

Table S1 Research sites—the Nysa Szalona River and its tributaries above the Stup dam reservoir

| | Site | Geographical Coordinates | |
|----|---|--------------------------|-------------------|
| 1 | The Nysa Szalona river below the springs in Domanów | N50° 51' 38.8261" | E16° 3' 54.4715" |
| 2 | Kocik | N50° 52' 15.4891" | E16° 4' 5.9042" |
| 3 | Ochodnik | N50° 53' 37.1718" | E16° 5' 59.7672" |
| 4 | Sadówka | N50° 55' 58.609" | E16° 10' 11.3627" |
| 5 | Czyściel | N50° 57' 49.4252" | E16° 13' 57.6982" |
| 6 | Radynia | N50° 58' 56.648" | E16° 14' 13.9202" |
| 7 | Nysa Mała | N51° 0' 10.455" | E16° 12' 26.0825" |
| 8 | Puszówka | N51° 2' 30.3945" | E16° 11' 39.425" |
| 9 | Jawornik | N51° 2' 57.6884" | E16° 10' 52.4584" |
| 10 | Księginka | N51° 3' 17.4033" | E16° 10' 11.2082" |
| 11 | Starucha | N51° 4' 31.7745" | E16° 9' 17.7528" |
| 12 | Rowiec | N51° 4' 22.844" | E16° 8' 27.5419" |
| 13 | Męcinka | N51° 4' 29.2507" | E16° 7' 28.5247" |
| 14 | Nysa Szalona mouth to the Stup reservoir | N51° 4' 29.2507" | E16° 7' 28.5247" |

Table S2 Research sites—the Strzegomka River and its tributaries above the Dobromierz dam reservoir

| | Site | Geographical Coordinates | |
|---|--|--------------------------|-------------------|
| 1 | The Strzegomka River below the springs in Nowe Bogaczowice | N50° 50' 14.5978" | E16° 7' 49.845" |
| 2 | Polska Woda | N50° 52' 48.0601" | E16° 11' 56.4194" |
| 3 | Sikorka | N50° 51' 47.2613" | E16° 13' 21.3918" |
| 4 | Czyżynka | N50° 52' 15.8303" | E16° 14' 29.8332" |
| 5 | Strzegomka mouth to the Dobromierz reservoir | N50° 53' 11.1994" | E16° 13' 58.4707" |

Table S3 Research sites—the Bystrzyca River and its tributaries above the Lubachów dam reservoir

| | Site | Geographical Coordinates | |
|---|---|--------------------------|-------------------|
| 1 | The Bystrzyca River below the springs in Wrześnik | N50° 38' 10.1652" | E16° 24' 5.7915" |
| 2 | Złoty Potok | N50° 38' 29.3697" | E16° 24' 41.0163" |
| 3 | Kłobia | N50° 40' 9.374" | E16° 23' 27.0131" |
| 4 | Otluczyna | N50° 40' 36.2015" | E16° 22' 46.8444" |
| 5 | Potok Marcowy Duży | N50° 41' 5.2762" | E16° 22' 32.3218" |
| 6 | Złota Woda | N50° 41' 4.2973" | E16° 22' 11.0015" |
| 7 | Rybna | N50° 41' 49.8085" | E16° 21' 58.1784" |
| 8 | Jaworzynik | N50° 43' 25.8799" | E16° 23' 56.5218" |
| 9 | Walimianka | N50° 43' 49.9381" | E16° 24' 15.0612" |

| | | | |
|----|---|------------------|------------------|
| 10 | Bystrzyca mouth to the Lubachów reservoir | N50° 45' 5.8065" | E16° 25' 1.4097" |
|----|---|------------------|------------------|

Table S4 Lithological separation for research rivers

| Main river | Tributary | Lithological separation |
|----------------------|---------------------|---|
| Nysa Szalona springs | | greenschist and greenschist shale grey shale gray shales with insets of Tarczyn quartzites |
| | Ochodnik | lower grey siltstone with inserts of greywacke and conglomerate in the bottom of volcanic rocks |
| Strzegomka | | polymictic conglomerates, culm from Stare Bogaczowice (Middle Sudetic Trough) |
| | Polska Woda | greywacke and undivided siltstone (Świebodzice Depression) peaked shale, Cieszow unit siltstone (Świebodzice Depression) sandstones, conglomerates and clays with streaks of hard coal (Świebodzice Depression) spilites, Cieszow unit |
| | Sikorka | greywacke and undivided siltstone (Świebodzice Depression) peaked shale, Cieszow unit siltstone (Świebodzice Depression) sandstones, conglomerates and clays with streaks of hard coal (Świebodzice Depression) spilites, Cieszow unit |
| | | sandstones with conglomerate shoals together with inserts of clay shale and tuffite in the roof (building sandstones) |
| Bystrzyca springs | Złoty Potok | quartzite conglomerates with inserts of lidite conglomerates in the floor sandstones with conglomerate shoals with inserts of clay shales and tuffites in the ceiling (building sandstones) vitroclastic tuffs, rhyolite, volcanic formation of the Stone Mountains |
| | Kłobia and Ołuczyna | arkose conglomerates, strip and clay shales, layers from Ottweiler |
| | Potok Marcowy Duży | biotite gneisses and migmatitic gneisses migmatites and stratified (streambed) gneisses |
| | Złota Woda | claystones and siltstones with inserts of fine-grained sandstones, locally bituminous, thin-laminated claystones, Zagórzyn sandstone cell, Slupca formation sandstones, subordinate conglomerates and claystones and siltstones, partly tuffogenic with carbonate concretions, Krajanow sandstone cell, formation from Świerki |
| | | |

| | | |
|--|------------|---|
| Bystrzyca estuary to the reservoir | | conglomerates and sandstones, Ludwikowice conglomerate link, formation from Świerki sandstones, siltstones and claystones, subordinate conglomerate inserts - sandstone and siltstone cell from Grzmiąca, Glinik formation migmatites and stratified gneisses (streambed) |
| | Rybna | sandstones, subordinate conglomerates and claystones and siltstones, partly tuffogenic with carbonate concretions, Krajanow sandstone cell, formation from Świerki lithic tuffs, rhyolites, tuffites and pyroclastic breccias, volcanic formation of the Stone Mountains rhyolites and felsite rhyodacites, volcanic formation of the Stone Mountains |
| | Jaworzynik | gneiss conglomerates and sandstones, sedimentary series of the Sowie Mountains biotite-plagioclase gneisses, fine-bedded, partially migmatized |
| | Walimianka | biotite-plagioclase gneisses, fine-bedded, partially migmatized gneiss conglomerates and sandstones, sedimentary series of the Sowie Mountains migmatites and stratified gneisses (streaky) |
| | | biotite gneisses and migmatitic gneisses |

Table S5 Aluminum release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

| time | Strzegomka | | | Nysa Szalona | | | Bystrzyca | | |
|------|--|--|--|--|--|--|--|--|--|
| | environment | | | | | | | | |
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | min-max $\bar{x} \pm SD$ | | | | | | | | |
| 0' | 0.0012-0.0014 0.0012±0.0001 | | | | | | | | |
| 15' | 0.0766- 0.0769 0.0768±0 .0001 | 0.0345- 0.0348 0.0346±0 .0001 | 0.0293- 0.0295 0.0294±0 .0001 | 0.0811- 0.0813 0.0812±0 .0001 | 0.0714- 0.0720 0.0718±0 .0003 | 0.0215- 0.0217 0.0216±0 .0001 | 0.0681- 0.0685 0.0683±0 .0002 | 0.0375- 0.0378 0.0377±0 .0001 | 0.0361- 0.0363 0.0362±0 .0001 |
| 30' | 0.0791- 0.0794 0.0792±0 .0001 | 0.0403- 0.0407 0.0405±0 .0002 | 0.0296- 0.0299 0.0298±0 .0001 | 0.0891- 0.0893 0.0892±0 .0001 | 0.0725- 0.0728 0.0726±0 .0001 | 0.0216- 0.0218 0.0217±0 .0001 | 0.0691- 0.0696 0.0694±0 .0002 | 0.0443- 0.0446 0.0445±0 .0001 | 0.0226- 0.0228 0.0227±0 .0001 |
| 3h | 0.0772- 0.0775 0.0774±0 .0001 | 0.0435- 0.0438 0.0437±0 .0001 | 0.0300- 0.0305 0.0302±0 .0002 | 0.0832- 0.0834 0.0833±0 .0001 | 0.0835- 0.0837 0.0836±0 .0001 | 0.0304- 0.0306 0.0305±0 .0001 | 0.0641- 0.0644 0.0643±0 .0001 | 0.0655- 0.0658 0.0657±0 .0001 | 0.0138- 0.0140 0.0139±0 .0001 |

| | | | | | | | | | |
|----|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 12 | 0.0435- | 0.0319- | 0.0305- | 0.0762- | 0.0817- | 0.0213- | 0.0415- | 0.0602- | 0.0322- |
| h | 0.0436 | 0.0321 | 0.0309 | 0.0765 | 0.0820 | 0.0215 | 0.0419 | 0.0604 | 0.0325 |
| | 0.0435±0 | 0.0320±0 | 0.0307±0 | 0.0764±0 | 0.0818±0 | 0.0214±0 | 0.0417±0 | 0.0603±0 | 0.0323±0 |
| | .0001 | .0001 | .0002 | .0001 | .0001 | .0001 | .0002 | .0001 | .0001 |
| 24 | 0.0411- | 0.0281- | 0.0315- | 0.0593- | 0.0685- | 0.0206- | 0.0431- | 0.0584- | 0.0395- |
| h | 0.0413 | 0.0290 | 0.0319 | 0.0597 | 0.0688 | 0.0209 | 0.0435 | 0.0588 | 0.0398 |
| | 0.0412±0 | 0.0287±0 | 0.0317±0 | 0.0595±0 | 0.0687±0 | 0.0208±0 | 0.0433±0 | 0.0586±0 | 0.0397±0 |
| | .0001 | .0004 | .0002 | .0002 | .0001 | .0001 | .0002 | .0002 | .0001 |
| 48 | 0.0381- | 0.0231- | 0.0303- | 0.0587- | 0.0583- | 0.0180- | 0.0345- | 0.0404- | 0.0403- |
| h | 0.0384 | 0.0233 | 0.0305 | 0.0590 | 0.0586 | 0.0182 | 0.0348 | 0.0407 | 0.0409 |
| | 0.0382±0 | 0.0232±0 | 0.0304±0 | 0.0589±0 | 0.0585±0 | 0.0181±0 | 0.0347±0 | 0.0406±0 | 0.0407±0 |
| | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0003 |
| 96 | 0.0437- | 0.0296- | 0.0295- | 0.0591- | 0.0664- | 0.0095- | 0.0593- | 0.0481- | 0.0431- |
| h | 0.0440 | 0.0299 | 0.0298 | 0.0596 | 0.0668 | 0.0098 | 0.0596 | 0.0483 | 0.0433 |
| | 0.0439±0 | 0.0298±0 | 0.0296±0 | 0.0594±0 | 0.0666±0 | 0.0097±0 | 0.0595±0 | 0.0482±0 | 0.0432±0 |
| | .0001 | .0001 | .0001 | .0002 | .0002 | .0001 | .0001 | .0001 | .0001 |

Table S6 Copper release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

| time | Strzegomka | | | Nysa Szalona | | | Bystrzyca | | |
|------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| | environment | | | | | | | | |
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | min-max | | | | | | | | |
| | $\bar{x}\pm SD$ | | | | | | | | |
| 0' | 0.0001-0.0003 0.0002±0.0001 | | | | | | | | |
| 15' | 0.0092-0.0094 0.0093±0.0001 | 0.0063-0.0066 0.0065±0.0001 | 0.0060-0.0062 0.0061±0.0001 | 0.0106-0.0108 0.0107±0.0001 | 0.0053-0.0055 0.0054±0.0001 | 0.0084-0.0086 0.0085±0.0001 | 0.0111-0.0113 0.0112±0.0001 | 0.0061-0.0063 0.0062±0.0001 | 0.0092-0.0095 0.0093±0.0001 |
| 30' | 0.0102-0.0104 0.0103±0.0001 | 0.0066-0.0069 0.0068±0.0001 | 0.0073-0.0075 0.0074±0.0001 | 0.0107-0.0109 0.0108±0.0001 | 0.0066-0.0068 0.0067±0.0001 | 0.0094-0.0096 0.0095±0.0001 | 0.0106-0.0108 0.0107±0.0001 | 0.0070-0.0074 0.0072±0.0002 | 0.0090-0.0092 0.0091±0.0001 |
| 3h | 0.0092-0.0094 0.0093±0.0001 | 0.0070-0.0072 0.0071±0.0001 | 0.0086-0.0088 0.0087±0.0001 | 0.0090-0.0092 0.0091±0.0001 | 0.0071-0.0073 0.0072±0.0001 | 0.0090-0.0093 0.0091±0.0001 | 0.0095-0.0097 0.0096±0.0001 | 0.0074-0.0077 0.0075±0.0001 | 0.0083-0.0085 0.0084±0.0001 |
| 12h | 0.0087-0.0089 0.0088±0.0001 | 0.0075-0.0078 0.0076±0.0001 | 0.0122-0.0124 0.0123±0.0001 | 0.0058-0.0060 0.0059±0.0001 | 0.0076-0.0078 0.0077±0.0001 | 0.0124-0.0126 0.0125±0.0001 | 0.0061-0.0063 0.0062±0.0001 | 0.0104-0.0107 0.0106±0.0001 | 0.0134-0.0136 0.0135±0.0001 |
| 24h | 0.0078-0.0081 0.0079±0.0001 | 0.0078-0.0080 0.0079±0.0001 | 0.0124-0.0126 0.0125±0.0001 | 0.0063-0.0066 0.0065±0.0001 | 0.0078-0.0080 0.0079±0.0001 | 0.0104-0.0106 0.0105±0.0001 | 0.0070-0.0073 0.0071±0.0001 | 0.0089-0.0092 0.0091±0.0001 | 0.0137-0.0139 0.0138±0.0001 |
| 48h | 0.0074-0.0076 | 0.0080-0.0082 | 0.0125-0.0127 | 0.0051-0.0055 | 0.0073-0.0075 | 0.0114-0.0116 | 0.0064-0.0066 | 0.0082-0.0088 | 0.0111-0.0116 |

| | | | | | | | | | |
|----|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 0.0075±0 .0001 | 0.0081±0 .0001 | 0.0126±0 .0001 | 0.0053±0 .0002 | 0.0074±0 .0001 | 0.0115±0 .0001 | 0.0065±0 .0001 | 0.0086±0 .0003 | 0.0114±0 .0002 |
| 96 | 0.0070- 0.0072 | 0.0095- 0.0098 | 0.0125- 0.0127 | 0.0046- 0.0049 | 0.0090- 0.0092 | 0.0101- 0.0103 | 0.0056- 0.0059 | 0.0082- 0.0089 | 0.0108- 0.0111 |
| h | 0.0071±0 .0001 | 0.0097±0 .0001 | 0.0126±0 .0001 | 0.0048±0 .0001 | 0.0091±0 .0001 | 0.0102±0 .0001 | 0.0058±0 .0001 | 0.0086±0 .0003 | 0.0109±0 .0001 |

Table S7 Manganese release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

| time | Strzegomka | | | Nysa Szalona | | | Bystrzyca | | |
|------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| | environment | | | | | | | | |
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | min-max | | | | | | | | |
| | $\bar{x}\pm SD$ | | | | | | | | |
| 0' | 0.0007-0.0009 0.0008±0.0001 | | | | | | | | |
| 15' | 0.0953-0.0956 0.0955±0.0001 | 0.0165-0.0168 0.0167±0.0001 | 0.0040-0.0042 0.0041±0.0001 | 0.1321-0.1324 0.1322±0.0001 | 0.0103-0.0107 0.0105±0.0002 | 0.0092-0.0095 0.0094±0.0001 | 0.1135-0.1138 0.1137±0.0001 | 0.0332-0.0336 0.0334±0.0002 | 0.0108-0.0111 0.0109±0.0001 |
| 30' | 0.0620-0.0623 0.0621±0.0001 | 0.0191-0.0193 0.0192±0.0001 | 0.0042-0.0044 0.0043±0.0001 | 0.1172-0.1176 0.1174±0.0002 | 0.0106-0.0109 0.0108±0.0001 | 0.0091-0.0094 0.0093±0.0001 | 0.0752-0.0754 0.0753±0.0001 | 0.0305-0.0307 0.0306±0.0001 | 0.0092-0.0096 0.0094±0.0002 |
| 3h | 0.1367-0.1369 0.1368±0.0001 | 0.0193-0.0195 0.0194±0.0001 | 0.0091-0.0093 0.0092±0.0001 | 0.1223-0.1225 0.1224±0.0001 | 0.0123-0.0126 0.0124±0.0001 | 0.0114-0.0118 0.0116±0.0002 | 0.1112-0.1115 0.1114±0.0001 | 0.0325-0.0327 0.0326±0.0001 | 0.0104-0.0106 0.0105±0.0001 |
| 12h | 0.1914-0.1916 0.1915±0.0001 | 0.0251-0.0254 0.0252±0.0001 | 0.0094-0.0096 0.0095±0.0001 | 0.2564-0.2569 0.2567±0.0002 | 0.0305-0.0308 0.0307±0.0001 | 0.0083-0.0086 0.0085±0.0001 | 0.2963-0.2967 0.2965±0.0002 | 0.0715-0.0719 0.0717±0.0002 | 0.0092-0.0094 0.0093±0.0001 |
| 24h | 0.2133-0.2135 0.2134±0.0001 | 0.0366-0.0368 0.0367±0.0001 | 0.0093-0.0097 0.0095±0.0002 | 0.3315-0.3318 0.3317±0.0001 | 0.0264-0.0267 0.0266±0.0001 | 0.0087-0.0089 0.0088±0.0001 | 0.3330-0.3334 0.3332±0.0002 | 0.0688-0.0691 0.0689±0.0001 | 0.0155-0.0157 0.0156±0.0001 |
| 48h | 0.2356-0.2358 0.2357±0.0001 | 0.0682-0.0685 0.0684±0.0001 | 0.0095-0.0098 0.0097±0.0001 | 0.2812-0.2814 0.2813±0.0001 | 0.0250-0.0252 0.0251±0.0001 | 0.0101-0.0106 0.0104±0.0002 | 0.4414-0.4419 0.4417±0.0002 | 0.0622-0.0629 0.0626±0.0003 | 0.0151-0.0155 0.0153±0.0002 |
| 96h | 0.4844-0.4846 0.4845±0.0001 | 0.0675-0.0677 0.0676±0.0001 | 0.0112-0.0115 0.0114±0.0001 | 0.5414-0.5419 0.5417±0.0002 | 0.0236-0.0238 0.0237±0.0001 | 0.0120-0.0122 0.0121±0.0001 | 0.4212-0.4216 0.4214±0.0002 | 0.1100-0.1109 0.1106±0.0004 | 0.0193-0.0197 0.0195±0.0002 |

Table S8 Iron release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

| Strzegomka | Nysa Szalona | Bystrzyca |
|------------|--------------|-----------|
|------------|--------------|-----------|

| ti m e | environment | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|--|
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | min-max | | | | | | | | |
| | $\bar{x}\pm SD$ | | | | | | | | |
| 0' | 0.0132-0.0134 0.0133±0.0001 | | | | | | | | |
| 15' | 0.0360- 0.0363 0.0361±0 .0001 | 0.0415- 0.0419 0.0417±0 .0002 | 0.0274- 0.0277 0.0276±0 .0001 | 0.0565- 0.0568 0.0567±0 .0001 | 0.0462- 0.0464 0.0463±0 .0001 | 0.0532- 0.0536 0.0534±0 .0002 | 0.0323- 0.0328 0.0326±0 .0002 | 0.0325- 0.0328 0.0327±0 .0001 | 0.0364- 0.0366 0.0365±0 .0001 |
| 30' | 0.0464- 0.0466 0.0465±0 .0001 | 0.0400- 0.0403 0.0402±0 .0001 | 0.0303- 0.0306 0.0304±0 .0001 | 0.0861- 0.0865 0.0863±0 .0002 | 0.0452- 0.0456 0.0454±0 .0002 | 0.0454- 0.0459 0.0457±0 .0002 | 0.0302- 0.0305 0.0304±0 .0001 | 0.0358- 0.0360 0.0359±0 .0001 | 0.0361- 0.0363 0.0362±0 .0001 |
| 3 h | 0.0412- 0.0415 0.0413±0 .0001 | 0.0410- 0.0413 0.0411±0 .0001 | 0.0475- 0.0477 0.0476±0 .0001 | 0.0462- 0.0466 0.0464±0 .0002 | 0.0774- 0.0779 0.0777±0 .0002 | 0.0660- 0.0663 0.0661±0 .0001 | 0.0309- 0.0312 0.0311±0 .0001 | 0.0335- 0.0338 0.0337±0 .0001 | 0.0366- 0.0369 0.0368±0 .0001 |
| 12 h | 0.0207- 0.0211 0.0209±0 .0002 | 0.0261- 0.0264 0.0263±0 .0001 | 0.0291- 0.0294 0.0292±0 .0001 | 0.0201- 0.0203 0.0202±0 .0001 | 0.0565- 0.0568 0.0567±0 .0001 | 0.0492- 0.0494 0.0493±0 .0001 | 0.0277- 0.0279 0.0278±0 .0001 | 0.0389- 0.0392 0.0391±0 .0001 | 0.0280- 0.0288 0.0285±0 .0004 |
| 24 h | 0.0173- 0.0175 0.0174±0 .0001 | 0.0250- 0.0253 0.0251±0 .0001 | 0.0501- 0.0504 0.0503±0 .0001 | 0.0350- 0.0352 0.0351±0 .0001 | 0.0356- 0.0358 0.0357±0 .0001 | 0.0522- 0.0525 0.0524±0 .0001 | 0.0260- 0.0263 0.0262±0 .0001 | 0.0257- 0.0259 0.0258±0 .0001 | 0.0291- 0.0295 0.0293±0 .0002 |
| 48 h | 0.0213- 0.0216 0.0214±0 .0001 | 0.0151- 0.0153 0.0152±0 .0001 | 0.0277- 0.0279 0.0278±0 .0001 | 0.0146- 0.0148 0.0147±0 .0001 | 0.0276- 0.0278 0.0277±0 .0001 | 0.0441- 0.0443 0.0442±0 .0001 | 0.0175- 0.0177 0.0176±0 .0001 | 0.0218- 0.0221 0.0219±0 .0001 | 0.0242- 0.0244 0.0243±0 .0001 |
| 96 h | 0.0182- 0.0188 0.0186±0 .0003 | 0.0421- 0.0423 0.0422±0 .0001 | 0.0226- 0.0229 0.0228±0 .0001 | 0.0247- 0.0249 0.0248±0 .0001 | 0.0281- 0.0283 0.0282±0 .0001 | 0.0223- 0.0230 0.0227±0 .0003 | 0.0233- 0.0237 0.0235±0 .0002 | 0.0148- 0.0151 0.0149±0 .0001 | 0.0191- 0.0196 0.0194±0 .0002 |

Table S9 Nickel release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

| time | Strzegomka | | | Nysa Szalona | | | Bystrzyca | | |
|------|--|--|--|--|--|--|--|--|--|
| | environment | | | | | | | | |
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | min-max $\bar{x}\pm SD$ | | | | | | | | |
| 0' | 0.0001-0.0002 0.0001±0.0000 | | | | | | | | |
| 15' | 0.0152- 0.0156 0.0154±0 .0002 | 0.0001- 0.0003 0.0002±0 .0001 | 0.0001- 0.0002 0.0001±0 .0000 | 0.0063- 0.0065 0.0064±0 .0001 | 0.0001- 0.0002 0.0001±0 .0000 | 0.0131- 0.0134 0.0132±0 .0001 | 0.0059- 0.0061 0.0060±0 .0001 | 0.0013- 0.0015 0.0014±0 .0001 | 0.0135- 0.0138 0.0137±0 .0001 |
| 30' | 0.0147- 0.0149 | 0.0014- 0.0016 | 0.0031- 0.0033 | 0.0024- 0.0026 | 0.0001- 0.0002 | 0.0146- 0.0149 | 0.0054- 0.0058 | 0.0011- 0.0014 | 0.0126- 0.0128 |

| | | | | | | | | | |
|------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 0.0148±0 .0001 | 0.0015±0 .0001 | 0.0032±0 .0001 | 0.0025±0 .0001 | 0.0001±0 .0000 | 0.0147±0 .0001 | 0.0056±0 .0002 | 0.0012±0 .0001 | 0.0127±0 .0001 |
| 3 h | 0.0131- 0.0133 | 0.0001- 0.0003 | 0.0148- 0.0150 | 0.0074- 0.0076 | 0.0012- 0.0015 | 0.0145- 0.0147 | 0.0025- 0.0027 | 0.0002- 0.0004 | 0.0110- 0.0114 |
| | 0.0132±0 .0001 | 0.0002±0 .0001 | 0.0149±0 .0001 | 0.0075±0 .0001 | 0.0013±0 .0001 | 0.0146±0 .0001 | 0.0026±0 .0001 | 0.0003±0 .0001 | 0.0112±0 .0002 |
| 12 h | 0.0082- 0.0084 | 0.0020- 0.0023 | 0.0126- 0.0128 | 0.0062- 0.0064 | 0.0001- 0.0002 | 0.0141- 0.0144 | 0.0048- 0.0050 | 0.0001- 0.0002 | 0.0102- 0.0105 |
| | 0.0083±0 .0001 | 0.0021±0 .0001 | 0.0127±0 .0001 | 0.0063±0 .0001 | 0.0001±0 .0000 | 0.0142±0 .0001 | 0.0049±0 .0001 | 0.0001±0 .0000 | 0.0104±0 .0001 |
| 24 h | 0.0031- 0.0033 | 0.0030- 0.0032 | 0.0132- 0.0135 | 0.0058- 0.0060 | 0.0001- 0.0002 | 0.0121- 0.0123 | 0.0131- 0.0133 | 0.0001- 0.0002 | 0.0133- 0.0135 |
| | 0.0032±0 .0001 | 0.0031±0 .0001 | 0.0134±0 .0001 | 0.0059±0 .0001 | 0.0001±0 .0000 | 0.0122±0 .0001 | 0.0132±0 .0001 | 0.0001±0 .0000 | 0.0134±0 .0001 |
| 48 h | 0.0057- 0.0059 | 0.0046- 0.0048 | 0.0121- 0.0123 | 0.0032- 0.0035 | 0.0001- 0.0002 | 0.0130- 0.0132 | 0.0065- 0.0068 | 0.0028- 0.0030 | 0.0136- 0.0138 |
| | 0.0058±0 .0001 | 0.0047±0 .0001 | 0.0122±0 .0001 | 0.0033±0 .0001 | 0.0001±0 .0000 | 0.0131±0 .0001 | 0.0067±0 .0001 | 0.0029±0 .0001 | 0.0137±0 .0001 |
| 96 h | 0.0090- 0.0100 | 0.0011- 0.0013 | 0.0140- 0.0151 | 0.0078- 0.0080 | 0.0006- 0.0008 | 0.0106- 0.0108 | 0.0081- 0.0084 | 0.0001- 0.0002 | 0.0128- 0.0130 |
| | 0.0095±0 .0004 | 0.0012±0 .0001 | 0.0146±0 .0005 | 0.0079±0 .0001 | 0.0007±0 .0001 | 0.0107±0 .0001 | 0.0082±0 .0001 | 0.0001±0 .0000 | 0.0129±0 .0001 |

Table S10 Cadmium release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

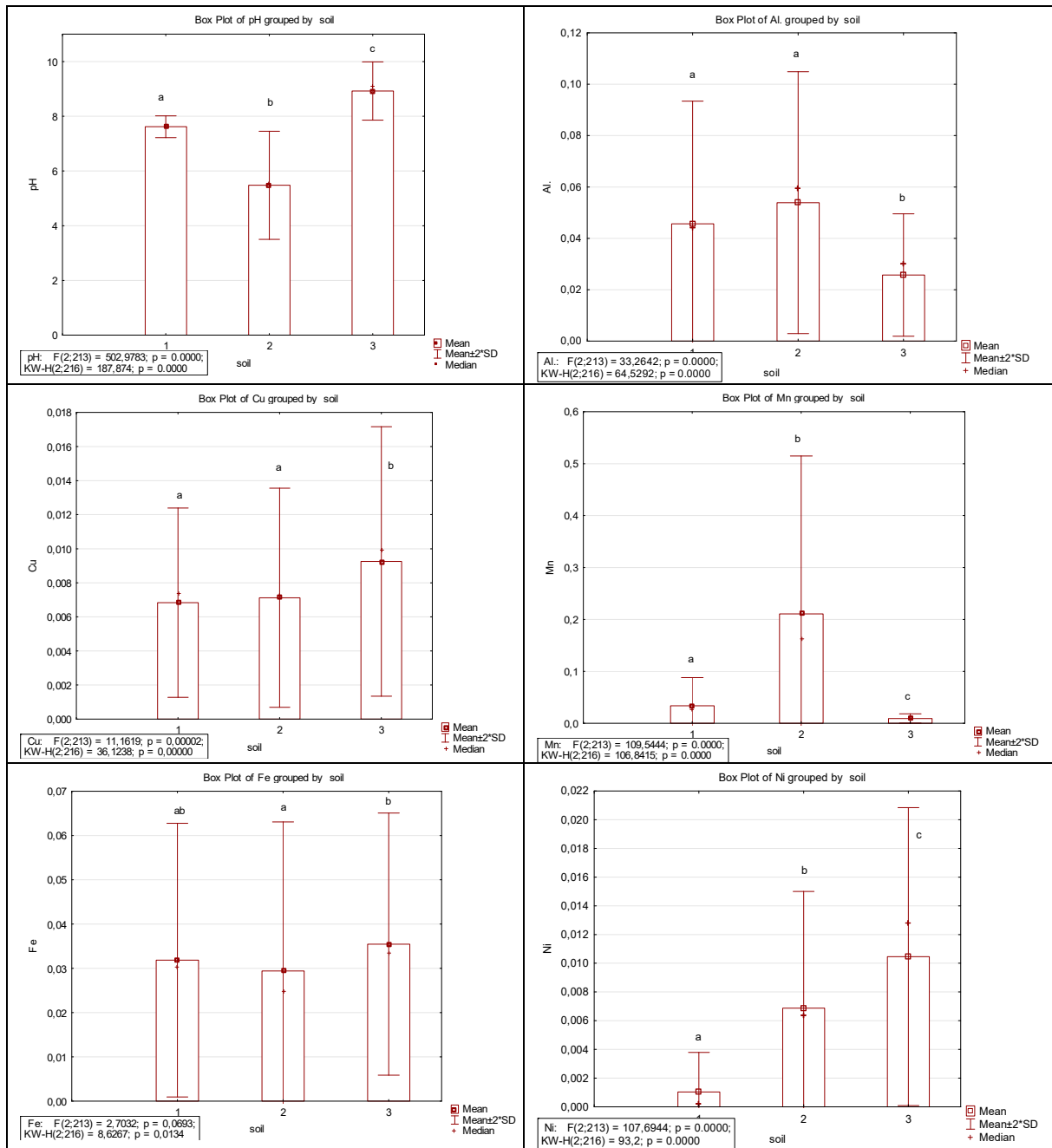
| time | Strzegomka | | | Nysa Szalona | | | Bystrzyca | | |
|-----------------------------|--------------------------------|---------|----------|--------------|---------|----------|-----------|---------|----------|
| | environment | | | | | | | | |
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | e | | | e | | | e | | |
| min-max $\bar{x} \pm SD$ | | | | | | | | | |
| 0' | 0.0001-0.0002 0.0001±0.0000 | | | | | | | | |
| 15' | 0.0031- | 0.0006- | 0.0001- | 0.0006- | 0.0001- | 0.0034- | 0.0005- | 0.0010- | 0.0042- |
| | 0.0033 | 0.0008 | 0.0003 | 0.0008 | 0.0002 | 0.0037 | 0.0007 | 0.0012 | 0.0044 |
| | 0.0032± | 0.0007± | 0.0002± | 0.0007± | 0.0001± | 0.0036± | 0.0006± | 0.0011± | 0.0043± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 30' | 0.0017- | 0.0004- | 0.0016- | 0.0015- | 0.0001- | 0.0034- | 0.0011- | 0.0005- | 0.0044- |
| | 0.0019 | 0.0006 | 0.0018 | 0.0017 | 0.0002 | 0.0036 | 0.0013 | 0.0007 | 0.0046 |
| | 0.0018± | 0.0005± | 0.0017± | 0.0016± | 0.0001± | 0.0035± | 0.0012± | 0.0006± | 0.0045± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 3h | 0.0015- | 0.0010- | 0.0044- | 0.0011- | 0.0001- | 0.0032- | 0.0011- | 0.0009- | 0.0042- |
| | 0.0017 | 0.0012 | 0.0046 | 0.0014 | 0.0002 | 0.0035 | 0.0014 | 0.0011 | 0.0045 |
| | 0.0016± | 0.0011± | 0.0045± | 0.0012± | 0.0001± | 0.0033± | 0.0013± | 0.0010± | 0.0044± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 12h | 0.0017- | 0.0014- | 0.0038- | 0.0001- | 0.0001- | 0.0033- | 0.0010- | 0.0003- | 0.0035- |
| | 0.0019 | 0.0016 | 0.0041 | 0.0002 | 0.0002 | 0.0035 | 0.0012 | 0.0005 | 0.0039 |
| | 0.0018± | 0.0015± | 0.0039± | 0.0001± | 0.0001± | 0.0034± | 0.0011± | 0.0004± | 0.0037± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 |

| | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 24 h | 0.0014- | 0.0011- | 0.0041- | 0.0001- | 0.0005- | 0.0024- | 0.0014- | 0.0004- | 0.0036- |
| | 0.0017 | 0.0014 | 0.0044 | 0.0002 | 0.0008 | 0.0026 | 0.0016 | 0.0006 | 0.0038 |
| | 0.0015± | 0.0013± | 0.0042± | 0.0001± | 0.0007± | 0.0025± | 0.0015± | 0.0005± | 0.0037± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 48 h | 0.0026- | 0.0018- | 0.0042- | 0.0001- | 0.0007- | 0.0026- | 0.0011- | 0.0007- | 0.0030- |
| | 0.0028 | 0.0020 | 0.0045 | 0.0002 | 0.0009 | 0.0028 | 0.0013 | 0.0009 | 0.0032 |
| | 0.0027± | 0.0019± | 0.0043± | 0.0001± | 0.0008± | 0.0027± | 0.0012± | 0.0008± | 0.0031± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 96 h | 0.0014- | 0.0016- | 0.0040- | 0.0007- | 0.0005- | 0.0029- | 0.0014- | 0.0002- | 0.0026- |
| | 0.0016 | 0.0018 | 0.0042 | 0.0009 | 0.0007 | 0.0031 | 0.0016 | 0.0004 | 0.0028 |
| | 0.0015± | 0.0017± | 0.0041± | 0.0008± | 0.0006± | 0.0030± | 0.0015± | 0.0003± | 0.0027± |
| | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |

Table S11 Zinc release (mg/L) from bottom sediments of the Strzegomka, Nysa Szalona and Bystrzyca rivers under laboratory conditions

| time | Strzegomka | | | Nysa Szalona | | | Bystrzyca | | |
|------|--------------------------------|----------|----------|--------------|----------|----------|-----------|----------|----------|
| | environment | | | | | | | | |
| | acidic | neutral | alkaline | acidic | neutral | alkaline | acidic | neutral | alkaline |
| | min-max $\bar{x}\pm SD$ | | | | | | | | |
| 0' | 0.0322-0.0323 0.0322±0.0000 | | | | | | | | |
| 15' | 0.1087- | 0.0423- | 0.0124- | 0.1108- | 0.0359- | 0.0252- | 0.1183- | 0.0451- | 0.0203- |
| | 0.1089 | 0.0425 | 0.0127 | 0.1111 | 0.0362 | 0.0255 | 0.1189 | 0.0454 | 0.0208 |
| | 0.1088±0 | 0.0424±0 | 0.0126±0 | 0.1109±0 | 0.0361±0 | 0.0253±0 | 0.1187±0 | 0.0453±0 | 0.0206±0 |
| | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0003 | .0001 | .0002 |
| 30' | 0.1121- | 0.0459- | 0.0210- | 0.1050- | 0.0322- | 0.0185- | 0.1153- | 0.0470- | 0.0156- |
| | 0.1123 | 0.0462 | 0.0212 | 0.1052 | 0.0325 | 0.0187 | 0.1156 | 0.0473 | 0.0158 |
| | 0.1122±0 | 0.0461±0 | 0.0211±0 | 0.1051±0 | 0.0324±0 | 0.0186±0 | 0.1155±0 | 0.0472±0 | 0.0157±0 |
| | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| 3 h | 0.1181- | 0.0455- | 0.0169- | 0.0965- | 0.0418- | 0.0152- | 0.1138- | 0.0403- | 0.0130- |
| | 0.1183 | 0.0458 | 0.0172 | 0.0968 | 0.0421 | 0.0155 | 0.1141 | 0.0409 | 0.0135 |
| | 0.1182±0 | 0.0457±0 | 0.0171±0 | 0.0967±0 | 0.0419±0 | 0.0154±0 | 0.1139±0 | 0.0407±0 | 0.0133±0 |
| | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0003 | .0002 |
| 12 h | 0.0925- | 0.0231- | 0.0261- | 0.0713- | 0.0241- | 0.0169- | 0.1075- | 0.0421- | 0.0177- |
| | 0.0928 | 0.0234 | 0.0264 | 0.0716 | 0.0245 | 0.0172 | 0.1078 | 0.0423 | 0.0179 |
| | 0.0927±0 | 0.0233±0 | 0.0263±0 | 0.0715±0 | 0.0243±0 | 0.0171±0 | 0.1076±0 | 0.0422±0 | 0.0178±0 |
| | .0001 | .0001 | .0001 | .0001 | .0002 | .0001 | .0001 | .0001 | .0001 |
| 24 h | 0.0671- | 0.0277- | 0.0321- | 0.0466- | 0.0310- | 0.0135- | 0.0915- | 0.0313- | 0.0174- |
| | 0.0673 | 0.0279 | 0.0324 | 0.0469 | 0.0312 | 0.0138 | 0.0919 | 0.0318 | 0.0176 |
| | 0.0672±0 | 0.0278±0 | 0.0323±0 | 0.0468±0 | 0.0311±0 | 0.0137±0 | 0.0917±0 | 0.0316±0 | 0.0175±0 |
| | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0001 |
| 48 h | 0.0288- | 0.0202- | 0.0155- | 0.0331- | 0.0249- | 0.0106- | 0.0838- | 0.0289- | 0.0141- |
| | 0.0290 | 0.0204 | 0.0158 | 0.0333 | 0.0252 | 0.0109 | 0.0843 | 0.0292 | 0.0144 |
| | 0.0289±0 | 0.0203±0 | 0.0156±0 | 0.0332±0 | 0.0251±0 | 0.0108±0 | 0.0841±0 | 0.0291±0 | 0.0143±0 |
| | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0001 | .0001 |
| 96 h | 0.0533- | 0.0251- | 0.0145- | 0.313- | 0.0183- | 0.0111- | 0.0849- | 0.0156- | 0.0113- |
| | 0.0535 | 0.0254 | 0.0147 | 0.0315 | 0.0186 | 0.0113 | 0.0852 | 0.0158 | 0.0116 |

| | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 0.0534±0 | 0.0252±0 | 0.0146±0 | 0.0314±0 | 0.0185±0 | 0.0112±0 | 0.0851±0 | 0.0157±0 | 0.0115±0 |
| .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |



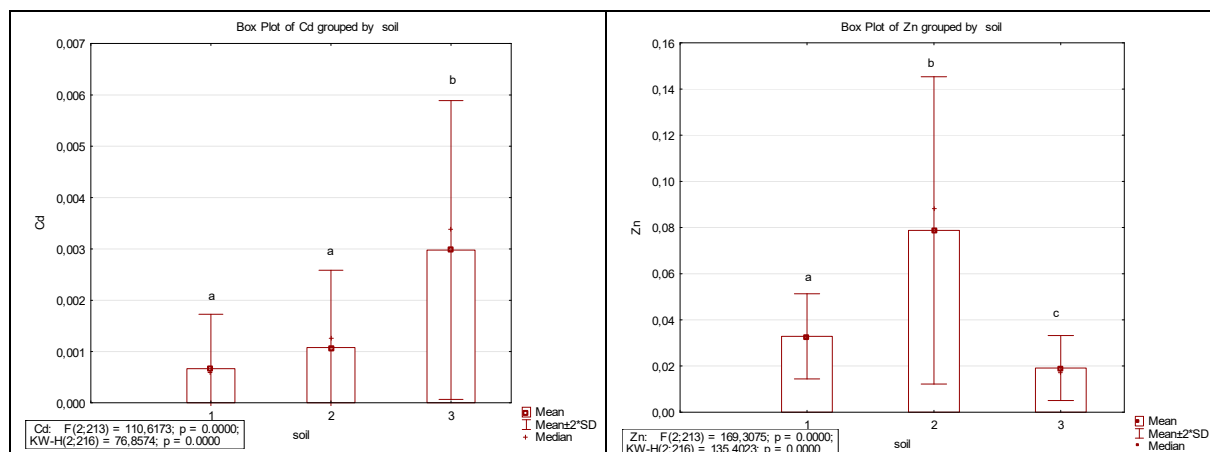
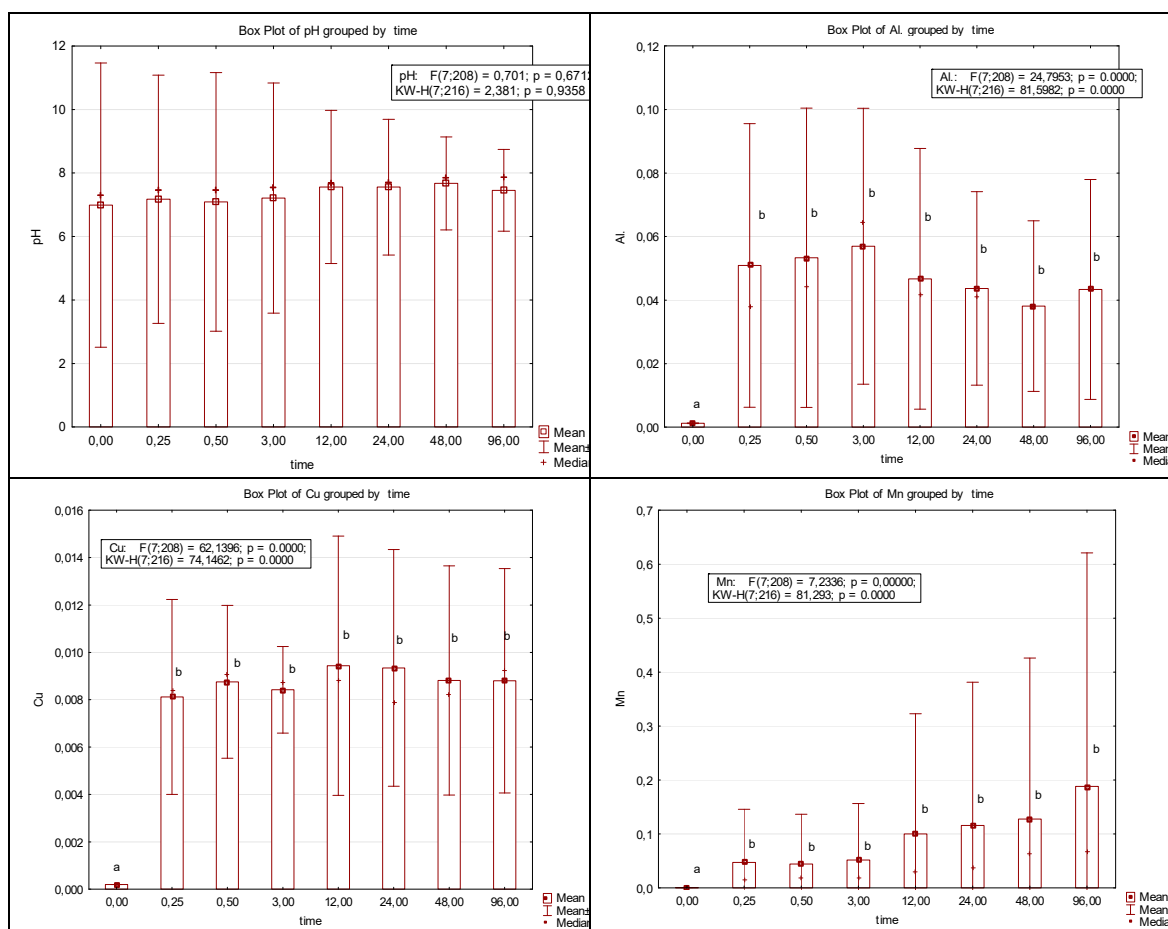


Figure S1 Metal concentration depending on water pH 1- neutral, 2 - acidic, 3 – alkaline

a, b, c – values marked with different letters differ significantly



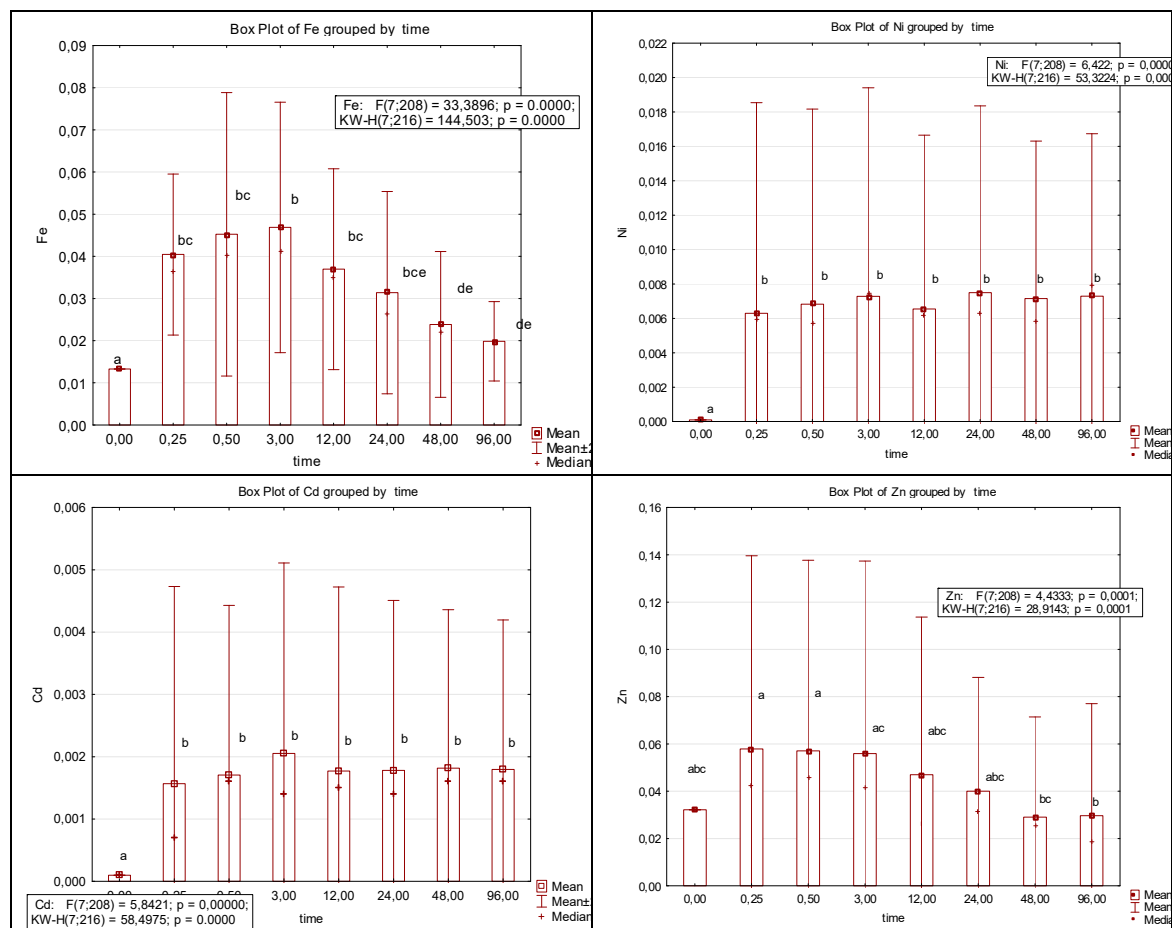


Figure S2 Metal content depending on the time elapsed since the start of the experiment (mean for all environments)

a, b, c – values marked with different letters differ significantly