Supplementary Material

**Supplementary Table 1.** Species list

| Species | Code | Species | Code |
| --- | --- | --- | --- |
| *Acorus calamus* L. | Aco\_cal | *Oenanthe aquatica* (L.) Poir. | Oen\_aqu |
| *Alisma gramineum* Lej. | Ali\_gra | *Persicaria amphibia* (L.) Gray | Per\_amp |
| *Alisma plantago-aquatica* L. | Ali\_pla | *Potamogeton x angustifolius* J. Presl | Pot\_ang |
| *Azolla filiculoides* Lam. | Azo\_fil | *Potamogeton crispus* L. | Pot\_cri |
| *Berula erecta* (Huds.) Coville | Ber\_ere | *Potamogeton gramineus* L. | Pot\_gra |
| *Butomus umbellatus* L. | But\_umb | *Potamogeton lucens* L. | Pot\_luc |
| *Ceratophyllum demersum* L. | Cer\_dem | *Potamogeton natans* L. | Pot\_nat |
| *Ceratophyllum submersum* L. | Cer\_sub | *Potamogeton nodosus* Poir. | Pot\_nod |
| *Eleocharis palustris* (L.) Roem & Schult. | Ele\_pal | *Potamogeton perfoliatus* L. | Pot\_per |
| *Elodea canadensis* Michx. | Elo\_can | *Potamogeton pusillus* L. | Pot\_pus |
| *Elodea nuttallii* (Planch.) H. St. John | Elo\_nut | *Ranunculus trichophyllus* Chaix ex Vill. | Ran\_tri |
| *Hydrocharis morsus-ranae* L. | Hyd\_mor | *Rorippa amphibia* (L.) Besser | Ror\_amp |
| *Iris pseudacorus* L. | Iri\_pse | *Sagittaria sagittifolia* L. | Sag\_sag |
| *Lemna gibba* L. | Lem\_gib | *Salvinia natans* (L.) All. | Sav\_nat |
| *Lemna minor* L. | Lem\_min | *Schoenoplectus lacustris* (L.) Palla | Sch\_lac |
| *Lemna trisulca* L. | Lem\_tri | *Sium latifolium* L. | Siu\_lat |
| *Mentha aquatica* L. | Men\_aqu | *Sparganium erectum* L. | Spa\_ere |
| *Myosotis scorpioides* L. | Myo\_sco | *Spirodela polyrrhiza* (L.) Schleid. | Spi\_pol |
| *Myriophyllum spicatum* L. | Myr\_spi | *Stratiotes aloides* L. | Str\_alo |
| *Myriophyllum verticillatum* L. | Myr\_ver | *Stuckenia pectinata* (L.) Börner | Stu\_pec |
| *Najas marina* L. | Naj\_mar | *Trapa natans* L. | Tra\_nat |
| *Najas minor* All. | Naj\_min | *Utricularia vulgaris* L. | Utr\_vul |
| *Nuphar lutea* (L.) Sm. | Nup\_lut | *Vallisneria spiralis* L. | Val\_spi |
| *Nymphaea alba* L. | Nym\_alb | *Zannichellia palustris* L. | Zan\_pal |
| *Nymphoides peltata* (S. G. Gmel.) Kuntze | Nyp\_pel |  |

**Supplementary Table 2.** Descriptive statistics of the functional diversity metrics, and environmental variables, prior to standardization.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Mean | Std.Dev | Min | Median | Max | N = 947 |
| FD | 1.29 | 0.16 | 1.00 | 1.34 | 1.53 |  |
| FDis | 5.46 | 2.60 | 0.00 | 6.58 | 8.08 |  |
| FDiv | 0.54 | 0.34 | 0.00 | 0.71 | 1.00 |  |
| FEve | 0.59 | 0.38 | 0.00 | 0.79 | 1.00 |  |
| FRed | 4.13 | 3.69 | 0.00 | 3.53 | 22.93 |  |
| FRic | 0.35 | 0.34 | 0.00 | 0.28 | 0.99 |  |
| RaoQ | 37.74 | 19.78 | 0.00 | 45.07 | 65.85 |  |
| bnk\_txt | 2.16 | 2.87 | 0.06 | 0.06 | 6.30 |  |
| cnnctv | 0.90 | 0.17 | 0.35 | 1.00 | 1.00 |  |
| dam\_dst | 227.02 | 139.45 | 1.00 | 217.00 | 862.00 |  |
| flw\_vlc | 39.03 | 27.34 | 0.00 | 50.00 | 105.00 |  |
| prt\_bnk | 0.48 | 0.50 | 0.00 | 0.00 | 1.00 |  |
| ripz\_hem | 3.22 | 1.46 | 1.00 | 3.00 | 7.00 |  |
| ripz\_w | 0.54 | 0.72 | 0.00 | 0.26 | 4.39 |  |
| river\_km | 1150.71 | 133.96 | 847.00 | 1158.00 | 1429.00 |  |
| sdm\_txt | 0.98 | 1.93 | 0.06 | 0.06 | 6.30 |  |
| trn\_str | 0.12 | 0.32 | 0.00 | 0.00 | 1.00 |  |
| trnspr | 82.76 | 27.14 | 25.00 | 80.00 | 150.00 |  |

**Supplementary Table 3.** Correlation between functional diversity metrics and environmental variables, extracted from the RDA.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | FRic | FEve | FDiv | FDis | RaoQ | FD | FRed |
| river\_km | -0.3784 | -0.5127 | -0.5180 | -0.4898 | -0.4749 | -0.4521 | -0.5138 |
| flw\_vlc | -0.0284 | -0.1485 | -0.1458 | -0.1071 | -0.1101 | -0.1051 | -0.0474 |
| trnspr | 0.1073 | 0.2787 | 0.2657 | 0.2297 | 0.1960 | 0.1660 | 0.2506 |
| cnnctv | -0.0588 | -0.0269 | -0.0409 | -0.0631 | -0.0850 | -0.0899 | 0.0139 |
| bnk\_txt | 0.2109 | 0.1513 | 0.1593 | 0.1858 | 0.1881 | 0.1991 | 0.2045 |
| sdm\_txt | 0.0959 | 0.2604 | 0.2802 | 0.1831 | 0.1633 | 0.1426 | 0.2473 |
| dam\_dst | -0.4103 | -0.4727 | -0.4865 | -0.4476 | -0.4395 | -0.4294 | -0.4836 |
| prt\_bnk | 0.0893 | 0.1753 | 0.1524 | 0.1357 | 0.1329 | 0.1325 | 0.0700 |
| trn\_str | -0.2276 | -0.2253 | -0.2179 | -0.1920 | -0.2091 | -0.2177 | -0.2218 |
| ripz\_w | -0.3098 | -0.3043 | -0.3152 | -0.3280 | -0.3320 | -0.3255 | -0.3762 |
| ripz\_hem | 0.1605 | 0.1839 | 0.1664 | 0.2121 | 0.2119 | 0.2113 | 0.1498 |



**Supplement Figure 1.** Results of the RLQ analysis, with eigenvalues of the first two axes in black: **(A)** site (L) scores; **(B)** species (Q) scores, **(C)** environmental variables (R); **(D)** species traits.