Supplementary Material

# Supplementary Figures and Tables

Table S1: Common Zone Elements of Metacommunity Structure for macroinvertebrates and diatoms on the lake-connected and river-connected aspects.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Macroinvertebrates | Diatoms |
|  |  | Lake-Connected | River-Connected | Lake-Connected | River-Connected |
|  | df | 18 | 17 | 18 | 17 |
| Coherence | Abs | 420 | 308 | 580 | 704 |
|  | z | 11.14 | 12.91 | 10.26 | 10.24 |
|  | p | <0.01 | <0.01 | <0.01 | <0.01 |
| Turnover | Re | 5664 | 5325 | 11314 | 15253 |
|  | z | -2.98 | -3.77 | -4.16 | -2.92 |
|  | p | <0.01 | <0.01 | <0.01 | <0.01 |
| Clumping | MI | 2.29 | 1.40 | 1.67 | 1.38 |
|  | p | <0.01 | <0.01 | <0.01 | <0.01 |
| Structure |  | Clementsian | Clementsian | Clementsian | Clementsian |

Table S2: Common Zone Mantel test between community dissimilarity (Bray Curtis Dissimilarity) and physical and environmental distances for macroinvertebrates and diatoms

|  |  |  |  |
| --- | --- | --- | --- |
|  | Macroinvertebrates |  | Diatoms |
|  | Lake-Connected | River-Connected |  | Lake-Connected | River-Connected |
|  | r | p | r | p |  | r | p | r | p |
| Euclidean | 0.40 | <0.01 | 0.60 | <0.01 |  | 0.15 | 0.04 | 0.48 | <0.01 |
| Topographic | 0.18 | 0.06 | 0.52 | <0.01 |  | 0.14 | 0.07 | 0.49 | <0.01 |
| Network | 0.25 | 0.01 | 0.60 | <0.01 |  | 0.16 | 0.04 | 0.47 | <0.01 |
| Environment | 0.37 | <0.01 | 0.46 | <0.01 |  | 0.42 | <0.01 | 0.04 | 0.03 |

Table S3: Formulas for logarithmic regressions for the Distance Decay Relationships of macroinvertebrate and diatom community dissimilarity compared to the four measured distances on the whole range

|  |  |  |
| --- | --- | --- |
|  | Macroinvertebrates | Diatoms |
|  | Lake-Connected | River-Connected | Lake-Connected | River-Connected |
|  | Formula | R2 | Formula | R2 | Formula | R2 | Formula | R2 |
| Euclidean | y = 0.07(log(x)) + 0.29 | 0.28 | y = 0.06(log(x)) + 0.26 | 0.36 | y = 0.04(log(x)) + 0.4 | 0.1 | y = 0.05(log(x)) + 0.39 | 0.21 |
| Topographic | y = 0.22(log(x)) - 1.30 | 0.09 | y = 0.19(log(x)) -1.10 | 0.14 | y = 0.17(log(x)) - 0.9 | 0.06 | y = 0.23(log(x)) -1.31 | 0.16 |
| Network | y = 0.04(log(x)) + 0.04 | 0.22 | y = 0.06(log(x)) - 0.15 | 0.36 | y = 0.03(log(x)) + 0.21 | 0.12 | y = 0.05(log(x)) + 0.03 | 0.21 |
| Environmental | y = 0.1(log(x)) + 0.40 | 0.13 | y = 0.07(log(x)) + 0.39 | 0.12 | y = 0.11(log(x)) + 0.48 | 0.18 | y = 0.07(log(x)) + 0.50 | 0.09 |

|  |  |  |
| --- | --- | --- |
|  | Macroinvertebrates | Diatoms |
|  | Lake-Connected | River-Connected | Lake-Connected | River-Connected |
|  | Formula | R2 | Formula | R2 | Formula | R2 | Formula | R2 |
| Euclidean | y = 0.07(log(x)) + 0.29 | 0.28 | y = 0.04(log(x)) + 0.26 | 0.43 | y = 0.04(log(x)) + 0.4 | 0.1 | y = 0.05(log(x)) + 0.38 | 0.23 |
| Topographic | y = 0.22(log(x)) - 1.30 | 0.09 | y = 0.24(log(x)) - 1.56 | 0.42 | y = 0.17(log(x)) - 0.90 | 0.06 | y = 0.3(log(x)) - 1.89 | 0.28 |
| Network | y = 0.04(log(x)) + 0.04 | 0.22 | y = 0.04(log(x)) - 0.04 | 0.45 | y = 0.03(log(x)) + 0.21 | 0.12 | y = 0.05(log(x)) + 0.05 | 0.23 |
| Environmental | y = 0.1(log(x)) + 0.40 | 0.13 | y = 0.06(log(x)) + 0.34 | 0.2 | y = 0.11(log(x)) + 0.48 | 0.18 | y = 0.08(log(x)) + 0.47 | 0.13 |

 Table S4: Formulas for logarithmic regressions for the Distance Decay Relationships of macroinvertebrate and diatom community dissimilarity compared to the four measured distances in the common zone

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|  |  |  |
| --- | --- | --- |
|  | Macroinvertebrates | Diatoms |
|  | Lake-Connected | River-Connected | Lake-Connected | River-Connected |
|  | r | p | r | p | r | p | r | p |
| Euclidean | Environmental | 0.40 | <0.01 | 0.48 | <0.01 | 0.12 | 0.077 | 0.35 | <0.01 |
| Topographic | Environmental | 0.12 | 0.15 | 0.46 | <0.01 | 0.07 | 0.252 | 0.42 | <0.01 |
| Network | Environmental | 0.24 | 0.014 | 0.48 | <0.01 | 0.13 | 0.084 | 0.34 | <0.01 |
| Environmental | Euclidean | 0.37 | <0.01 | 0.22 | 0.05 | 0.42 | <0.01 | 0.19 | 0.10 |
| Environmental | Topographic  | 0.35 | <0.01 | 0.37 | <0.01 | 0.41 | <0.01 | 0.29 | 0.05 |
| Environmental | Network  | 0.36 | <0.01 | 0.22 | 0.05 | 0.42 | <0.01 | 0.20 | 0.10 |
| Other Taxa | All Physical and Environmental | 0.31 | <0.01 | 0.2 | 0.08 | 0.31 | <0.01 | 0.2 | 0.1 |
|  |  |  |  |  |  |  |  |  |

 Table S5: Common Zone partial Mantel tests of Bray Curtis Dissimilarity using Spearman's rank correlation for macroinvertebrate communities on the east and west aspects and diatom communities on the east and west aspects. “|” stands for “adjusted for.”

Table S6: Partial mantel tests of Bray Curtis Dissimilarity using Spearman's rank correlation for macroinvertebrate communities on the east and west aspects of the common zone. “|” stands for “adjusted for.”

|  |  |
| --- | --- |
|  | Macroinvertebrates |
|  | Lake-Connected | River-Connected |
|  | r | p | r | p |
| Euclidean | Environmental and Diatom | 0.38 | <0.01 | 0.41 | <0.01 |
| Topographic | Environmental and Diatom | 0.11 | 0.19 | 0.37 | <0.01 |
| Network | Environmental and Diatom | 0.21 | 0.03 | 0.40 | <0.01 |
| Environmental | Euclidean and Diatom | 0.19 | 0.7 | 0.18 | 0.09 |
| Environmental | Topographic and Diatom | 0.17 | 0.1 | 0.31 | 0.02 |
| Environmental | Network and Diatom | 0.18 | 0.09 | 0.18 | 0.09 |
| Diatom | Environmental and all physical distances | 0.31 | <0.01 | 0.2 | 0.1 |

Table S7: Partial mantel tests of Bray Curtis Dissimilarity using Spearman's rank correlation for diatoms communities on the east and west aspects on the common zone. “|” stands for “adjusted for.”

|  |  |
| --- | --- |
|  | Diatoms |
|  | Lake-Connected | River-Connected |
|  | r | p | r | p |
| Euclidean | Environmental and Macroinvertebrates | 0.0 | 0.46 | 0.22 | 0.02 |
| Topographic | Environmental and Macroinvertebrates | 0.03 | 0.36 | 0.31 | <0.01 |
| Network | Environmental and Macroinvertebrates | 0.06 | 0.25 | 0.22 | 0.03 |
| Environmental | Euclidean and Macroinvertebrates | 0.29 | <0.01 | 0.15 | 0.15 |
| Environmental | Topographic and Macroinvertebrates | 0.29 | <0.01 | 0.22 | 0.11 |
| Environmental | Network and Macroinvertebrates | 0.29 | <0.01 | 0.15 | 0.17 |
| Macroinvertebrates| Environmental and all physical distances | 0.31 | <0.01 | 0.2 | 0.08 |



Figure S1: Distance Decay Relationships of common zone macroinvertebrates and diatoms. Points represent individual distances between two given sites, while lines represent the linear regression for each group of points. Macroinvertebrates are represented by red points and lines, while diatoms are represented by black points and lines. The lines shown in the figures are based on linear models. Solid lines represent significant Mantel tests, while dashed lines represent insignificant Mantel tests. The gray area surrounding the linear regressions represents a 95% CI. Formulas and R2 values can be found in Table S4.