Suplementarny materials to original paper in Journal of Elementology:

Freshwater biodiversity crisis: macroinvertebrates response to receiving a wastewater treatment plant effluent along a downstream gradient

Renata Kędzior1, Ewa Dacewicz2, Agnieszka Ziernicka-Wojtaszek1, Krzysztof Chmielowski3

1Department of Ecology, Climatology and Air Protection, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, Poland, renata.kedzior@urk.edu.pl

2 Department of Sanitary Engineering and Water Management, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, Poland

 3 Department of Natural Gas Engineering, AGH University of Science and Technology, Krakow, Poland

Corresponding author: Renata Kędzior (renata.kedzior@urk.edu.pl)

Supplementary Table S1.

Habitat variables in sampling sections with results of Kruskal-Wallis test and spatial autocorrelation analysis (Moran’s I)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Habitat variable** | **UP\_300m** | **UP\_100m** | **WWTP** | **DS\_100m** | **DS\_300m** | **DS\_500m** | **Kruskal-Wallis test (p-value)** | **Spatial autocorelation** |
| **Moran I** | **p** |
| Elevation [m a.s.l.] | 258 | 259 | 257 | 254 | 253 | 252 | 0.999 | 0.296 | 0.014 |
| Sand [%] | 50 | 55 | 20 | 20 | 50 | 75 | 0.072 | 0.078 | 0.221 |
| Gravel [%] | 15 | 20 | 0 | 5 | 15 | 21 | 0.061 | -0.171 | 0.899 |
| Stone [%] | 5 | 0 | 70 | 0 | 5 | 1 | 0.001 | -0.349 | 0.649 |
| Silt [%] | 30 | 25 | 10 | 45 | 30 | 30 | 0.043 | -0.511 | 0.261 |
| Width [m] | 0.2 | 0.2 | 0.15 | 0.22 | 0.25 | 0.25 | 0.056 | 0.321 | 0.036 |
| Depth [m[ | 0.35 | 0.34 | 0.33 | 0.38 | 0.37 | 0.37 | 0.351 | -0.048 | 0.471 |
| Channel incision [0-1] | 1 | 1 | 1 | 1 | 1 | 1 | ns | -0.808 | 0.008 |
| Riffle [%] | 25 | 35 | 50 | 15 | 45 | 30 | 0.764 |  -  |  -  |
| Pool [%] | 50 | 65 | 20 | 85 | 50 | 70 | 0.981 | -0.670 | 0.068 |
| Macrophytes [%] | 5 | 2 | 0 | 0 | 1 | 2 | 0.013 | 0.177 | 0.168 |

Supplementary Table S2.

PERMANOVA results from comparisons of macroinvertebrate communities between sections (p-values, \*< 0.05, \*\*< 0.001)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **UP\_300m** | **UP\_100m** | **WWTP** | **DS\_100m** | **DS\_300m** | **DS\_500m** |
| **UP\_300m** |  -  |  -  |  -  |  -  |  -  |  -  |
| **UP\_100m** | 2.1 |  -  |  -  |  -  |  -  |  -  |
| **WWTP** | 60.7\*\* | 43.4\*\* |  -  |  -  |  -  |  -  |
| **DS\_100m** | 35.5\*\* | 24.9\*\* | 27.5\*\* |  -  |  -  |  -  |
| **DS\_300m** | 13.3\*\* | 10.3\*\* | 34.1\*\* | 9.6\*\* |  -  |  -  |
| **DS\_500m** | 2.3 | 2.6 | 34.6\*\* | 22.3\*\* | 8.8\*\* |  -  |

Supplementary Table S3.

Results for GLMM model of macroinvertebrates indices

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Macroinvertbrate indices** | **df.** | **Variable** | **Wald stat.** | **p** |
| Abundance | 5 | Section type (sampling site) | 354.68 | <0.0001 |
| Taxon number | 5 | Section type (sampling site) | 138.47 | <0.0001 |
| Diversity index | 5 | Section type (sampling site) | 14.91 | 0.011 |
| Dominance index | 5 | Section type (sampling site) | 4.85 | 0.434 |
| BMWP\_PL | 5 | Section type (sampling site) | 797.98 | <0.0001 |
| %EPT | 5 | Section type (sampling site) | 370.44 | <0.0001 |