

Supplementary materials

Table S1. Korean resident species and their representative toxicity values in SSD for Cd.

Species Scientific Name	Species Group	Duration (days)	Effect	Toxicity Value ($\mu\text{g/L}$) *
<i>Oncorhynchus mykiss</i>	Fish	4	Mortality	3.93
<i>Oncorhynchus kisutch</i>	Fish	4	Mortality	10.81
<i>Daphnia pulex</i>	Crustaceans	2	Mortality	29.45
<i>Moina macrocopa</i>	Crustaceans	3	Mortality	33.95
<i>Neocaridina denticulata</i>	Crustaceans	4	Mortality	56.72
<i>Ceriodaphnia reticulata</i>	Crustaceans	2	Intoxication	58.43
<i>Ceriodaphnia dubia</i>	Crustaceans	2	Intoxication	59.87
<i>Halteria grandinella</i>	Invertebrates	1	Mortality	68.00
<i>Simocephalus serrulatus</i>	Crustaceans	2	Mortality	100.37
<i>Simocephalus vetulus</i>	Crustaceans	2	Mortality	132.16
<i>Nais elinguis</i>	Worms	4	Mortality	142.35
<i>Hydra vulgaris</i>	Invertebrates	4	Mortality	191.45
<i>Daphnia obtusa</i>	Crustaceans	2	Intoxication	236.53
<i>Diaphanosoma brachyurum</i>	Crustaceans	1	Mortality	245.91
<i>Lecane hamata</i>	Invertebrates	2	Mortality	254.99
<i>Lumbriculus variegatus</i>	Worms	4	Mortality	275.08
<i>Dexiotricha granulosa</i>	Invertebrates	1	Mortality	291.44
<i>Lecane quadridentata</i>	Invertebrates	2	Mortality	310.42
<i>Chironomus javanus</i>	Insects	4	Mortality	337.94
<i>Lecane luna</i>	Invertebrates	2	Mortality	388.03
<i>Glossiphonia complanata</i>	Worms	4	Mortality	392.58
<i>Semisulcospira forticosta</i>	Mollusks	4	Mortality	458.87
<i>Alona affinis</i>	Crustaceans	2	Intoxication	501.83
<i>Euplotes aediculatus</i>	Invertebrates	1	Mortality	573.17
<i>Semisulcospira gottschei</i>	Mollusks	4	Mortality	611.83
<i>Oryzias latipes</i>	Fish	3	Mortality	621.08
<i>Semisulcospira coreana</i>	Mollusks	4	Mortality	633.68
<i>Moinodaphnia macleayi</i>	Crustaceans	2	Mortality	697.86
<i>Colpidium colpoda</i>	Invertebrates	1	Mortality	864.62
<i>Brachionus rubens</i>	Invertebrates	1	Mortality	898.00
<i>Brachionus calyciflorus</i>	Invertebrates	1	Mortality	1369.59
<i>Carassius auratus</i>	Fish	4	Mortality	1656.07
<i>Limnodrilus hoffmeisteri</i>	Worms	4	Mortality	3014.78
<i>Tubifex tubifex</i>	Worms	4	Mortality	3059.62
<i>Chydorus sphaericus</i>	Crustaceans	2	Intoxication	3098.66
<i>Spirostomum ambiguum</i>	Invertebrates	1	Mortality	3310.14
<i>Heterocypris incongruens</i>	Crustaceans	1	Mortality	6396.96
<i>Gammarus sobaegensis</i>	Crustaceans	4	Mortality	6454.59
<i>Stylodrilus heringianus</i>	Worms	4	Mortality	9753.69
<i>Branchiura sowerbyi</i>	Worms	4	Mortality	11628.68
<i>Lepomis macrochirus</i>	Fish	4	Mortality	12977.73
<i>Chlorella vulgaris</i>	Algae	4	Growth	14373.36
<i>Cyprinus carpio</i>	Fish	4	Mortality	14521.14
<i>Chironomus plumosus</i>	Insects	4	Mortality	15800.43
<i>Oreochromis niloticus</i>	Fish	4	Mortality	18608.44
<i>Chironomus tentans</i>	Insects	2	Intoxication	31271.77
<i>Daphnia galeata</i>	Crustaceans	2	Mortality	74303.11
<i>Chironomus yoshimatsui</i>	Insects	4	Mortality	149249.96

* Geometric mean of the species toxicity value by adjusting hardness at 100 mg/L as CaCO₃.

Table S2. Korean resident species and their representative toxicity values in SSD for Cu.

Species	Scientific Name	Species Group	Duration (days)	Effect	Toxicity Value ($\mu\text{g/L}$) *
	<i>Bosmina longirostris</i>	Crustaceans	2	Mortality	3.89
	<i>Daphnia obtusa</i>	Crustaceans	2	Intoxication	7.17
	<i>Moina macrocopa</i>	Crustaceans	2	Mortality	7.99
	<i>Daphnia longispina</i>	Crustaceans	2	Intoxication	8.58
	<i>Chydorus sphaericus</i>	Crustaceans	2	Mortality	9.17
	<i>Ceratophyllum demersum</i>	Higher Plants	4	Growth	9.47
	<i>Euplotes aediculatus</i>	Invertebrates	1	Mortality	9.73
	<i>Halteria grandinella</i>	Invertebrates	1	Mortality	9.73
	<i>Ceriodaphnia cornuta</i>	Crustaceans	1	Intoxication	11.14
	<i>Daphnia galeata</i>	Crustaceans	2	Mortality	11.39
	<i>Ceriodaphnia reticulata</i>	Crustaceans	2	Intoxication	11.42
	<i>Ceriodaphnia dubia</i>	Crustaceans	2	Intoxication	14.12
	<i>Ceriodaphnia pulchella</i>	Crustaceans	2	Intoxication	15.19
	<i>Simocephalus vetulus</i>	Crustaceans	2	Intoxication	18.08
	<i>Ceriodaphnia quadrangula</i>	Crustaceans	2	Intoxication	19.00
	<i>Scapholeberis mucronata</i>	Crustaceans	2	Intoxication	19.40
	<i>Brachionus rubens</i>	Invertebrates	1	Mortality	20.98
	<i>Eurycercus lamellatus</i>	Crustaceans	2	Intoxication	21.12
	<i>Daphnia pulex</i>	Crustaceans	2	Intoxication	23.04
	<i>Branchinella kugenumaensis</i>	Crustaceans	1	Mortality	23.66
	<i>Diaphanosoma brachyurum</i>	Crustaceans	1	Mortality	23.88
	<i>Hydra vulgaris</i>	Invertebrates	4	Mortality	24.39
	<i>Alona quadrangularis</i>	Crustaceans	2	Intoxication	26.52
	<i>Brachionus calyciflorus</i>	Invertebrates	1	Mortality	30.25
	<i>Nais elinguis</i>	Worms	4	Mortality	34.67
	<i>Simocephalus exspinosus</i>	Crustaceans	2	Intoxication	34.71
	<i>Oncorhynchus mykiss</i>	Fish	4	Mortality	35.27
	<i>Spirostomum ambiguum</i>	Invertebrates	1	Mortality	38.03
	<i>Colpidium colpoda</i>	Invertebrates	1	Mortality	48.63
	<i>Lecane luna</i>	Invertebrates	2	Mortality	66.26
	<i>Tubifex tubifex</i>	Worms	4	Intoxication	67.92
	<i>Oncorhynchus kisutch</i>	Fish	4	Mortality	69.94
	<i>Mesocyclops pehpeiensis</i>	Crustaceans	2	Mortality	82.83
	<i>Heterocypris incongruens</i>	Crustaceans	1	Mortality	99.76
	<i>Chydorus ovalis</i>	Crustaceans	2	Intoxication	101.93
	<i>Disparalona rostrata</i>	Crustaceans	2	Intoxication	104.81
	<i>Lumbriculus variegatus</i>	Worms	4	Mortality	121.27
	<i>Moinodaphnia macleayi</i>	Crustaceans	2	Mortality	149.91
	<i>Dexiotricha granulosa</i>	Invertebrates	1	Mortality	165.33
	<i>Chironomus tentans</i>	Insects	4	Intoxication	167.29
	<i>Aphelenchus avenae</i>	Worms	4	Mortality	220.23
	<i>Chlorella vulgaris</i>	Algae	4	Population	233.09
	<i>Chironomus plumosus</i>	Insects	4	Mortality	246.80
	<i>Lecane hamata</i>	Invertebrates	2	Mortality	254.00
	<i>Gasterosteus aculeatus</i>	Fish	4	Mortality	257.77
	<i>Hydrilla verticillata</i>	Higher Plants	4	Growth	316.72
	<i>Cyprinus carpio</i>	Fish	2	Mortality	328.19
	<i>Lecane quadridentata</i>	Invertebrates	2	Mortality	364.44
	<i>Carassius auratus</i>	Fish	1	Mortality	464.08
	<i>Oryzias latipes</i>	Fish	4	Mortality	493.50
	<i>Chironomus javanus</i>	Insects	4	Mortality	897.41
	<i>Pungtungia herzi</i>	Fish	4	Mortality	1399.32
	<i>Scenedesmus subspicatus</i>	Algae	3	Population	1601.07
	<i>Lepomis macrochirus</i>	Fish	4	Mortality	2307.71
	<i>Anguilla japonica</i>	Fish	4	Mortality	9279.40

* Geometric mean of the species toxicity value by adjusting hardness at 100 mg/L as CaCO₃

Table S3. Korean resident species and their representative toxicity values in SSD for Pb.

Species Scientific Name	Species Group	Duration (days)	Effect	Toxicity Value (µg/L) *
<i>Tubifex tubifex</i>	Worms	4	Intoxication	13.42
<i>Ceriodaphnia dubia</i>	Crustaceans	2	Mortality	109.54
<i>Dexiotricha granulosa</i>	Invertebrates	1	Mortality	115.57
<i>Halteria grandinella</i>	Invertebrates	1	Mortality	115.57
<i>Lecane luna</i>	Invertebrates	2	Mortality	160.09
<i>Colpidium colpoda</i>	Invertebrates	1	Mortality	221.51
<i>Branchinella kugenumaensis</i>	Crustaceans	1	Mortality	284.05
<i>Euplotes aediculatus</i>	Invertebrates	1	Mortality	481.54
<i>Ceriodaphnia reticulata</i>	Crustaceans	2	Intoxication	616.15
<i>Daphnia pulex</i>	Crustaceans	2	Intoxication	657.16
<i>Oncorhynchus mykiss</i>	Fish	4	Mortality	733.38
<i>Daphnia galeata</i>	Crustaceans	2	Mortality	769.38
<i>Lecane hamata</i>	Invertebrates	2	Mortality	777.60
<i>Oryzias latipes</i>	Fish	4	Mortality	805.89
<i>Gammarus sobaegensis</i>	Crustaceans	4	Mortality	2579.63
<i>Aphelenchus avenae</i>	Worms	4	Mortality	3257.57
<i>Lecane quadridentata</i>	Invertebrates	2	Mortality	4231.08
<i>Nais elinguis</i>	Worms	4	Mortality	5186.27
<i>Chironomus javanus</i>	Insects	4	Mortality	7645.80
<i>Oncorhynchus kisutch</i>	Fish	4	Mortality	24441.59
<i>Chironomus tentans</i>	Insects	4	Mortality	75372.08
<i>Carassius auratus</i>	Fish	4	Mortality	90094.17
<i>Oreochromis niloticus</i>	Fish	4	Mortality	91553.65
<i>Pungtungia herzi</i>	Fish	4	Mortality	95052.18
<i>Spirostomum ambiguum</i>	Invertebrates	2	Mortality	253092.39
<i>Chironomus yoshimatsui</i>	Insects	4	Mortality	1096542.16

* Geometric mean of the species toxicity value by adjusting hardness at 100 mg/L as CaCO₃

Table S4. Korean resident species and their representative toxicity values in SSD for Zn.

Species Scientific Name	Species Group	Duration (days)	Effect	Toxicity Value (µg/L) *
<i>Ceriodaphnia dubia</i>	Crustaceans	2	Mortality	126.82
<i>Lecane quadridentata</i>	Invertebrates	2	Mortality	134.59
<i>Diaphanosoma brachyurum</i>	Crustaceans	2	Mortality	244.13
<i>Mesocyclops pehpeiensis</i>	Crustaceans	2	Mortality	262.41
<i>Daphnia longispina</i>	Crustaceans	2	Intoxication	377.58
<i>Ceriodaphnia reticulata</i>	Crustaceans	2	Intoxication	440.78
<i>Simocephalus vetulus</i>	Crustaceans	2	Intoxication	441.94
<i>Daphnia galeata</i>	Crustaceans	2	Intoxication	470.89
<i>Oncorhynchus mykiss</i>	Fish	4	Mortality	531.04
<i>Simocephalus exspinosus</i>	Crustaceans	2	Intoxication	550.64
<i>Daphnia pulex</i>	Crustaceans	2	Mortality	594.01
<i>Chydorus ovalis</i>	Crustaceans	2	Intoxication	765.37
<i>Ceriodaphnia pulchella</i>	Crustaceans	2	Intoxication	794.95
<i>Chydorus sphaericus</i>	Crustaceans	2	Intoxication	1318.30
<i>Brachionus calyciflorus</i>	Invertebrates	1	Mortality	1541.07
<i>Moina macrocopa</i>	Crustaceans	2	Mortality	1742.33
<i>Gasterosteus aculeatus</i>	Fish	4	Mortality	2077.55
<i>Oncorhynchus kisutch</i>	Fish	4	Mortality	2227.24
<i>Lepomis macrochirus</i>	Fish	4	Mortality	2361.85
<i>Oryzias latipes</i>	Fish	4	Mortality	2704.37
<i>Tubifex tubifex</i>	Worms	4	Mortality	3587.31
<i>Nais elinguis</i>	Worms	4	Mortality	3919.75

<i>Hydra vulgaris</i>	Invertebrates	4	Mortality	7376.30
<i>Spirostomum ambiguum</i>	Invertebrates	2	Mortality	8564.92
<i>Cyprinus carpio</i>	Fish	4	Mortality	12742.85
<i>Aphelenchus avenae</i>	Worms	4	Mortality	15146.84
<i>Lumbriculus variegatus</i>	Worms	4	Mortality	25621.57
<i>Chironomus tentans</i>	Insects	2	Intoxication	26542.34
<i>Chironomus javanus</i>	Insects	4	Mortality	26841.93
<i>Chironomus plumosus</i>	Insects	4	Mortality	39384.87

* Geometric mean of the species toxicity value by adjusting hardness at 100 mg/L as CaCO₃