	**0.58**	0.23	0.06	**0.67**	**0.89**	0.12	-0.05	0.24	-0.13	**0.45**	**0.64**	-0.16	0.15	0.01	0.26
Fe	**0.95**	-0.06	0.04	0.00	0.16	**0.59**	0.08	**0.72**	0.15	**0.87**	0.31	-0.12	0.21	-0.14	-0.16
Hg	-0.27	**0.47**	**0.66**	-0.01	**0.92**	0.23	0.06	-0.11	0.07	**-0.45**	0.25	-0.35	-0.05	-0.33	-0.27
Mn	**0.84**	-0.23	0.12	-0.12	0.28	**0.83**	0.39	-0.06	0.06	0.08	**0.83**	0.03	-0.03	**-0.41**	0.00
Ni	0.23	0.05	**0.89**	0.00	0.04	0.01	**0.88**	0.01	-0.06	-0.14	-0.13	**0.91**	-0.10	-0.03	-0.01
Pb	-0.25	**0.89**	0.14	0.10	**0.79**	0.07	0.24	0.14	0.38	0.19	0.13	-0.11	-0.07	**0.83**	-0.09
Se	**-0.77**	0.30	0.20	0.08	0.31	-0.05	**0.75**	-0.26	0.21	-0.01	-0.19	**0.58**	-0.07	**0.63**	-0.15
V	**0.95**	-0.19	-0.07	0.04	-0.03	0.02	0.01	**0.98**	0.04	**0.93**	-0.15	0.01	-0.06	0.12	0.07
Zn	0.00	**0.89**	0.07	-0.12	**0.82**	0.37	0.35	-0.07	0.15	-0.05	**0.81**	-0.19	-0.01	0.14	-0.07
Percentage of variance (%)	52.6	12.6	8.9	8.8	23.1	21.2	19.0	13.8	10.4	24.0	15.8	14.4	10.4	9.7	8.5
Percentage cumulative variance (%)	52.6	65.3	74.2	83.0	23.1	44.3	63.3	77.1	87.5	24.0	39.8	54.3	64.7	74.4	83.0

Tabla S9. Median concentrations of trace elements ($mgkg^{-1}$) in soil of sites S1, S2 and S3 compared to values found in other studies

Country	Location	pH	Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn	References
Chile	S1, Temuco - La Araucanía	6.9	38618	9.6	57.6	165	18.2	33.8	26.2	85.3	53875	0.07	1670	20.7	18.2	22.2	193	149	[1] This Study
Chile	S2, Villarrica - La Araucanía	6.9	13695	6.7	35.7	91.9	11.1	18.3	20.2	81.1	34217	0.06	504	23.4	10.4	23.5	112	96.6	[1] This Study
Chile	S3, Lonquimay - La Araucanía	6.7	14712	6.0	40.5	84.2	14.0	22.0	7.4	58.6	36897	0.01	602	12.1	17.4	24.2	144	85.3	[1] This Study
Brazil	Novo Hamburgo	6.1	-	-	-	-	0.20	-	113	120	-	0.02	-	97.0	20.0	-	-	72.0	[2] Schenato et al. (2008)
Cuba	The Havana	-	-	-	-	-	-	8.4	-	252	-	-	-	50	276	-	-	489	[3] Díaz Rizo et al. (2012)
Brazil	Estancia Velha	-	-	1.2	-	44.6	-	-	29.4	4.1	-	0.23	80.8	-	9.7	-	-	23.0	[4] Augustin Jr & Viero (2012)
Spain	Catalonia	-	-	4.1	-	-	0.24	-	15.3		-	0.07	-	10.6	64.4	-	-	-	[5] Herrero et al. (2020)
Ghana	S1, Amakon	7.5	-	12.0	-	-	5.9	-	77.0	347	-	0.2	-	34.0	309	-	-	558	[6] Akanchise et al. (2020)
	S2, Kronum	7.8	-	4.8	-	-	13.0	-	66.0	32.0	-	0.04	-	26.0	13.0	-	-	166	
Nigeria	Abakaliki	-	-	-	-	-	0.12	-	-	27.7	130	-	-		17.0	-	-	63.5	[7] Aja et al. (2021)

[1] This Study

[2] Schenato, F., Schröder, N., & Martins, F. (2008). Assessment of contaminated soils by heavy metals in municipal solid waste landfills in southern Brazil. *Wseas Trans. Environ. Dev.*, *9*. Retrieved 09/01, from https://www.researchgate.net/publication/228657405_Assessment_of_contaminated_soils_by_heavy_metals_in_municipal_solid_waste_landfills_in_southern_Brazil

[3] Díaz Rizo, O., Hernández Merlo, M., Echeverría Castillo, F., & Arado López, J. O. (2012). Assessment of Metal Pollution in Soils From a Former Havana (Cuba) Solid Waste Open Dump. *Bulletin of Environmental Contamination and Toxicology*, *88*(2), 182-186. https://doi.org/10.1007/s00128-011-0505-7

[4] Augustin Jr, P., & Viero, A. (2012). Environmental impact and geochemical behavior of soil contaminants from an industrial waste landfill in Southern Brazil. *Environmental Earth Sciences*, *67*. https://doi.org/10.1007/s12665-012-1597-z

[5] Herrero, M., Rovira, J., Marquès, M., Nadal, M., & Domingo, J. L. (2020). Human exposure to trace elements and PCDD/Fs around a hazardous waste landfill in Catalonia (Spain). *Science of The Total Environment*, *710*, 136313. https://doi.org/10.1016/j.scitotenv.2019.136313

[6] Akanchise, T., Boakye, S., Borquaye, L. S., Dodd, M., & Darko, G. (2020). Distribution of heavy metals in soils from abandoned dump sites

Table S10. Background concentrations (mgkg^{-1}) of trace elements in site S1.

		Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
Original data	Media	38618	9.5	57.6	165	18.2	33.8	26.2	85.3	53875	0.07	1670	20.7	18.2	22.2	193	149
	Median	36057	3.1	56.7	158	17.2	31.1	25.2	84.3	52232	0.06	1439	20.8	10.3	20.4	182	136
	Sd[a]	13798	11.9	16.4	68.6	4.9	11.1	8.3	23.1	14188	0.06	885	3.2	19.7	19.5	57.7	68.5
	n	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Median +2MAD	Threshold	25333	0.83	79.1	143	23.0	52.8	38.0	77.1	65207	0.04	4396	18.6	18.1	1.4	266	145
Upper whisker method	Threshold	29490	15.6	86.2	157	23.5	53.5	39.0	80.5	67018	0.04	4691	19.7	19.7	1.4	285	156
Percentile 95	Threshold	28057	15.5	77.2	144	22.8	51.2	39.1	76.6	64274	0.04	4415	17.8	17.6	1.4	258	148

[a] Desviación Estándar.
n = number of samples

Table S11. Background concentrations (mgkg^{-1}) of trace elements in site S2.

		Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
Original data	Media	13695	6.7	35.7	91.9	11.1	18.3	20.2	81.1	34217	0.06	504	23.4	10.4	23.5	112	96.6
	Median	14262	5.9	39.1	94.7	11.0	19.1	20.0	67.7	35140	0.05	475	21.4	9.8	21.8	110	82.3
	Sd[a]	3587	6.7	17.5	42.8	3.1	3.5	4.6	74.8	6984	0.04	197	8.0	8.4	12.4	22.7	43.9
	n	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Median +2MAD	Threshold	41785	0.83	55.2	78.2	11.3	18.7	20.5	67.9	37097	0.05	1006	19.3	13.3	21.3	119	102
Upper whisker method	Threshold	46042	23.6	65.2	110	11.8	19.8	22.2	87.7	40338	0.05	1129	21.2	14.9	38.2	126	109
Percentile 95	Threshold	46832	19.7	58.9	81.3	12.1	18.5	21.7	126	41697	0.05	1007	20.4	12.0	21.5	122	109

[a] Desviación Estándar.

n = number of simples.

Table S12. Background concentrations (mgkg^{-1}) of trace elements in site S3.

		Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
Original data	Media	14712	6.0	40.5	68.7	12.5	22.0	6.8	49.9	36897	0.01	602	10.4	48.9	24.2	120	76.6
	Median	14117	0.83	38.3	68.0	12.4	21.9	6.2	48.6	37420	0.01	558	9.2	6.5	24.3	121	75.7
	Sd[a]	2418	8.8	7.8	13.3	1.5	2.6	2.1	9.0	3729	0.01	146	4.6	173	10.3	16.0	11.5
	n	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Median +2MAD	Threshold	15104	8.9	29.2	59.2	10.1	18.4	12.3	47.8	36230	0.02	482	16.7	1.0	28.2	108	68.1
Upper whisker method	Threshold	18416	17.8	36.4	64.9	11.6	19.6	18.5	57.8	39710	0.02	537	26.8	1.0	37.9	119	71.6
Percentile 95	Threshold	14702	14.2	40.5	62.5	10.3	20.9	12.7	49.2	38819	0.02	517	20.6	6.3	31.9	121	71.8

[a] Desviación Estándar.

n = number of samples

Table S13. Number of samples in each category of ecological risk assessment in site S1.

Factor		Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
Igeo	Igeo ≤ 0	18	16	32	24	32	32	32	30	32	19	32	30	24	11	32	29
	0 < Igeo ≤ 1	14			8				2		12		2	7			3
	1 < Igeo ≤ 2													1			
	2 < Igeo ≤ 3		6								1				3		
	3 < Igeo ≤ 4		2												8		
	4 < Igeo ≤ 5		7												10		
	5 > Igeo		1														
EF	EF < 2	32	16	32	32	32	32	32	32	32	28	32	32	29	11	32	30
	2 ≤ EF < 5		1								3			3	1		2
	5 ≤ EF < 20		10								1				11		
	20 ≤ EF < 40		4												6		
	EF ≥ 40		1												3		
Cf	Cf < 1	4		26	13	26	28	29	11	25	9	32	8	20		27	18
	1 ≤ Cf < 3	28	16	6	19	6	4	3	21	7	22		24	11	11	5	14
	3 ≤ Cf < 6													1			
	Cf ≥ 6		16								1				21		

Table S14. Number of samples in each category of ecological risk assessment in site S2.

Factor		Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
Igeo	Igeo ≤ 0	20	9	20	13	20	20	20	18	20	16	20	17	17	14	20	17
	0 < Igeo ≤ 1				7				1		3		3	3	6		3
	1 < Igeo ≤ 2		1						1		1						
	2 < Igeo ≤ 3		4														
	3 < Igeo ≤ 4		5														
	4 < Igeo ≤ 5		1														
	5 > Igeo																
EF	EF < 2	20		9	2	1			2		4	18		9	5	1	2
	2 ≤ EF < 5		8	11	17	18	19	18	17	20	12	2	16	9	12	19	17
	5 ≤ EF < 20		2		1	1	1	2	1		4		4	2	3		1
	20 ≤ EF < 40		5														
	EF ≥ 40		5														
Cf	Cf < 1	20		17	9	11	8	11	10	14	10	20	4	12	9	14	13
	1 ≤ Cf < 3		9	3	11	9	12	9	9	6	9		16	8	11	6	7
	3 ≤ Cf < 6		1						1		1						
	Cf ≥ 6		10														

Table S15. Number of samples in each category of ecological risk assessment in site S3.

Factor		Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn
Igeo	Igeo ≤ 0	21	18	14	21	20	20	21	20	21	20	17	20	9	20	20	20
	0 < Igeo ≤ 1		2	7		1	1		1		1	4	1		1	1	1
	1 < Igeo ≤ 2		1											1			
	2 < Igeo ≤ 3													4			
	3 < Igeo ≤ 4													3			
	4 < Igeo ≤ 5													3			
	5 > Igeo													1			
EF	EF < 2	21	19	21	21	21	21	21	21	21	20	21	21	9	20	21	21
	2 ≤ EF < 5		2								1				1		
	5 ≤ EF < 20													6			
	20 ≤ EF < 40													4			
	EF ≥ 40													2			
Cf	Cf < 1	14	15	2	4	2	1	20	10	9	20	3	19		15	5	2
	1 ≤ Cf < 3	7	5	19	17	19	20	1	11	12	1	18	2	9	6	16	19
	3 ≤ Cf < 6		1											1			
	Cf ≥ 6													11			

Table S16. Potential ecological risk index of a single element.

S1 (n=32)	As	Cd	Co	Cr	Cu	Hg	Pb	Zn	PERI prom.	PERI Min	PERI Max
Media	115	23.9	3.3	1.4	5.6	66.3	5.2	1.0	222	65.3	663
Mediana	37.5	22.7	3.0	1.3	5.5	56.4	2.9	0.94			
Sd[a]	144	6.4	1.1	0.44	1.5	58.5	5.6	0.47			
Min	10.0	12.6	1.5	0.73	2.9	19.2	0.30	0.49			
Max	518	36.2	5.3	2.3	10.9	353	21.5	2.9			
S2 (n=20)											
Media	81.0	29.6	5.0	2.0	6.0	48.1	4.3	0.95	177	43.9	392
Mediana	71.3	29.3	5.2	1.9	5.0	38.2	4.0	0.81			
Sd[a]	80.6	8.3	0.95	0.45	5.5	35.8	3.5	0.43			
Min	10.0	13.2	2.9	1.2	1.8	11.9	0.43	0.46			
Max	282	41.0	6.5	2.8	28.3	154	13.1	2.0			
S3 (n=21)											
Media	6.7	37.2	6.0	1.1	5.2	25.5	234	1.1	317	70.8	3900
Mediana	0.93	36.9	5.9	1.0	5.1	21.9	31.1	1.1			
Sd[a]	9.9	4.5	0.72	0.35	0.94	16.0	826	0.17			
Min	0.93	28.6	4.6	0.77	3.2	14.0	5.0	0.80			
Max	34.5	46.0	7.6	2.1	7.6	90	3826	1.7			

Table S17. Non carcinogenic and carcinogenic risk for different exposure, pathways for adults and children in soils of sites S1, S2, and S3

Media non carcinogenic risk						
	S1		S2		S3	
	Adults	Children	Adults	Children	Adults	Children
Ingestión	2.7E-02	2.6E-01	1.6E-02	1.5E-01	1.9E-02	1.7E-01
Absorción dérmica	1.8E-03	1.2E-02	1.2E-03	7.7E-03	1.1E-03	7.2E-03
Inhalación	7.7E-04	1.4E-03	5.0E-04	8.9E-04	4.8E-04	8.5E-04
Total	3.0E-02	2.7E-01	1.8E-02	1.6E-01	2.0E-02	1.8E-01
Media carcinogenic risk						
	S1		S2		S3	
	Adultos	Niños	Adultos	Niños	Adultos	Niños
Ingestión	1.5E-05	3.5E-05	1.0E-05	2.4E-05	9.5E-06	2.2E-05
Absorción dérmica	2.2E-06	3.7E-06	2.9E-06	2.5E-06	1.4E-06	2.3E-06
Inhalación	1.1E-07	4.9E-08	8.5E-08	3.8E-08	3.0E-08	1.3E-08
Total	1.7E-05	3.9E-05	1.3E-05	2.7E-05	1.1E-05	2.4E-05

Table S18. Non carcinogenic risk (HI) for adults and children in soils of site S1.

S1 (n=32)	Adults						Children					
	Min	P25	P50	P75	Max	% samples HI>1	Min	P25	P50	P75	Max	% samples HI>1
As	3.8E-02	4.3E-03	1.6E-02	1.0E-01	2.0E+00	0.0	3.8E-02	3.8E-02	1.4E-01	9.0E-01	2.0E+00	21.9
Ba	3.9E-03	1.0E-03	1.4E-03	1.7E-03	2.0E-02	0.0	3.9E-03	8.0E-03	1.1E-02	1.4E-02	2.0E-02	0.0
Cd	1.4E-01	2.4E-02	2.9E-02	3.4E-02	3.9E-01	0.0	1.4E-01	2.1E-01	2.5E-01	3.0E-01	3.9E-01	0.0
Co	6.8E-01	1.2E-01	1.5E-01	1.8E-01	2.3E+00	0.0	6.8E-01	1.1E+00	1.3E+00	1.6E+00	2.3E+00	87.5
Cr	6.6E-02	1.1E-02	1.4E-02	1.8E-02	2.1E-01	0.0	6.6E-02	9.4E-02	1.2E-01	1.6E-01	2.1E-01	0.0
Cu	1.4E-02	2.4E-03	2.9E-03	3.3E-03	5.4E-02	0.0	1.4E-02	2.2E-02	2.7E-02	3.1E-02	5.4E-02	0.0
Hg	1.6E-03	3.5E-04	5.2E-04	6.9E-04	3.0E-02	0.0	1.6E-03	3.2E-03	4.7E-03	6.3E-03	3.0E-02	0.0
Ni	2.0E-02	3.5E-03	3.9E-03	4.3E-03	3.7E-02	0.0	2.0E-02	2.5E-02	2.8E-02	3.0E-02	3.7E-02	0.0
Pb	3.8E-03	4.1E-04	4.1E-03	1.0E-02	2.8E-01	0.0	3.8E-03	3.8E-03	3.8E-02	9.3E-02	2.8E-01	0.0
V	3.1E-01	4.6E-02	5.8E-02	7.6E-02	8.5E-01	0.0	3.1E-01	4.1E-01	5.1E-01	6.7E-01	8.5E-01	0.0
Zn	3.0E-03	4.9E-04	6.2E-04	7.4E-04	1.8E-02	0.0	3.0E-03	4.6E-03	5.8E-03	6.9E-03	1.8E-02	0.0

Table S19. Non carcinogenic risk (HI) for adults and children in soils of site S2.

S2 (n=20)	Adults						Children					
	Min	P25	P50	P75	Max	% samples HI>1	Min	P25	P50	P75	Max	% samples HI>1
As	4.3E-03	4.3E-03	3.1E-02	5.7E-02	1.2E-01	0.0	3.8E-02	3.8E-02	2.7E-01	5.2E-01	1.1E+00	5.0
Ba	2.7E-04	4.7E-04	8.2E-04	1.1E-03	1.4E-03	0.0	2.2E-03	3.7E-03	6.5E-03	9.1E-03	1.1E-02	0.0
Cd	8.2E-03	1.6E-02	1.8E-02	2.3E-02	2.6E-02	0.0	7.1E-02	1.4E-01	1.6E-01	2.0E-01	2.2E-01	0.0
Co	5.1E-02	7.8E-02	9.0E-02	9.8E-02	1.1E-01	0.0	4.7E-01	7.1E-01	8.2E-01	8.9E-01	1.0E+00	5.0
Cr	6.5E-03	8.9E-03	1.1E-02	1.2E-02	1.5E-02	0.0	5.8E-02	7.9E-02	9.5E-02	1.1E-01	1.3E-01	0.0
Cu	8.4E-04	1.7E-03	2.3E-03	2.9E-03	1.3E-02	0.0	7.8E-03	1.6E-02	2.2E-02	2.7E-02	1.2E-01	0.0
Hg	1.3E-04	2.8E-04	4.2E-04	6.4E-04	1.7E-03	0.0	1.2E-03	2.6E-03	3.9E-03	5.9E-03	1.6E-02	0.0
Ni	2.5E-03	3.7E-03	4.0E-03	4.4E-03	9.4E-03	0.0	1.7E-02	2.6E-02	2.9E-02	3.1E-02	6.7E-02	0.0
Pb	4.1E-04	1.3E-03	3.8E-03	5.5E-03	1.2E-02	0.0	3.8E-03	1.2E-02	3.6E-02	5.1E-02	1.2E-01	0.0
V	2.1E-02	3.2E-02	3.5E-02	3.9E-02	5.3E-02	0.0	1.8E-01	2.9E-01	3.1E-01	3.4E-01	4.7E-01	0.0
Zn	2.2E-04	2.9E-04	3.8E-04	5.3E-04	9.3E-04	0.0	2.0E-03	2.7E-03	3.5E-03	4.9E-03	8.7E-03	0.0

Table S20. Non carcinogenic risk (HI) for adults and children in soils of site S3.

S3 (n=21)	Adults						Children					
	Min	P25	P50	P75	Max	% samples HI>1	Min	P25	P50	P75	Max	% samples HI>1
As	4.3E-03	4.3E-03	4.3E-03	5.3E-02	1.6E-01	0.0	3.8E-02	3.8E-02	3.8E-02	4.7E-01	1.4E+00	9.5
Ba	2.6E-04	5.4E-04	5.9E-04	6.6E-04	7.5E-04	0.0	2.1E-03	4.3E-03	4.7E-03	5.3E-03	6.0E-03	0.0
Cd	1.6E-02	2.0E-02	2.1E-02	2.2E-02	2.6E-02	0.0	1.4E-01	1.7E-01	1.8E-01	1.9E-01	2.2E-01	0.0
Co	8.0E-02	9.4E-02	1.0E-01	1.1E-01	1.3E-01	0.0	7.3E-01	8.6E-01	9.4E-01	1.0E+00	1.2E+00	33.3
Cr	2.5E-03	3.0E-03	3.3E-03	3.5E-03	6.8E-03	0.0	2.3E-02	2.6E-02	2.9E-02	3.1E-02	6.0E-02	0.0
Cu	1.0E-03	1.5E-03	1.7E-03	1.9E-03	2.5E-03	0.0	9.7E-03	1.4E-02	1.6E-02	1.7E-02	2.3E-02	0.0
Hg	6.0E-05	7.7E-05	9.3E-05	1.1E-04	3.8E-04	0.0	5.5E-04	7.1E-04	8.6E-04	9.9E-04	3.5E-03	0.0
Ni	1.2E-03	1.5E-03	1.7E-03	2.0E-03	4.7E-03	0.0	8.4E-03	1.0E-02	1.2E-02	1.4E-02	3.4E-02	0.0
Pb	4.1E-04	4.1E-04	2.6E-03	8.7E-03	3.1E-01	0.0	3.8E-03	3.8E-03	2.4E-02	8.1E-02	2.9E+00	4.8
V	2.9E-02	3.5E-02	3.9E-02	4.1E-02	5.3E-02	0.0	2.6E-01	3.1E-01	3.4E-01	3.6E-01	4.6E-01	0.0
Zn	2.5E-04	3.3E-04	3.5E-04	3.7E-04	5.4E-04	0.0	2.3E-03	3.0E-03	3.2E-03	3.4E-03	5.0E-03	0.0

Tabla S21. Carcinogenic risk (CR) for adults and children in soils of site S1, S2 and S3.

S1 (n=32)	Adults						Children					
	Min	P25	P50	P75	Max	% samples CR>1x10⁻⁴	Min	P25	P50	P75	Max	% samples CR>1x10⁻⁴
As	6.6E-07	6.6E-07	2.5E-06	1.5E-05	3.4E-05	0.0	1.5E-06	1.5E-06	5.6E-06	3.5E-05	7.7E-05	0.0
Cd	3.3E-05	5.0E-05	5.9E-05	7.1E-05	9.4E-05	0.0	7.4E-05	1.1E-04	1.3E-04	1.6E-04	2.1E-04	84.4
Cr	4.0E-06	5.8E-06	7.4E-06	9.6E-06	1.3E-05	0.0	8.5E-06	1.2E-05	1.6E-05	2.0E-05	2.7E-05	0.0
Ni	7.2E-06	8.8E-06	9.8E-06	1.1E-05	1.3E-05	0.0	1.6E-05	2.0E-05	2.2E-05	2.4E-05	2.9E-05	0.0
Pb	4.2E-09	4.2E-09	4.1E-08	1.0E-07	3.0E-07	0.0	9.8E-09	9.8E-09	9.7E-08	2.4E-07	7.1E-07	0.0
S2 (n=20)	Adults						Children					
	Min	P25	P50	P75	Max	% samples CR>1x10⁻⁴	Min	P25	P50	P75	Max	% samples CR>1x10⁻⁴
As	6.6E-07	6.6E-07	4.7E-06	8.8E-06	1.8E-05	0.0	1.5E-06	1.5E-06	1.1E-05	2.0E-05	4.2E-05	0.0
Cd	1.7E-05	3.3E-05	3.8E-05	4.7E-05	5.3E-05	0.0	3.8E-05	7.3E-05	8.4E-05	1.1E-04	1.2E-04	30.0
Cr	7.7E-06	1.0E-05	1.3E-05	1.5E-05	1.8E-05	0.0	7.5E-06	1.0E-05	1.2E-05	1.4E-05	1.8E-05	0.0
Ni	6.1E-06	9.3E-06	1.0E-05	1.1E-05	2.4E-05	0.0	1.4E-05	2.1E-05	2.3E-05	2.5E-05	5.3E-05	0.0
Pb	4.2E-09	1.4E-08	3.9E-08	5.6E-08	1.3E-07	0.0	9.8E-09	3.2E-08	9.1E-08	1.3E-07	2.9E-07	0.0
S3 (n=21)	Adults						Children					
	Min	P25	P50	P75	Max	% samples CR>1x10⁻⁴	Min	P25	P50	P75	Max	% samples CR>1x10⁻⁴
As	6.6E-07	6.6E-07	6.6E-07	8.1E-06	2.4E-05	0.0	1.5E-06	1.5E-06	1.5E-06	1.8E-05	5.5E-05	0.0
Cd	3.3E-05	4.1E-05	4.3E-05	4.5E-05	5.3E-05	0.0	7.4E-05	9.1E-05	9.5E-05	1.0E-04	1.2E-04	33.3
Cr	1.4E-06	1.6E-06	1.8E-06	1.9E-06	3.7E-06	0.0	2.9E-06	3.4E-06	3.8E-06	4.0E-06	7.8E-06	0.0
Ni	3.0E-06	3.7E-06	4.3E-06	5.0E-06	1.2E-05	0.0	6.7E-06	8.4E-06	9.8E-06	1.1E-05	2.7E-05	0.0
Pb	4.2E-09	4.2E-09	2.6E-08	8.9E-08	3.2E-06	0.0	9.8E-09	9.8E-09	6.1E-08	2.1E-07	7.5E-06	0.0

Table S22. Media concentrations of trace elements ($mgkg^{-1}$) in soils of sites S1, S2 and S3 and comparison with other studies.

Country	Location	pH	Al	As	B	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	V	Zn	References
Chile	S1, Temuco - La Araucanía	6.9	38618	9.6	57.6	165	18.2	33.8	26.2	85.3	53875	0.07	1670	20.7	18.2	22.2	193	149	[1] This Study
Chile	S2, Villarrica - La Araucanía	6.9	13695	6.7	35.7	91.9	11.1	18.3	20.2	81.1	34217	0.06	504	23.4	10.4	23.5	112	96.6	[1] This Study
Chile	S3, Lonquimay - La Araucanía	6.7	14712	6.0	40.5	84.2	14.0	22.0	7.4	58.6	36897	0.01	602	12.1	17.4	24.2	144	85.3	[1] This Study
Brazil	Novo Hamburgo	6.1	-	-	-	-	0.20	-	113	120	-	0.02	-	97.0	20.0	-	-	72.0	[2] Schenato et al. (2008)
Cuba	The Havana	-	-	-	-	-	-	8.4	-	252	-	-	-	50	276	-	-	489	[3] Díaz Rizo et al. (2012)
Brazil	Estancia Velha	-	-	1.2	-	44.6	-	-	29.4	4.1	-	0.23	80.8	-	9.7	-	-	23.0	[4] Augustin Jr & Viero (2012)
Spain	Catalonia	-	-	4.1	-	-	0.24	-	15.3		-	0.07	-	10.6	64.4	-	-	-	[5] Herrero et al. (2020)
Ghana	S1, Amakon	7.5	-	12.0	-	-	5.9	-	77.0	347	-	0.2	-	34.0	309	-	-	558	[6] Akanchise et al. (2020)
	S2, Kronum	7.8	-	4.8	-	-	13.0	-	66.0	32.0	-	0.04	-	26.0	13.0	-	-	166	
Nigeria	Abakaliki	-	-	-	-	-	0.12	-	-	27.7	130	-	-		17.0	-	-	63.5	[7] Aja et al. (2021)

[1] This Study

[2] Schenato, F., Schröder, N., & Martins, F. (2008). Assessment of contaminated soils by heavy metals in municipal solid waste landfills in southern Brazil. *Wseas Trans. Environ. Dev.*, *9*. Retrieved 09/01, from https://www.researchgate.net/publication/228657405_Assessment_of_contaminated_soils_by_heavy_metals_in_municipal_solid_waste_landfills_in_southern_Brazil

[3] Díaz Rizo, O., Hernández Merlo, M., Echeverría Castillo, F., & Arado López, J. O. (2012). Assessment of Metal Pollution in Soils From a Former Havana (Cuba) Solid Waste Open Dump. *Bulletin of Environmental Contamination and Toxicology*, *88*(2), 182-186. https://doi.org/10.1007/s00128-011-0505-7

[4] Augustin Jr, P., & Viero, A. (2012). Environmental impact and geochemical behavior of soil contaminants from an industrial waste landfill in Southern Brazil. *Environmental Earth Sciences*, *67*. https://doi.org/10.1007/s12665-012-1597-z

[5] Herrero, M., Rovira, J., Marquès, M., Nadal, M., & Domingo, J. L. (2020). Human exposure to trace elements and PCDD/Fs around a hazardous waste landfill in Catalonia (Spain). *Science of The Total Environment*, *710*, 136313. https://doi.org/10.1016/j.scitotenv.2019.136313

[6] Akanchise, T., Boakye, S., Borquaye, L. S., Dodd, M., & Darko, G. (2020). Distribution of heavy metals in soils from abandoned dump sites in Kumasi, Ghana. *Scientific African*, *10*, e00614. https://doi.org/10.1016/j.sciaf.2020.e00614

[7] Aja, D., Okolo, C. C., Nwite, N. J., & Njoku, C. (2021). Environmental risk assessment in selected dumpsites in Abakaliki metropolis, Ebonyi state, southeastern Nigeria. *Environmental Challenges*, *4*, 100143. https://doi.org/10.1016/j.envc.2021.100143

Supplementary material

Analysis and evaluation of potentially toxic elements concentrations in landfills in the Araucanía Region, Chile.

Pedro Tume[a,b], Carolina Rubio[a], Oscar Cornejo[a,*], Bernardo Sepúlveda[c], Núria Roca[d], Jaume Bech[d]

a Facultad de Ingeniería, Universidad Católica de la Santísima Concepción, Casilla 297, Concepción, Chile

b Centro de Investigación en Biodiversidad y Ambientes Sustentables (CIBAS), Universidad Católica de la Santísima Concepción, Concepción, Chile

c Centro Regional de Investigación y Desarrollo Sustentable de Atacama (CRIDESAT), Universidad de Atacama, Copiapó, Chile.

d Dept. Biologia Evolutiva, Ecologia i Ciències ambientals, Facultat de Biologia, Universitat de Barcelona, Av. Diagonal 643, 08023 Barcelona, Spain.

Corresponding author: Oscar Cornejo