Ignasi Arranz, Bertrand Fournier, Nigel P. Lester, Brian J. Shuter, and Pedro R. Peres-Neto. Species compositions mediate biomass conservation: the case of lake fish communities. Ecology.

Appendix S9. Influence of environmental factors on biomass conservation

Regression analysis (Table S1) showed that six environmental variables accounted for 27.3% of the variation in biomass conservation (i.e., BIOCON: the slope of the normalized biomass spectrum). Predictors included two climate variables (MAT), two lake size variables (AREA, DEPMN), and two water chemistry variables (DOC, COND). Regression analysis (Table S2) showed that adding other environmental variables (DEPMAX, SEC, TP) did not improve the model. Variance Partitioning (Table S3) showed that climate and lake size contribute approximately equally to variation in BIOCON (independent contributions of 0.062 and 0.063, respectively). Water chemistry alone has a small contribution (0.029)

**Table S1.** Regression model for the Environment (5 variables). The table includes the raw (b) and standardized values (Std. Value), as well as their residual standard errors (SE).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Env)** | |  |  |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.2791 |  |  |  |  |  |  |
| Adjusted R2 = | 0.2734 |  |  |  |  |  |  |
| Residual standard error = | 0.2376 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE (Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
| Intercept |  |  |  | -1.119 | 0.080 | -14.038 | 0.000 |
| Mean air temperature | MAT | -0.294 | 0.043 | -0.047 | 0.007 | -6.892 | 0.000 |
| Surface area | log10(AREA) | 0.172 | 0.038 | 0.072 | 0.016 | 4.567 | 0.000 |
| Mean depth | log10(DEPMN) | 0.225 | 0.042 | 0.195 | 0.037 | 5.327 | 0.000 |
| Dissolved organic carbon | DOC | 0.193 | 0.046 | 0.015 | 0.004 | 4.197 | 0.000 |
| Conductivity | log10(COND) | -0.146 | 0.037 | -0.122 | 0.031 | -3.933 | 0.000 |

## Table S2. Regression model for the Environment (9 variables).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Env\_all)** | |  |  |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.2794 |  |  |  |  |  |  |
| Adjusted R2 = | 0.2702 |  |  |  |  |  |  |
| Residual standard error = | 0.2381 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE(Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
| Intercept |  |  |  | -1.145 | 0.101 | -11.358 | 0.000 |
| E1\_MAT | MAT | -0.298 | 0.044 | -0.047 | 0.007 | -6.833 | 0.000 |
| E2\_L10Area\_ha | log10(AREA) | 0.169 | 0.042 | 0.071 | 0.017 | 4.066 | 0.000 |
| E2\_L10Depmn | log10(DEPMN) | 0.211 | 0.085 | 0.183 | 0.073 | 2.492 | 0.013 |
| E3\_DOC | DOC | 0.192 | 0.059 | 0.015 | 0.005 | 3.239 | 0.001 |
| E3\_L10Conductivity | log10(COND) | -0.153 | 0.041 | -0.128 | 0.035 | -3.703 | 0.000 |
| L10Depmax |  | 0.017 | 0.087 | 0.014 | 0.071 | 0.197 | 0.844 |
| L10Secchi |  | 0.017 | 0.060 | 0.019 | 0.067 | 0.281 | 0.779 |
| L10TP |  | 0.022 | 0.052 | 0.026 | 0.062 | 0.421 | 0.674 |

## Table S3. Calculation of variance partitions in the six variables grouped by Climate (MAT), Size (AREA, DEPMN) and Water (DOC, COND). aR2 is the adjusted R2 for the specified component. aR2\_other is the adjusted R2 when the indicated component is omitted. aR2\_ind = [Total aR2 of all components – aR2\_other]. aR2\_Share = [aR2 (the component) – aR2\_ind]. For example, the fraction of total variation in BIOCON associated with the climate variables alone is 0.2024. In the first model, where Size and Water variables are included as separate components, 0.0616 is the fraction of BIOCON variation that is associated with variation in climate variables independent of variation in the other two components and 0.1408 is the fraction of BIOCON variation that is associated jointly (shared) with variation in the Climate, Size and Water variables – these two components add up to 0.2024. In the second model, where the influences of Size and Water are pooled, the independent and shared components for climate shift a bit, but still add up to 0.2024.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Components** | **aR2** | **aR2\_other** | **aR2\_ind** | **aR2\_Share** |
| **Model: E1 + E2 + E3** | 0.2812 |  |  |  |
| E1\_Climate | 0.2024 | 0.2195 | 0.0616 | 0.1408 |
| E2\_Size | 0.0757 | 0.2185 | 0.0627 | 0.0130 |
| E3\_Water | 0.0954 | 0.2522 | 0.0290 | 0.0665 |
| **Model: E1 + E2-E3** | 0.2879 |  |  |  |
| E1\_Climate | 0.2024 | 0.2195 | 0.0684 | 0.1340 |
| E2-E3\_Size\_Water | 0.2195 | 0.2024 | 0.0856 | 0.1340 |