Endpoint levels of biological organization are highlighted: cellular and molecular (green); individual (without color); population, community, and ecosystem (yellow).

Supplementary Table 1. Total arsenic effective concentrations (EC_x) and the properties of soils under study

Study	SO	Soil properties			Species	EP	TD	As_{total} (mg kg^{-1})		
		pH	CEC (cmol$_+$ kg^{-1})	OM (%)				EC_{10}	EC_{25}	EC_{50}
Invertebrates: Worms										
Bustos et al. (2015)	Chile	5.7-7.6	NA	0.7-4.9	*Eisenia fetida*	CQ	28	**8**	**14**	**22**
Microorganisms										
Nordgren et al. (1986)	Sweden	3.5-5.0a	NA	NA	Native microbes	FG	NAP	-	-	200
Wang et al. (2020)	China	4.6-8.2	8.1-22	0.5-5.3	Native microbes	ACP K_a	<1	20	-	184
						ACP V_{max}	<1	49	-	438
						ALP K_a	<1	42	-	378
						ALP V_{max}	<1	36	-	327
						BG K_a	<1	29	-	259
						BG V_{max}	<1	41	-	369
						DHA K_a	<1	30	-	266
						DHA V_{max}	<1	32	-	285
						Mean		35	-	313
						Microbe mean		**35**	-	**257**

CEC: cation exchange capacity; EP: endpoint; NA: not available; NAP: not applicable (field observations); native microbes: biological response is attributed to several soil microorganism taxa (i.e., archaea, bacteria, actinomycete, algae, fungi, and protozoa); OM: organic matter; SO: soil origin; TD: test duration (days).
ACP K_a: acid phosphatase catalytic efficiency; ACP V_{max}: acid phosphatase maximum reaction rate; ALP K_a: alkaline phosphatase catalytic efficiency; ALP V_{max}: alkaline phosphatase maximum reaction rate; BG K_a: β-glucosidase catalytic efficiency; BG V_{max}: β-glucosidase maximum reaction rate; CQ: cocoon quantity; DHA K_a: dehydrogenase catalytic efficiency; DHA V_{max}: dehydrogenase maximum reaction rate; FG: functional groups. [a]Estimate based on illustrations.

Supplementary Table 2. Total copper effective concentrations (EC_x) and the properties of soils under study

Study	SO	Soil properties			Species	EP	TD	Cu_{total} (mg kg^{-1})		
		pH	CEC (cmol$_+$ kg^{-1})	OM (%)				EC_{10}	EC_{25}	EC_{50}
Plants										
Hamels et al. (2014)	Sweden	5.0-6.1	9-16	12.1	*Hordeum vulgare* (Barley)	SH DW	14	-	-	1260
Kolbas et al. (2014)	France	7.0-7.5	3.1-19	1.5-7.8	*Helianthus annuus* (Sunflower)	CC	28	151	-	759
						ChlTot	28	138	-	691
						EL	28	912	-	-
						LA	28	282	-	954
						R DW	28	155	-	677
						SH DW	28	323	-	717
						TLA	28	395	-	-
						WC	28	620	-	-
						Mean		372	-	760
Verdejo et al. (2015)	Chile	5.7-7.6	NA	0.7-5.8	*Lolium perenne* (Perennial ryegrass)	R L	21	500	765	1031
						SH L	21	327	735	1144
						Mean		414	750	1088

Verdejo et al. (2016)	Chile	5.7-7.6	NA	0.7-5.8	*Lactuca sativa* (Lettuce)	SH L	21	445	955	1805
Mondaca et al. (2017)	Chile	5.7-7.6	NA	0.7-5.8	*Avena sativa* (Oat)	SH DW	21	607	900	1230
						SH L	21	908	1328	1802
						R DW	62	363	593	853
						SH DW	62	454	616	798
						SH L	62	569	720	889
						Mean		580	831	1114
					Brassica rapa (Turnip)	SH DW	21	161	298	452
						SH L	21	197	352	526
						R L	42	412	598	809
						SH DW	42	254	372	506
						SH L	42	245	419	616
						SPQ	42	297	383	480
						Mean		261	404	565
Plants										
Kolbas et al. (2018)	France	5.9-7.2	2.7-3.2	1.2-1.5	*Helianthus annuus* (Sunflower)	ChlTot	28	51	-	329
						R DW	28	74	-	203
						SH DW	28	166	-	333
						SH L	28	355	-	407
						TAC	28	23	-	301
						TLA	28	201	-	335
						Mean		145	-	318
						Plant mean		**369**	**735**	**987**
Invertebrates										
a. Nematodes										
Naveed et al. (2014)	Denmark	5.9-6.6	NA	3.3-6.0	Native nematodes	ACE R	NAP	275[c]	-	-
						S-W D	NAP	400[c]	-	-
						Mean		**338**	-	-
b. Springtails										
Scott-Fordsmand et al. (2000a)	Denmark	6.1-7.1	10-13	3.9-5.5	*Folsomia fimetaria*	FPZ	NAP	643	-	-
						JQ	21	2463[d]	-	-
Liu et al. (2018)	China	7.2	18	3.2	*Folsomia candida*	FPZ	NAP	31	-	153
						BL	28	68	-	-
						JQ	28	21	-	135
						SV	28	355	-	1560
						Mean		148	-	848
					Folsomia quadrioulata	FPZ	NAP	52	-	258
					Sinella curviseta	BL	28	880	-	-
						JQ	28	26	-	174
						SV	28	645	-	3089
						Mean		517	-	1632
						Springtail mean		**278**	-	**723**

c. Worms										
Scott-Fordsmand et al. (2000b)	Denmark	6.5-7.0	NA	NA	*Eisenia fetida*	CQ	21	248	-	517
						NRRT	21	69	-	163
						Mean		159	-	340
Van Zwieten et al. (2004)	Australia	6.6-6.9	NA	3.3-12	*Eisenia fetida*	AT	2	-	-	131[a]
Maraldo et al. (2006)	Denmark	NA	NA	NA	*Enchytraeus crypticus*	JQ	14	99	-	439
Konečný et al. (2014)	Zambia	5.1-6.9	3.5-15	1.7-15	*Enchytraeus crypticus*	JQ	28	-	-	351
Naveed et al. (2014)	Denmark	5.9-6.6	NA	3.3-6.0	Native earthworms	FPZ	NAP	110	-	-
Delgadillo et al. (2017)	Chile	5.7-8.3	NA	0.7-10	*Eisenia fetida*	AT	2	-	-	213
Mirmonsef et al. (2017)	Denmark	NA	NA	NA	*Aporrectodea tuberculata*	CQ	21	-	-	220
							42	-	-	220[d]
							63	-	-	450[d]
						Worm mean		**123**	**-**	**282**
Microorganisms										
Baath et al. (1991)	Sweden	NA	NA	NA	Native microbes	SIR + ATP	<1	-	-	2500[d]
Sauvé (2006)	Denmark	6.0-7.1	NA	3.7-5.1	Native microbes	SOM D	NAP	154	193[b]	285
Arthur et al. (2012)	Denmark	6.1-6.6	NA	2.7-5.1	Native microbes	DHA	<1	-	-	542
						FDA	<1	-	-	521
						Mean		-	-	532
Naveed et al. (2014)	Denmark	5.9-6.6	NA	3.3-6.0	Native microbes	DHA	NA	350[c]	-	-
						FDA	NA	800	-	-
						Mean		575	-	-
						Microbe mean		**365**	**-**	**408**
a. Archaea/Bacteria										
Mertens et al. (2010)	Denmark	5.2-5.9	6.7	3.6	AOA and AOB	PNR	4	-	-	2060[d]
Naveed et al. (2014)	Denmark	5.9-6.6	NA	3.3-6.0	Native bacteria	ACE R	NAP	170	-	-
						S-W D	NAP	170	-	-
						Mean		**170**	**-**	**-**
b. Fungi										
Naveed et al. (2014)	Denmark	5.9-6.6	NA	3.3-6.0	Native fungi	ACE R	NAP	800	-	-
						S-W D	NAP	2370	-	-
						Mean		**1585**	**-**	**-**
Soil properties										
Naveed et al. (2014)	Denmark	5.9-6.6	NA	3.3-6.0	Physical properties	AP	NAP	320	-	-
						SWR	NAP	275	-	-
						GD	NAP	200[c]	-	-
						R-R α	NAP	260[c]	-	-
						R-R β	NAP	170[c]	-	-
						TPO	NAP	320[c]	-	-
						Mean		275	-	-
					Chemical properties	OC	NAP	290[c]	-	-
						TN	NAP	470	-	-
						TP	NAP	225	-	-
						Mean		348	-	-
					Soil properties mean			**311**	**-**	**-**

CEC: cation exchange capacity; EP: endpoint; NA: not available; NAP: not applicable (field observations); native microbes: biological response is attributed to several soil microorganism taxa (i.e., archaea, bacteria, actinomycete, algae, fungi, and protozoa); OM: organic matter; SO: soil origin; TD: test duration (days).

ACE R: ACE richness; AOA and AOB: ammonia-oxidizing archaea and ammonia-oxidizing bacteria community; AP: air permeability; AT: avoidance test; BL: body length; SWR: Soil water retention; CC: carotenoid content; Chl*a*/Chl*b*: chlorophyll a/chlorophyll b ratio; ChlTot: total chlorophyll content; CQ: cocoon quantity; DHA: dehydrogenase activity; EL: epicotyl length; FDA: fluorescein diacetate hydrolysis; FPZ: field population size; GD: gas diffusivity; JQ: juvenile quantity; LA: leaf asymmetry; LL: leaf length; NRRT: neutral-red retention time; OC: organic carbon; PC: plant cover; PNR: potential nitrification rate; R DW: root dry weight; R L: root length; R-R α: soil pore size distribution (Rosin-Rammler α); R-R β: soil pore size distribution (Rosin-Rammler β); SH DW: shoot dry weight; SH L: shoot length; SIR + ATP: substrate induced respiration and ATP content; SO: soil origin; SOM D: soil organic matter decomposition; SPQ: seeds pods quantity; SR: species richness; SV: survival; S-W D: Shannon-Wiener diversity index; TAC: total antioxidant capacity; TLA: total leaf area; TN: total nitrogen; TP: total phosphorus; TPO: total porosity; WC: water content.

[a]Mean value for several soils. [b]EC_{20} instead of EC_{25}. (not included in the mean). [c]Estimate based on illustrations. [d]Not considered for mean calculation.

Supplementary Table 3. Extractable, soluble, and free copper ion effective concentrations (EC_x)

Study	Species	EP	TD	Extractant	$Cu_{extractable}$ (mg kg^{-1})	$Cu_{soluble}$ (µg L^{-1})			pCu^{2+}		
					EC_{50}	EC_{10}	EC_{25}	EC_{50}	EC_{10}	EC_{25}	EC_{50}
Plants											
Hamels et al. (2014)	*Hordeum vulgare* (Barley)	SH DW	14	0.0155 M Cohex, SSR: NA	**50**	-	-	-	-	-	-
				1 M NH_4NO_3, SSR: 1/2.5	**8.9**	-	-	-	-	-	-
				0.05 M EDTA, SSR: 1/2.5	**930**	-	-	-	-	-	-
				0.001 M $CaCl_2$, SSR: 1/10	-	-	-	**390**	-	-	-
				C_{DGT}	-	-	-	**40**	-	-	-
Kolbas et al. (2014)	*Helianthus annuus* (Sunflower)	CC	28	Pore water	-	114	-	571	7.3	-	6.6
		Chl*a*/Chl*b*	28	Pore water	-	-	-	-	7.3	-	6.6
		ChlTot	28	Pore water	-	104	-	524	7.4	-	6.7
		EL	28	Pore water	-	728	-	-	-	-	-
		LA	28	Pore water	-	-	-	-	6.7	-	5.7
		LL	28	Pore water	-	-	-	-	6.5	-	-
		R DW	28	Pore water	-	118	-	590	7.3	-	6.5
		SH DW	28	Pore water	-	261	-	607	7.0	-	5.2
		SH L	28	Pore water	-	-	-	608	-	-	-
		TLA	28	Pore water	-	312	-	-	-	-	6.9
		WC	28	Pore water	-	538	-	-	-	-	6,4
		Mean			-	311	-	580	7.1	-	6.3
Kolbas et al. (2018)	*Helianthus annuus* (Sunflower)	R DW	28	Pore water	-	-	-	290	-	-	-
		SH DW	28	Pore water	-	-	-	432	-	-	-
		Mean			-	-	-	361	-	-	-
Lillo-Robles et al. (2020)	Several species	PC	180	0.1 M KNO_3, SSR: 1/2.5	-	376	448	532	7.3	6.8	6.1
		SH DW	180	0.1 M KNO_3, SSR: 1/2.5	-	184	304	444	8.0	7.2	6.3
		SR	180	0.1 M KNO_3, SSR: 1/2.5	-	240	440	640	7.2	6.3	5.3
		Mean			-	**267**	**397**	**539**	**7.5**	**6.8**	**5.9**
		Plant mean		**Pore water**	-	-	-	471	-	-	-
Invertebrates: Worms											
Konečný et al. (2014)	*Enchytraeus crypticus*	JQ	28	0.05 M EDTA, SSR: 1/2.5 (recalculated from SSR: 1/10)	398	-	-	-	-	-	-
Microorganisms											
Aponte et al. (2021)	Native microbes	ARY	<1	NA M DTPA, SSR: NA	139	-	-	-	-	-	-

EP: endpoint; TD: test duration (days); SSR: soil/solution ratio. CC: carotenoid content; C_{DGT}: diffusive gradients in thin films measured concentration; native microbes: biological response is attributed to several soil microorganism taxa (i.e., archaea, bacteria, actinomycete, algae, fungi, and protozoa).
ARY: arylsulfatase activity; Chl_a/Chl_b: chlorophyll a/chlorophyll b ratio; ChlTot: total chlorophyll content; EL: epicotyl length; JQ: juvenile quantity; LA: leaf asymmetry; LL: leaf length; NA: not available; PC: plant cover; R DW: root dry weight; SH DW: shoot dry weight; SH L: shoot length; SR: species richness; TLA: total leaf area; WC: water content.
Lillo-Robles et al. (2020): various Chilean field-collected soils with pH 4.9-7.1 and 0.9-8.0% organic matter. This study demonstrates the impact of a single pollutant on biological responses.
Aponte et al. (2021): various Chilean field-collected soils with pH 4.7-5.9 and 1.0-2.8% organic matter. This study demonstrates the impact of a single pollutant on biological responses.

Supplementary Table 4. Total nickel effective concentrations (EC_x) and the properties of soils under study

Study	SO	Soil properties			Species	EP	TD	Ni_{total} (mg kg^{-1})	
		pH	CEC ($cmol_+$ kg^{-1})	OM (%)				EC_{25}	EC_{50}
Plants									
Dan et al. (2008)	Canada	5.7-6.9	5.0-63	6.0-28	*Avena sativa* (Oat)	SH DW	28-70	1727[a]	-
Cioccio et al. (2017)	Canada	4.6-6.1	23-54	9.6-25	*Avena sativa* (Oat)	AY	NA	-	1270
		NA	NA	NA	*Glycine max* (Soybean)	AY	NA	-	1590
Gopalapillai et al. (2018)	Canada	5.5-7.4	9.7-49	3.6-18	*Avena sativa* (Oat)	SH DW	NA	-	2269[a]
						Plant mean		**1727**	**1710**

CEC: cation exchange capacity; EP: endpoint; OM: organic matter; NA: not available; SO: soil origin; TD: test duration (days). AY: Agronomic yield. SH DW: Shoot dry weight; R DW: Root dry weight. [a] Mean value for several soils.

Supplementary Table 5. Extractable, soluble, and free nickel ion effective concentrations (EC_x)

Study	Species	EP	TD	Extractant	$Ni_{extractable}$ (mg kg^{-1})		$Ni_{soluble}$ (µg L^{-1})	pNi^{2+}
					EC_{25}	EC_{50}	EC_{25}	EC_{50}
Plants								
Kukier and Chaney (2004)	*Avena sativa* (Oat)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	5.7	-
	Beta vulgaris (Red beet)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	6.4	-
	Beta vulgaris var. cicla (Swiss chard)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	6.2	-
	Glycine max (Soybean)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	4.6	-
	Hordeum vulgare (Barley)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	15	-
	Lolium perenne (Perennial ryegrass)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	20	-
	Phaseolus vulgaris (Bean)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	3.5	-
	Raphanus sativus (Radish)	R DW	31	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	6.0	-
		SH DW	31	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	7.2	-
		Mean			-	-	6.6	-
	Solanum lycopersicum (Tomato)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	6.6	-
	Triticum aestivum (Wheat)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	22	-
	Zea mays (Corn)	SH DW	42	0.01 M $Sr(NO_3)_2$, SSR: 1/4	-	-	6.8	-
Dan et al. (2008)	*Avena sativa* (Oat)	SH DW	28-70	0.2 M $C_2H_2O_4$ + $(NH_4)_2C_2O_4$, SSR: 1/20	**465[a]**	-	-	-
Gopalapillai et al. (2018)	*Avena sativa* (Oat)	SH DW	NA	0.2 M $C_2H_2O_4$ + $(NH_4)_2C_2O_4$, SSR: 1/20	-	**607[a]**	-	-
				Pore water	-	-	-	**6.8[a]**
		Plant mean		**0.01 M $Sr(NO_3)_2$, SSR: 1/4**	-	-	**9.3**	-

EP: endpoint; TD: test duration (days); SSR: soil/solution ratio. SH DW: shoot dry weight; R DW: root dry weight. [a] Mean value for several soils. Kukier and Chaney (2004): Canadian field-collected soil artificially adjusted to pH 5.2-7.8 by adding $CaCO_3$ and $MgCO_3$; contains 17% of organic matter. The study demonstrates the impact of a single pollutant on biological responses.

Supplementary Table 6. Total lead effective concentrations (EC_x) and the properties of soils under study

Study	SO	Soil properties			Species	EP	TD	Pb_{total} (mg kg^{-1})	
		pH	CEC ($cmol_+$ kg^{-1})	OM (%)				EC_{10}	EC_{50}
Invertebrates									
a. Mites									
Luo et al. (2015)	Netherlands	3.2-6.8	1.8-21	3.8-13	*Platynothrus peltifer*	JQ	84	**658**	**696**
b. Worms									
Hui et al. (2009)	Finland	NA	NA	NA	Native enchytraeids	SV	33	-	11,030[a]
Luo et al. (2014b)	Netherlands	3.2-6.8	1.8-21	3.8-13	*Eisenia andrei*	SV	28	-	1603
						JQ	56	1377	1482
						Mean		1377	1543
Luo et al. (2014a)	Netherlands	3.2-6.8	1.8-21	3.8-13	*Enchytraeus crypticus*	SV	21	-	638
						JQ	21	583	645
						Mean		583	642
						Worm mean		**980**	**1092**
Microorganisms									
Vanhala and Ahtiainen (1994)	Finland	3.1-4.8	NA	NA	Native microbes	ATP	NAP	-	68,700
						RR	<1	-	25,000
						Mean		-	**46,850**

CEC: cation exchange capacity; EP: endpoint; NA: not available; NAP: not applicable (field observations); native microbes: biological response is attributed to several soil microorganism taxa (i.e., archaea, bacteria, actinomycete, algae, fungi, and protozoa); OM: organic matter; SO: soil origin; TD: test duration (days).
ATP: ATP content; JQ: Juvenile quantity; RR: Respiration rate; SV: Survival. [a] Not considered for mean calculation.

Supplementary Table 7. Extractable and soluble lead effective concentrations (EC_x)

Study	Species	EP	TD	Extractant	$Pb_{extractable}$ (mg kg^{-1})		$Pb_{soluble}$ (µg L^{-1})	
					EC_{10}	EC_{50}	EC_{10}	EC_{50}
Invertebrates								
a. Mites								
Luo et al. (2015)	*Platynothrus peltifer*	JQ	84	Water, SSR: 1/5	**2.2**	**5.5**	-	-
				0.01 M $CaCl_2$, SSR: 1/5	**7.2**	**49**	-	-
				Pore water	-	-	**3040**	**6418**
b. Worms								
Luo et al. (2014b)	*Eisenia andrei*	SV	28	Water, SSR: 1/5	-	5.5	-	-
				0.01 M $CaCl_2$, SSR: 1/5	-	98	-	-
				Pore water	-	-	-	5100
		JQ	56	Water, SSR: 1/5	0.4	0.5	-	-
				0.01 M $CaCl_2$, SSR: 1/5	0.4	2.2	-	-
				Pore water	-	-	99,000	130,000
		Mean		Water, SSR: 1/5	0.4	3.0	-	-
				0.01 M $CaCl_2$, SSR: 1/5	0.4	50	-	-
				Pore water	-	-	99,000	67,550
Luo et al. (2014a)	*Enchytraeus crypticus*	SV	21	Water, SSR: 1/5	-	1.5	-	-
				0.01 M $CaCl_2$, SSR: 1/5	-	8.5	-	-
				Pore water	-	-	-	643

Luo et al. (2014a)	*Enchytraeus crypticus*	JQ	21	Water, SSR: 1/5	0.4	0.5	-	-
				0.01 M $CaCl_2$, SSR: 1/5	1.3	1.6	-	-
				Pore water	-	-	119	126
		Mean		Water, SSR: 1/5	0.4	1.0	-	-
				0.01 M $CaCl_2$, SSR: 1/5	1.3	5.1	-	-
				Pore water	-	-	119	385
		Worm mean		**Water, SSR: 1/5**	**0.4**	**2.0**	**-**	**-**
				0.01 M $CaCl_2$, SSR: 1/5	**0.9**	**28**	**-**	**-**
				Pore water	**-**	**-**	**49,560**	**33,967**

EP: endpoint; TD: test duration (days); SSR: soil/solution ratio. JQ: juvenile quantity; SV: survival.

Supplementary Table 8. Total zinc effective concentrations (EC_x) and the properties of soils under study

Study	SO	Soil properties			Species	EP	TD	Zn_{total} (mg kg^{-1})	
		pH	CEC ($cmol_+$ kg^{-1})	OM (%)				EC_{10}	EC_{50}
Plants									
De Knecht et al. (1998)	Netherlands	NA	NA	NA	*Trifolium pratense* (Red clover)	SH FW	24	-	347
Smolders et al. (2002)	Belgium	5.5-6.1	17-21	6.0-13	*Triticum aestivum* (Wheat)	SH DW	21	217	1215
Beyer et al. (2011)	United States	3.8-4.8	NA	NA	Wild shrubs and vines	PC	NAP	-	1350
						SR	NAP	-	4287[a]
					Wild trees	PC	NAP	-	1740
						SD	NAP	-	2740[b]
					Wild trees, shrubs, and vines	PC	NAP	-	2060
						Mean		-	2359
Beyer et al. (2013)	United States	3.6-4.2	14-16	8.0-13	*Acer rubrum* (Red maple)	L FW	126	-	160
						R FW	126	-	180
						Mean		-	170
					Betula populifolia (Gray birch)	L FW	119	-	110
						R FW	119	-	110
						Mean		-	110
					Glycine max (Soybean)	L FW	28	-	160
						R FW	28	-	250
						Mean		-	205
					Pinus strobus (Eastern white pine)	L FW	126	-	970
						R FW	126	-	880
						Mean		-	925
					Quercus prinus (Chestnut oak)	L FW	84	-	340
						R FW	84	-	220
						Mean		-	280
					Quercus rubra (Northern red oak)	L FW	77	-	180
						R FW	77	-	170
						Mean		-	175
Hamels et al. (2014)	Belgium/France	4.8-7.6	1.0-69	1.7-40	*Hordeum vulgare* (Barley)	SH DW	14	-	9820[a]
						Plant mean		217	1561

Invertebrates									
Spurgeon et al. (2005)	United Kingdom	3.7-7.1	NA	NA	Decomposer community	OM R	6	-	**979**
a. Springtails									
Mertens and Smolders (2013)	Belgium / United Kingdom	NA	NA	NA	*Folsomia candida*	R	NA	**507**	-
b. Worms									
Spurgeon and Hopkin (1995)	United Kingdom	5.5-7.4	NA	9.4-27	*Eisenia fetida*	CQ	21	-	3605
						W	21	-	22,371[d]
Posthuma and Notenboom (1996)	Netherlands	5.5	NA	1.9-6.4	*Eisenia andrei*	CQ	21	-	2553
					Enchytraeus crypticus	JQ	28	-	205
Spurgeon and Hopkin (1996)	United Kingdom	5.5-7.4	NA	9.4-27	*Eisenia fetida*	W	35	-	3120
						SM	56	-	1860
						CQ	84	-	637
						CQ	140	-	4950[d]
						CQ	NA	-	3600[d]
						Mean		-	1872
Nahmani and Lavelle (2002)	France	NA	NA	NA	*Aporrectodea caliginosa*	FPZ	NAP	-	2000[c]
Spurgeon et al. (2005)	United Kingdom	NA	NA	NA	*Lumbricus rubellus*	CQ	70	-	3236
						NRRT	70	-	645
						GE	70	-	616
						Mean		-	1499
		5.4-7.4	NA	NA	Native earthworms	S-W D	NAP	-	1737
Mertens and Smolders (2013)	Belgium / United Kingdom	NA	NA	NA	*Eisenia fetida*	R	NA	924[a]	-
						Worm mean		**924**	**1912**
Microorganisms									
Vanhala and Ahtiainen (1994)	Finland	4.3-7.2	NA	NA	Native microbes	ATP	NAP	-	1550
						RR	<1	-	4000
						Mean		**-**	**2775**
a. Bacteria									
Broos et al. (2004)	United Kingdom	5.2-5.7	2.5-4.7	NA	*Rhizobium leguminosarum* bv. *trifolii*	N_{dff}	32	-	602
Broos et al. (2004)	United Kingdom	5.2-5.7	2.5-4.7	NA	*Rhizobium leguminosarum* bv. *trifolii*	MPN	149	-	204
						Bacteria mean		-	**403**

CEC: cation exchange capacity; decomposer community: biological response is attributed to several soil organism taxa (i.e., earthworms, isopods, microbes, mites, mollusks, myriapods and springtails); EP: endpoint; NA: not available; NAP: not applicable (field observations); native microbes: biological response is attributed to several soil microorganism taxa (i.e., archaea, bacteria, actinomycete, algae, fungi, and protozoa); OM: organic matter; SO: soil origin; TD: test duration (days). AS: arylsulfatase stability; ATP: ATP content; CQ: cocoon quantity; EA: enzymatic activity of arylsulfatase, β-glucosidase, invertase, phosphatase, protease and urease; ES: enzymatic stability of arylsulfatase, β-glucosidase, invertase, phosphatase, protease and urease; FPZ: field population size; GE: gene expression (*mt-2*); JQ: juvenile quantity; L FW: leaf fresh weight; MPN: most probable number; N_{dff}: symbiotic nitrogen fixation; NRRT: neutral-red retention time; OM R: organic material removal (feeding); PC: plant cover; PS: protease stability; R FW: root fresh weight; R: reproduction (not detailed); RR: respiration rate; SD: seedling density; SH DW: shoot dry weight; SH FW: shoot fresh weight ; SM: sexual maturity; SR: species richness; S-W D: Shannon-Wiener diversity index; US: urease stability; W: weight. [a] Mean value for several soils. [b] EC_{90} instead of EC_{50} (not included in the mean). [c] EC_{100} instead of EC_{50} (not included in the mean). [d] Not considered for mean calculation.

Supplementary Table 9. Extractable, soluble, and free zinc ion effective concentrations (EC_x)

Study	Species	EP	TD	Extractant	$Zn_{extractable}$ (mg kg^{-1})	$Zn_{soluble}$ (µg L^{-1})		pZn^{2+}	
					EC_{50}	EC_{10}	EC_{50}	EC_{10}	EC_{50}
Plants									
De Knecht et al. (1998)	*Trifolium pratense* (Red clover)	SH FW	24	0.01 $CaCl_2$, SSR: NA	**121**	-	-	-	-
Smolders et al. (2002)	*Triticum aestivum* (Wheat)	SH DW	21	Pore water	-	**400**	**6900**	-	-
				C_{DGT}	-	150	4410	-	-
Nolan et al. (2005)	*Triticum aestivum* (Wheat)	SH DW	16	Pore water	-	-	-	**3.9**	**3.4**
Beyer et al. (2011)	Wild shrubs and vines	PC	NAP	0.01 M $Sr(NO_3)_2$, SSR: 1/4	71	-	-	-	-
		SR	NAP	0.01 M $Sr(NO_3)_2$, SSR: 1/4	186[a]	-	-	-	-
	Wild trees	SD	NAP	0.01 M $Sr(NO_3)_2$, SSR: 1/4	133[b]	-	-	-	-
	Wild trees, shrubs, and vines	PC	NAP	0.01 M $Sr(NO_3)_2$, SSR: 1/4	102	-	-	-	-
		Mean			120	-	-	-	-
Beyer et al. (2013)	*Acer rubrum* (Red maple)	L FW	126	0.01 M $Sr(NO_3)_2$, SSR: 1/4	28	-	-	-	-
				Mehlich 3, SSR: NA	48	-	-	-	-
		R FW	126	0.01 M $Sr(NO_3)_2$, SSR: 1/4	28	-	-	-	-
				Mehlich 3, SSR: NA	56	-	-	-	-
		Mean		0.01 M $Sr(NO_3)_2$, SSR: 1/4	28	-	-	-	-
				Mehlich 3, SSR: NA	52	-	-	-	-
	Betula populifolia (Gray birch)	L FW	119	0.01 M $Sr(NO_3)_2$, SSR: 1/4	19	-	-	-	-
				Mehlich 3, SSR: NA	32	-	-	-	-
		R FW	119	0.01 M $Sr(NO_3)_2$, SSR: 1/4	18	-	-	-	-
				Mehlich 3, SSR: NA	35	-	-	-	-
		Mean		0.01 M $Sr(NO_3)_2$, SSR: 1/4	19	-	-	-	-
				Mehlich 3, SSR: NA	34	-	-	-	-
	Glycine max (Soybean)	L FW	28	0.01 M $Sr(NO_3)_2$, SSR: 1/4	27	-	-	-	-
				Mehlich 3, SSR: NA	48	-	-	-	-
		R FW	28	0.01 M $Sr(NO_3)_2$, SSR: 1/4	36	-	-	-	-
				Mehlich 3, SSR: NA	76	-	-	-	-
		Mean		0.01 M $Sr(NO_3)_2$, SSR: 1/4	32	-	-	-	-
				Mehlich 3, SSR: NA	62	-	-	-	-
Plants									
Beyer et al. (2013)	*Pinus strobus* (Eastern white pine)	L FW	126	0.01 M $Sr(NO_3)_2$, SSR: 1/4	160	-	-	-	-
				Mehlich 3, SSR: NA	300	-	-	-	-
		R FW	126	0.01 M $Sr(NO_3)_2$, SSR: 1/4	156	-	-	-	-
				Mehlich 3, SSR: NA	270	-	-	-	-
		Mean		0.01 M $Sr(NO_3)_2$, SSR: 1/4	158	-	-	-	-
				Mehlich 3, SSR: NA	285	-	-	-	-
	Quercus prinus (Chestnut oak)	L FW	84	0.01 M $Sr(NO_3)_2$, SSR: 1/4	59	-	-	-	-
				Mehlich 3, SSR: NA	100	-	-	-	-
		R FW	84	0.01 M $Sr(NO_3)_2$, SSR: 1/4	40	-	-	-	-
				Mehlich 3, SSR: NA	68	-	-	-	-
		Mean		0.01 M $Sr(NO_3)_2$, SSR: 1/4	50	-	-	-	-
				Mehlich 3, SSR: NA	84	-	-	-	-

Beyer et al. (2013)	*Quercus rubra* (Northern red oak)	L FW	77	0.01 M $Sr(NO_3)_2$, SSR: 1/4	29	-	-	-	-
				Mehlich 3, SSR: NA	52	-	-	-	-
		R FW	77	0.01 M $Sr(NO_3)_2$, SSR: 1/4	27	-	-	-	-
				Mehlich 3, SSR: NA	50	-	-	-	-
		Mean		0.01 M $Sr(NO_3)_2$, SSR: 1/4	28	-	-	-	-
				Mehlich 3, SSR: NA	51	-	-	-	-
Hamels et al. (2014)	*Hordeum vulgare* (Barley)	SH DW	14	0.0155 M Cohex, SSR: NA	**327**[a]	-	-	-	-
				1 M NH_4NO_3, SSR: 1/2.5	**145**[a]	-	-	-	-
				0.05 M EDTA, SSR: 1/2.5	**3798**[a]	-	-	-	-
				0.001 M $CaCl_2$, SSR: 1/10	-	-	**2388**[a]	-	-
				C_{DGT}	-	-	2770[a]	-	-
		Plant mean		**0.01 M $Sr(NO_3)_2$, SSR: 1/4**	**62**	-	-	-	-
				Mehlich 3, SSR: NA	**95**	-	-	-	-
				C_{DGT}	-	-	**3590**	-	-
Invertebrates: Worms									
Spurgeon and Hopkin (1995)	*Eisenia fetida*	CQ	21	Water, SSR: 1/13 to 1/17	**21**	-	-	-	-
Posthuma and Notenboom (1996)	*Eisenia andrei*	CQ	21	0.01 M $CaCl_2$, SSR: 1/10	183	-	-	-	-
				Pore water	-	-	41,000	-	-
	Enchytraeus crypticus	JQ	28	0.01 M $CaCl_2$, SSR: 1/10	6.8	-		-	-
				Pore water	-	-	1270	-	-
		Worm mean		**0.01 M $CaCl_2$, SSR: 1/10**	**95**	-	-	-	-
				Pore water	-	-	**21,135**	-	-
Microorganisms									
Lessard et al. (2014b)	Native microbes	EA	<1	0.01 M KNO_3, SSR: 1/2	-	-	5254	-	-
				ASV: 0.01 M KNO_3, SSR: 1/2	-	-	4740	-	-
		ES	1	0.01 M KNO_3, SSR: 1/2	-	-	10,808	-	-
				ASV: 0.01 M KNO_3, SSR: 1/2	-	-	14,221	-	-
		Mean		0.01 M KNO_3, SSR: 1/2	-	-	**8031**	-	-
				ASV: 0.01 M KNO_3, SSR: 1/2	-	-	9481	-	-
Lessard et al. (2014a)	Native microbes	AS	11	ASV: 0.01 M KNO_3, SSR: 1/2	-	-	455	-	-
		PS	11	ASV: 0.01 M KNO_3, SSR: 1/2	-	-	359	-	-
		US	11	ASV: 0.01 M KNO_3, SSR: 1/2	-	-	387	-	-
		Mean			-	-	400	-	-
		Microbe mean		**ASV: 0.01 M KNO_3, SSR: 1/2**	-	-	**4940**	-	-

ASV: measured by square wave anodic stripping voltammetry; C_{DGT}: Diffusive gradients in thin films measured concentration. EP: endpoint; NA: not available; NAP: not applicable (field observations); TD: test duration (days); SSR: soil/solution ratio. AS: arylsulfatase stability; CQ: cocoon quantity; EA: enzymatic activity of arylsulfatase, β-glucosidase, invertase, phosphatase, protease and urease; ES: enzymatic stability of arylsulfatase, β-glucosidase, invertase, phosphatase, protease and urease; JQ: juvenile quantity; L FW: leaf fresh weight; PC: plant cover; PS: protease stability; R FW: root fresh weight; SD: seedling density; SH DW: shoot dry weigh; SH FW: shoot fresh weight; SR: species richness; US: urease stability.

[a] Mean value for several soils. [b] EC_{90} instead of EC_{50}.

Lessard et al. (2014a): various Canadian field-collected soils. The study demonstrates the impact of a single pollutant on biological responses.

Lessard et al. (2014b): various Canadian various field-collected soils with pH 3.3-7.1, CEC 15-247 $cmol_+ kg^{-1}$, and 1.6-70.3% organic matter. The study demonstrates the impact of a single pollutant on biological responses.

Nolan et al. (2005): various Australian and United States field-collected soils, with pH 3.6-8.1 and 0.2-20% of organic matter. The study, however, does not demonstrate the impact of a single pollutant on biological responses.