

Article

Tin and Antimony as Soil Pollutants along Railway Lines—A Case Study from North-Western Croatia

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Supplementary Materials

Table S1. Contamination factors (CFs) for each metalloid and sampling site.

Values mg/kg No. of site	CFs							
	Calculated in regards to background value in northwest Croatia		Calculated in regards to minimum and maximum values for north-eastern part of Croatia [71]				Calculated in regards to the median for European top-soils [71]	
	4.13 Sn	1.67 Sb	4 Sn	7 Sn	0.83 Sb	1.46 Sb	3 Sn	0.6 Sb
1	1.0	0.7	1.0	0.6	1.5	0.8	1.3	2.0
2	3.5	5.2	3.6	2.1	10.5	6.0	4.8	14.5
3	1.9	0.6	2.0	1.1	1.2	0.7	2.6	1.6
4	2.0	0.9	2.1	1.2	1.8	1.0	2.7	2.5
5	1.9	3.0	2.0	1.1	6.1	3.5	2.6	8.4
6	3.5	3.6	3.6	2.0	7.2	4.1	4.8	10.0
7	2.3	1.0	2.3	1.3	1.9	1.1	3.1	2.6
8	1.7	0.7	1.8	1.0	1.3	0.8	2.4	1.8
9	1.7	0.7	1.8	1.0	1.4	0.8	2.3	2.0
10	1.8	1.0	1.8	1.0	2.0	1.1	2.4	2.8
11	1.7	1.0	1.8	1.0	2.1	1.2	2.4	2.9
12	4.5	5.3	4.7	2.7	10.7	6.1	6.3	14.9
13	3.9	5.2	4.0	2.3	10.4	5.9	5.4	14.4
14	12.7	16.4	13.2	7.5	33.0	18.8	17.5	45.6
15	3.4	5.4	3.6	2.0	10.9	6.2	4.7	15.1
16	7.4	12.8	7.7	4.4	25.8	14.7	10.2	35.7
17	1.6	0.6	1.7	0.9	1.3	0.7	2.2	1.8
18	2.0	0.9	2.1	1.2	1.9	1.1	2.8	2.6
19	1.9	1.2	1.9	1.1	2.5	1.4	2.6	3.4
20	1.9	0.7	2.0	1.1	1.5	0.9	2.6	2.1
21	2.0	1.8	2.0	1.2	3.5	2.0	2.7	4.9
22	1.7	0.8	1.7	1.0	1.6	0.9	2.3	2.2
23	5.0	10.7	5.1	2.9	21.6	12.3	6.8	29.9

24	2.2	2.3	2.3	1.3	4.6	2.6	3.0	6.4
25	1.6	0.8	1.6	0.9	1.6	0.9	2.2	2.3
26	3.6	5.3	3.7	2.1	10.7	6.1	5.0	14.8
27	1.9	1.3	2.0	1.1	2.6	1.5	2.6	3.6
28	2.2	31.1	2.2	1.3	62.6	35.6	3.0	86.6
29	2.2	0.7	2.3	1.3	1.5	0.9	3.1	2.1
30	1.8	1.2	1.8	1.0	2.4	1.4	2.4	3.3
31	2.9	2.6	3.0	1.7	5.2	3.0	4.0	7.2
32	2.2	1.4	2.3	1.3	2.7	1.6	3.0	3.8
33	2.0	2.8	2.0	1.2	5.6	3.2	2.7	7.7
34	6.6	6.6	6.8	3.9	13.2	7.5	9.1	18.3
35	1.7	3.3	1.7	1.0	6.6	3.8	2.3	9.1
36	2.6	3.5	2.7	1.5	7.0	4.0	3.6	9.7
37	0.8	1.9	0.8	0.5	3.7	2.1	1.1	5.2
38	1.4	2.4	1.4	0.8	4.9	2.8	1.9	6.8
39	1.6	2.4	1.7	1.0	4.8	2.7	2.3	6.6
40	8.3	15.3	8.5	4.9	30.8	17.5	11.4	42.5
41	1.0	1.4	1.0	0.6	2.8	1.6	1.3	3.9
42	6.9	10.0	7.1	4.1	20.2	11.5	9.5	27.9
43	3.0	3.5	3.1	1.8	7.1	4.1	4.1	9.9
44	23.6	8.0	24.4	13.9	16.1	9.1	32.5	22.2
45	1.0	1.2	1.1	0.6	2.4	1.3	1.4	3.3
46	1.6	2.7	1.7	1.0	5.4	3.0	2.3	7.4
47	1.3	1.7	1.3	0.8	3.4	1.9	1.8	4.7
48	0.7	1.5	0.8	0.4	3.0	1.7	1.0	4.1
49	2.3	4.4	2.4	1.4	8.9	5.1	3.2	12.3
50	14.9	25.8	15.3	8.8	52.0	29.6	20.5	71.9
51	5.0	15.2	5.2	3.0	30.5	17.3	6.9	42.2
52	1.1	0.9	1.1	0.6	1.9	1.1	1.5	2.6
53	1.5	1.3	1.6	0.9	2.6	1.5	2.1	3.6
54	0.9	1.7	1.0	0.5	3.5	2.0	1.3	4.8
55	1.2	2.0	1.2	0.7	4.1	2.3	1.6	5.7
56	1.6	1.7	1.6	0.9	3.4	1.9	2.2	4.7
57	1.5	2.7	1.5	0.9	5.5	3.1	2.0	7.6
58	1.5	1.8	1.6	0.9	3.6	2.0	2.1	5.0
59	1.6	1.7	1.6	0.9	3.5	2.0	2.2	4.8
60	3.2	1.7	3.3	1.9	3.4	2.0	4.4	4.7
Average	3.2	4.3	3.3	1.9	8.6	4.9	4.4	11.9
Median	1.9	1.8	2.0	1.1	3.7	2.1	2.6	5.1
Maximum	23.6	31.1	24.4	13.9	62.6	35.6	32.5	86.6
Minimum	0.7	0.6	0.8	0.4	1.2	0.7	1.0	1.6

Table S2. Published research on Sn and Sb along the railway.

Literature source	Country	Locality	Functional part of railway	Distance from the tracks	Year of soil samples collection	Sn mg/kg	Sb mg/kg
Dzierżanowski and Gawroński [14]	Poland	suburbs of Warsaw	between stations	0–1 m from the track embankments	2011	below detection limit	below detection limit
Wiłkomirski [15]	Poland	Białystok, Sokółka, Hajnówka and Kuźnica	railway stations: in different functional parts	not specified	2012	3–23	not investigated
Staszewski [16]	Poland	Ława Główna	railway junction	< 2 m	2008	4–33	not investigated

Table S3. Bioavailable concentrations and percentage of bioavailable concentrations for Sn and Sb.

No. of site	Bioavailable concentrations		Percentage of bioavailable concentrations	
	Sn mg/kg	Sb mg/kg	Sn %	Sb %
1	0.0006	0.001	0.015	0.10
2	0.0009	0.004	0.006	0.05
3	0.0005	0.001	0.006	0.14
4	0.0008	0.003	0.010	0.20
5	0.0007	0.007	0.009	0.13
6	0.0005	0.011	0.004	0.19
7	0.0006	0.001	0.006	0.09
8	0.0006	0.002	0.009	0.15
9	0.0006	0.002	0.009	0.17
10	0.0008	0.004	0.011	0.25
11	0.0015	0.001	0.021	0.07
12	0.0015	0.025	0.008	0.28
13	0.0005	0.002	0.003	0.02
14	0.0010	0.047	0.002	0.17
15	0.0006	0.004	0.004	0.05
16	0.0011	0.041	0.004	0.19
17	0.0006	0.001	0.009	0.08
18	0.0005	0.004	0.006	0.28
19	0.0005	0.002	0.006	0.07
20	0.0007	0.004	0.009	0.29
21	0.0007	0.007	0.009	0.24
22	0.0006	0.002	0.009	0.16
23	0.0013	0.009	0.006	0.05
24	0.0008	0.009	0.009	0.23
25	0.0008	0.005	0.013	0.35
26	0.0007	0.028	0.005	0.32
27	0.0007	0.004	0.009	0.20
28	0.0008	0.136	0.009	0.26
29	0.0009	0.002	0.009	0.14
30	0.0009	0.002	0.012	0.11

31	0.0005	0.007	0.004	0.17
32	0.0006	0.005	0.007	0.22
33	0.0005	0.012	0.006	0.25
34	0.0006	0.036	0.002	0.33
35	0.0007	0.007	0.010	0.13
36	0.0007	0.007	0.006	0.13
37	0.0006	0.001	0.018	0.04
38	0.0009	0.002	0.017	0.05
39	0.0006	0.005	0.009	0.13
40	0.0006	0.003	0.002	0.01
41	0.0006	0.006	0.015	0.27
42	0.0006	0.012	0.002	0.07
43	0.0008	0.013	0.006	0.23
44	0.0009	0.013	0.001	0.09
45	0.0007	0.005	0.016	0.24
46	0.0006	0.015	0.009	0.34
47	0.0004	0.007	0.008	0.24
48	0.0006	0.003	0.020	0.10
49	0.0006	0.003	0.006	0.04
50	0.0010	0.032	0.002	0.07
51	0.0013	0.016	0.006	0.06
52	0.0006	0.004	0.013	0.26
53	0.0010	0.003	0.016	0.14
54	0.0005	0.004	0.013	0.14
55	0.0010	0.006	0.020	0.16
56	0.0007	0.005	0.011	0.17
57	0.0006	0.001	0.010	0.03
58	0.0007	0.008	0.011	0.27
59	0.0006	0.007	0.009	0.25
60	0.0006	0.010	0.005	0.34
Average	0.0007	0.011	0.009	0.17
Median	0.0006	0.005	0.009	0.16
Maximum	0.0015	0.136	0.021	0.35
Minimum	0.0004	0.001	0.001	0.01

Table S4. Proportions of soil fractions.

No. of site	Coarse sand 2.0-0.2 mm	Fine sand 0.2-0.063 mm	Coarse silt 0.063-0.02 mm	Fine silt 0.02-0.002 mm	Clay < 0.002 mm
1	9.7	15.0	21.3	35.0	19.0
2	46.9	14.7	19.1	16.5	2.8
3	6.5	12.3	38.6	35.9	6.7
4	23.9	19.2	26.3	25.2	5.4
5	41.4	13.4	12.4	28.4	4.4
6	27.9	11.8	27.0	26.7	6.6
7	1.8	2.5	44.3	41.6	9.8
8	29.7	17.2	27.0	21.8	4.3
9	36.3	20.8	20.5	19.6	2.8
10	5.3	9.5	47.7	30.7	6.8
11	11.0	22.0	37.2	23.9	5.9
12	41.0	17.6	20.4	16.2	4.8
13	57.3	22.0	14.6	5.6	0.5
14	25.9	25.6	25.0	19.3	4.2

15	48.8	15.8	18.2	15.7	1.5
16	38.3	17.9	18.8	17.8	7.2
17	20.3	24.7	30.3	17.1	7.6
18	5.1	10.1	55.3	24.5	5.0
19	69.9	15.0	8.1	5.7	1.3
20	35.9	13.5	21.3	21.7	7.6
21	38.6	15.5	17.4	20.9	7.6
22	53.7	24.5	8.8	11.1	1.9
23	18.5	14.9	24.7	35.6	6.3
24	20.6	9.9	20.1	40.2	9.2
25	41.5	15.1	19.4	19.5	4.5
26	42.0	15.4	14.7	20.0	7.9
27	2.0	2.2	18.3	49.0	28.5
28	42.8	12.0	12.9	24.7	7.6
29	0.7	5.0	39.7	43.4	11.2
30	30.9	7.0	26.7	29.6	5.8
31	14.7	9.7	31.3	34.6	9.7
32	30.0	17.0	19.0	27.0	7.0
33	19.6	12.3	26.8	28.8	12.5
34	20.5	12.6	21.3	35.3	10.3
35	69.3	16.9	5.7	7.1	1.0
36	59.5	13.8	11.5	12.1	3.1
37	81.0	10.9	3.7	3.9	0.5
38	77.5	9.1	5.6	7.2	0.6
39	25.4	14.2	22.4	30.4	7.6
40	49.7	15.7	19.3	11.8	3.5
41	41.9	15.6	16.3	21.5	4.7
42	53.3	11.8	11.3	16.4	7.2
43	34.5	16.3	16.4	25.3	7.5
44	52.4	15.0	12.9	13.9	5.8
45	28.1	16.8	18.1	28.8	8.2
46	19.8	6.0	14.3	34.8	25.1
47	18.8	18.1	17.0	32.0	14.1
48	29.6	10.0	15.3	33.0	12.1
49	69.4	8.7	9.1	11.0	1.8
50	29.1	11.5	15.7	34.2	9.5
51	34.2	8.9	15.4	31.7	9.8
52	15.2	16.7	16.8	38.6	12.7
53	18.8	10.3	22.5	38.0	10.4
54	46.4	18.9	15.2	13.7	5.8
55	39.4	20.6	20.2	16.3	3.5
56	17.6	23.8	24.3	26.0	8.3
57	71.3	10.0	8.6	8.7	1.4
58	16.2	26.8	27.7	22.6	6.7
59	24.1	16.0	21.1	26.6	12.2
60	24.9	23.2	20.7	22.1	9.1
Average	33.4	14.7	20.7	23.9	7.27
Median	29.9	15.0	19.2	24.2	6.75
Maximum	81.0	26.8	55.3	49.0	28.5
Minimum	0.70	2.20	3.70	3.90	0.50