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 S10. Influence of species richness on biomass conservation

Richness alone was not related to BIOCON (adjusted R2 = 0.000). When we added richness to the environmental factor model, a significant negative but trivial (adjusted R2= 0.005) amount of additional variation was accounted for. When we added richness to models that included our two measures (Env + PA, Env + Biomass) of community composition, we found that richness had no additional influence on the amount of variation accounted for by each model. From this set of results, we concluded that richness adds little useful information on variation in BIOCON values, over and above that already provided by environmental factors.

## Table S1. Regression model for Richness.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Richness)** | | |  |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.00093 |  |  |  |  |  |  |
| Adjusted R2 = | 0.00000 |  |  |  |  |  |  |
| Residual standard error = | 0.27903 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE(Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
| Intercept |  |  |  | -0.980 | 0.031 | -30.728 | 0.000 |
| ***Richness*** | ***RICH*** | -0.030 | 0.039 | -0.002 | 0.003 | -0.771 | 0.441 |

## Table S2. Regression model for the Environment + Richness.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Env + Richness)** | | |  |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.2854 |  |  |  |  |  |  |
| Adjusted R2 = | 0.2786 |  |  |  |  |  |  |
| Residual standard error = | 0.2368 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE (Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
| Intercept |  |  |  | -1.165 | 0.082 | -14.240 | 0.000 |
| Mean air temperature | MAT | -0.264 | 0.045 | -0.042 | 0.007 | -5.929 | 0.000 |
| Surface area | log10(AREA) | 0.239 | 0.047 | 0.100 | 0.020 | 5.075 | 0.000 |
| Mean depth | log10(DEPMN) | 0.246 | 0.043 | 0.213 | 0.037 | 5.714 | 0.000 |
| Dissolved organic carbon | DOC | 0.188 | 0.046 | 0.015 | 0.004 | 4.098 | 0.000 |
| Conductivity | log10(COND) | -0.127 | 0.038 | -0.106 | 0.032 | -3.351 | 0.001 |
| ***Richness*** | ***RICH*** | ***-0.115*** | ***0.049*** | ***-0.008*** | ***0.003*** | ***-2.350*** | ***0.019*** |

## Table S3. Regression model for the Environment + Species PA + Richness.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Env + PA + Richness)** | | |  |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.4938 |  |  |  |  |  |  |
| Adjusted R2 = | 0.4723 |  |  |  |  |  |  |
| Residual standard error = | 0.2025 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE (Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
|  | Intercept |  |  | -0.880 | 0.092 | -9.608 | 0.000 |
| ***Richness*** | **Rich\_BSM** | **-0.049** | **0.065** | **-0.003** | **0.004** | **-0.752** | **0.453** |
| Mean air temperature | MAT | -0.212 | 0.067 | -0.034 | 0.011 | -3.186 | 0.002 |
| Surface area | log10(AREA) | 0.020 | 0.045 | 0.008 | 0.019 | 0.442 | 0.659 |
| Mean depth | log10(DEPMN) | 0.205 | 0.048 | 0.177 | 0.042 | 4.256 | 0.000 |
| Dissolved organic carbon | DOC | 0.057 | 0.043 | 0.005 | 0.003 | 1.325 | 0.186 |
| Conductivity | log10(COND) | -0.126 | 0.036 | -0.105 | 0.030 | -3.449 | 0.001 |
|  | CPA1 | -0.381 | 0.054 | -0.342 | 0.049 | -7.030 | 0.000 |
|  | CPA2 | -0.113 | 0.054 | -0.123 | 0.058 | -2.103 | 0.036 |
|  | CPA3 | 0.009 | 0.054 | 0.013 | 0.076 | 0.168 | 0.867 |
|  | CPA4 | -0.192 | 0.041 | -0.332 | 0.071 | -4.658 | 0.000 |
|  | CPA5 | 0.090 | 0.033 | 0.187 | 0.068 | 2.740 | 0.006 |
|  | CPA6 | 0.114 | 0.031 | 0.246 | 0.068 | 3.632 | 0.000 |
|  | CPA7 | 0.095 | 0.031 | 0.221 | 0.071 | 3.096 | 0.002 |
|  | CPA8 | -0.066 | 0.030 | -0.157 | 0.073 | -2.164 | 0.031 |
|  | CPA11 | -0.073 | 0.029 | -0.184 | 0.075 | -2.467 | 0.014 |
|  | CPA17 | 0.108 | 0.030 | 0.327 | 0.092 | 3.538 | 0.000 |
|  | CPA22 | 0.087 | 0.029 | 0.297 | 0.100 | 2.982 | 0.003 |
|  | CPA39 | 0.064 | 0.029 | 0.345 | 0.156 | 2.213 | 0.027 |
|  | CPA43 | 0.044 | 0.029 | 0.265 | 0.176 | 1.507 | 0.132 |
|  | CPA50 | -0.050 | 0.030 | -0.419 | 0.250 | -1.675 | 0.094 |
|  | CPA59 | 0.055 | 0.029 | 0.655 | 0.344 | 1.905 | 0.057 |
|  | CPA73 | 0.050 | 0.029 | 1.314 | 0.759 | 1.732 | 0.084 |
|  | CPA74 | 0.038 | 0.029 | 1.027 | 0.790 | 1.301 | 0.194 |
|  | CPA79 | -0.079 | 0.029 | -2.846 | 1.043 | -2.729 | 0.007 |
|  | CPA82 | 0.039 | 0.029 | 1.936 | 1.444 | 1.341 | 0.180 |
|  | CPA83 | -0.059 | 0.029 | -3.933 | 1.935 | -2.032 | 0.043 |

## Table S4. Regression model for the Environment + Species Biomass + Richness.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Env + Biomass + Richness)** | | | |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.769 |  |  |  |  |  |  |
| Adjusted R2 = | 0.769 |  |  |  |  |  |  |
| Residual standard error = | 0.134 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE(Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
|  | Intercept |  |  | -1.132 | 0.065 | -17.527 | 0.000 |
| ***Richness*** | **Rich\_BSM** | **0.036** | **0.044** | **0.002** | **0.003** | **0.806** | **0.421** |
| Mean air temperature | MAT | -0.020 | 0.044 | -0.003 | 0.007 | -0.457 | 0.648 |
| Surface area | log10(AREA) | 0.024 | 0.032 | 0.010 | 0.013 | 0.762 | 0.446 |
| Mean depth | log10(DEPMN) | 0.067 | 0.037 | 0.058 | 0.032 | 1.822 | 0.069 |
| Dissolved organic carbon | DOC | 0.054 | 0.030 | 0.004 | 0.002 | 1.796 | 0.073 |
| Conductivity | log10(COND) | 0.003 | 0.026 | 0.002 | 0.022 | 0.096 | 0.923 |
|  | Cbio1 | -0.494 | 0.035 | -0.425 | 0.030 | -14.262 | 0.000 |
|  | Cbio2 | 0.419 | 0.033 | 0.399 | 0.032 | 12.638 | 0.000 |
|  | Cbio3 | 0.246 | 0.034 | 0.305 | 0.042 | 7.204 | 0.000 |
|  | Cbio4 | -0.065 | 0.029 | -0.097 | 0.043 | -2.255 | 0.025 |
|  | Cbio5 | 0.180 | 0.020 | 0.328 | 0.037 | 8.899 | 0.000 |
|  | Cbio6 | 0.283 | 0.021 | 0.540 | 0.041 | 13.335 | 0.000 |
|  | Cbio7 | 0.058 | 0.020 | 0.121 | 0.041 | 2.922 | 0.004 |
|  | Cbio8 | -0.105 | 0.020 | -0.227 | 0.044 | -5.176 | 0.000 |
|  | Cbio9 | -0.103 | 0.020 | -0.236 | 0.045 | -5.273 | 0.000 |
|  | Cbio10 | -0.162 | 0.020 | -0.381 | 0.046 | -8.285 | 0.000 |
|  | Cbio11 | -0.036 | 0.019 | -0.099 | 0.053 | -1.868 | 0.062 |
|  | Cbio12 | -0.051 | 0.021 | -0.140 | 0.059 | -2.379 | 0.018 |
|  | Cbio13 | 0.126 | 0.023 | 0.369 | 0.066 | 5.598 | 0.000 |
|  | Cbio14 | 0.039 | 0.020 | 0.114 | 0.058 | 1.975 | 0.049 |
|  | Cbio15 | 0.073 | 0.020 | 0.224 | 0.061 | 3.649 | 0.000 |
|  | Cbio17 | -0.009 | 0.021 | -0.032 | 0.076 | -0.417 | 0.677 |
|  | Cbio20 | 0.040 | 0.020 | 0.172 | 0.087 | 1.979 | 0.048 |
|  | Cbio21 | -0.068 | 0.020 | -0.299 | 0.087 | -3.423 | 0.001 |
|  | Cbio22 | -0.099 | 0.019 | -0.448 | 0.088 | -5.077 | 0.000 |
|  | Cbio23 | 0.021 | 0.020 | 0.102 | 0.095 | 1.073 | 0.284 |
|  | Cbio24 | 0.039 | 0.019 | 0.191 | 0.095 | 2.014 | 0.044 |
|  | Cbio26 | -0.039 | 0.019 | -0.210 | 0.102 | -2.057 | 0.040 |
|  | Cbio27 | 0.039 | 0.021 | 0.222 | 0.118 | 1.881 | 0.060 |
|  | Cbio29 | -0.021 | 0.020 | -0.126 | 0.120 | -1.055 | 0.292 |
|  | Cbio30 | 0.085 | 0.020 | 0.523 | 0.123 | 4.244 | 0.000 |
|  | Cbio31 | -0.063 | 0.019 | -0.391 | 0.121 | -3.238 | 0.001 |
|  | Cbio32 | 0.031 | 0.020 | 0.209 | 0.134 | 1.562 | 0.119 |
|  | Cbio33 | 0.023 | 0.019 | 0.160 | 0.138 | 1.160 | 0.246 |
|  | Cbio34 | 0.029 | 0.020 | 0.213 | 0.144 | 1.472 | 0.141 |
|  | Cbio35 | 0.038 | 0.019 | 0.302 | 0.154 | 1.961 | 0.050 |
|  | Cbio37 | 0.017 | 0.021 | 0.143 | 0.179 | 0.800 | 0.424 |
|  | Cbio39 | 0.030 | 0.019 | 0.271 | 0.172 | 1.572 | 0.116 |
|  | Cbio40 | 0.013 | 0.019 | 0.122 | 0.187 | 0.654 | 0.513 |
|  | Cbio41 | 0.032 | 0.019 | 0.320 | 0.191 | 1.671 | 0.095 |
|  | Cbio43 | -0.034 | 0.019 | -0.387 | 0.223 | -1.736 | 0.083 |
|  | Cbio44 | -0.050 | 0.019 | -0.608 | 0.231 | -2.632 | 0.009 |
|  | Cbio47 | 0.016 | 0.019 | 0.227 | 0.272 | 0.834 | 0.405 |
|  | Cbio48 | -0.014 | 0.019 | -0.219 | 0.297 | -0.737 | 0.461 |
|  | Cbio50 | 0.017 | 0.019 | 0.299 | 0.328 | 0.913 | 0.362 |
|  | Cbio53 | 0.021 | 0.019 | 0.438 | 0.408 | 1.074 | 0.283 |
|  | Cbio54 | -0.019 | 0.019 | -0.502 | 0.496 | -1.012 | 0.312 |
|  | Cbio55 | -0.051 | 0.019 | -1.328 | 0.504 | -2.635 | 0.009 |
|  | Cbio56 | 0.030 | 0.019 | 0.821 | 0.540 | 1.520 | 0.129 |
|  | Cbio57 | -0.017 | 0.019 | -0.527 | 0.595 | -0.885 | 0.377 |
|  | Cbio59 | -0.017 | 0.019 | -0.566 | 0.635 | -0.892 | 0.373 |
|  | Cbio60 | -0.012 | 0.019 | -0.445 | 0.702 | -0.635 | 0.526 |
|  | Cbio64 | -0.036 | 0.019 | -1.558 | 0.821 | -1.896 | 0.058 |
|  | Cbio67 | 0.012 | 0.019 | 0.612 | 0.985 | 0.621 | 0.535 |
|  | Cbio68 | -0.026 | 0.019 | -1.454 | 1.062 | -1.369 | 0.172 |
|  | Cbio69 | -0.025 | 0.019 | -1.616 | 1.228 | -1.317 | 0.189 |
|  | Cbio74 | 0.014 | 0.019 | 1.439 | 1.944 | 0.740 | 0.459 |
|  | Cbio75 | 0.027 | 0.019 | 3.404 | 2.425 | 1.403 | 0.161 |
|  | Cbio77 | -0.017 | 0.019 | -2.546 | 2.916 | -0.873 | 0.383 |
|  | Cbio79 | 0.039 | 0.019 | 9.883 | 4.842 | 2.041 | 0.042 |
|  | Cbio80 | 0.038 | 0.019 | 12.746 | 6.496 | 1.962 | 0.050 |
|  | Cbio82 | 0.015 | 0.019 | 8.126 | 10.233 | 0.794 | 0.427 |

## Table S5. Regression model for the Environment + PA + Species Biomass + Richness.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Regression (BIOCON vs Env + PA + Biomass + Richness)** | | | |  |  |  |  |
| N = | 639 |  |  |  |  |  |  |
| R2 = | 0.807 |  |  |  |  |  |  |
| Adjusted R2 = | 0.779 |  |  |  |  |  |  |
| Residual standard error = | 0.131 |  |  |  |  |  |  |
| **Variable** | **Label** | **Std. Value** | **SE(Std. Value)** | **b** | **SE(b)** | **t(632)** | ***p*-value** |
|  | Intercept |  |  | -1.137 | 0.069 | -16.547 | 0.000 |
| ***Richness*** | **Rich\_BSM** | **-0.017** | **0.056** | **-0.001** | **0.004** | **-0.307** | **0.759** |
| Mean air temperature | E1\_MAT | 0.003 | 0.049 | 0.001 | 0.008 | 0.067 | 0.946 |
| Surface area | E2\_L10Area\_ha | 0.040 | 0.032 | 0.017 | 0.013 | 1.252 | 0.211 |
| Mean depth | E2\_L10Depmn | 0.081 | 0.037 | 0.070 | 0.032 | 2.155 | 0.032 |
| Dissolved organic carbon | E3\_DOC | 0.054 | 0.030 | 0.004 | 0.002 | 1.789 | 0.074 |
| Conductivity | E3\_L10Conductivity | 0.005 | 0.027 | 0.004 | 0.022 | 0.192 | 0.847 |
|  | CBio1 | -0.389 | 0.079 | -0.336 | 0.068 | -4.939 | 0.000 |
|  | CBio2 | 0.586 | 0.058 | 0.559 | 0.055 | 10.138 | 0.000 |
|  | CBio3 | 0.220 | 0.062 | 0.273 | 0.078 | 3.519 | 0.000 |
|  | CBio4 | -0.075 | 0.041 | -0.113 | 0.061 | -1.854 | 0.064 |
|  | CBio5 | 0.241 | 0.029 | 0.438 | 0.052 | 8.404 | 0.000 |
|  | CBio6 | 0.281 | 0.031 | 0.538 | 0.059 | 9.039 | 0.000 |
|  | CBio7 | 0.090 | 0.025 | 0.187 | 0.052 | 3.609 | 0.000 |
|  | CBio8 | -0.094 | 0.024 | -0.203 | 0.053 | -3.824 | 0.000 |
|  | CBio9 | -0.100 | 0.025 | -0.230 | 0.058 | -3.964 | 0.000 |
|  | CBio10 | -0.193 | 0.031 | -0.453 | 0.072 | -6.317 | 0.000 |
|  | CBio11 | -0.045 | 0.021 | -0.123 | 0.057 | -2.149 | 0.032 |
|  | CBio12 | -0.110 | 0.027 | -0.305 | 0.074 | -4.099 | 0.000 |
|  | CBio13 | 0.162 | 0.028 | 0.474 | 0.083 | 5.734 | 0.000 |
|  | CBio14 | 0.068 | 0.026 | 0.198 | 0.078 | 2.556 | 0.011 |
|  | CBio15 | 0.109 | 0.022 | 0.337 | 0.068 | 4.964 | 0.000 |
|  | CBio17 | -0.003 | 0.022 | -0.010 | 0.082 | -0.128 | 0.898 |
|  | CBio20 | 0.044 | 0.023 | 0.190 | 0.099 | 1.921 | 0.055 |
|  | CBio21 | -0.075 | 0.022 | -0.330 | 0.097 | -3.405 | 0.001 |
|  | CBio22 | -0.109 | 0.021 | -0.494 | 0.096 | -5.159 | 0.000 |
|  | CBio23 | 0.010 | 0.021 | 0.049 | 0.100 | 0.485 | 0.628 |
|  | CBio24 | 0.040 | 0.021 | 0.195 | 0.101 | 1.935 | 0.053 |
|  | CBio26 | -0.014 | 0.020 | -0.073 | 0.106 | -0.685 | 0.493 |
|  | CBio27 | 0.039 | 0.024 | 0.220 | 0.133 | 1.651 | 0.099 |
|  | CBio29 | -0.017 | 0.021 | -0.100 | 0.126 | -0.796 | 0.426 |
|  | CBio30 | 0.101 | 0.021 | 0.624 | 0.133 | 4.708 | 0.000 |
|  | CBio31 | -0.069 | 0.020 | -0.433 | 0.128 | -3.391 | 0.001 |
|  | CBio32 | 0.055 | 0.021 | 0.372 | 0.143 | 2.606 | 0.009 |
|  | CBio33 | 0.004 | 0.020 | 0.028 | 0.144 | 0.194 | 0.846 |
|  | CBio34 | 0.022 | 0.021 | 0.162 | 0.155 | 1.043 | 0.298 |
|  | CBio35 | 0.044 | 0.020 | 0.349 | 0.161 | 2.173 | 0.030 |
|  | CBio37 | 0.009 | 0.022 | 0.081 | 0.187 | 0.433 | 0.665 |
|  | CBio39 | 0.023 | 0.020 | 0.208 | 0.177 | 1.178 | 0.239 |
|  | CBio40 | -0.000 | 0.021 | -0.003 | 0.201 | -0.014 | 0.989 |
|  | CBio41 | 0.042 | 0.021 | 0.417 | 0.211 | 1.974 | 0.049 |
|  | CBio43 | -0.042 | 0.020 | -0.487 | 0.227 | -2.142 | 0.033 |
|  | CBio44 | -0.049 | 0.021 | -0.592 | 0.250 | -2.368 | 0.018 |
|  | CBio47 | 0.018 | 0.019 | 0.252 | 0.273 | 0.926 | 0.355 |
|  | CBio48 | -0.004 | 0.023 | -0.058 | 0.353 | -0.164 | 0.870 |
|  | CBio50 | 0.010 | 0.020 | 0.164 | 0.343 | 0.479 | 0.632 |
|  | CBio53 | 0.012 | 0.022 | 0.262 | 0.462 | 0.567 | 0.571 |
|  | CBio54 | -0.016 | 0.019 | -0.408 | 0.505 | -0.808 | 0.420 |
|  | CBio55 | -0.061 | 0.020 | -1.585 | 0.535 | -2.962 | 0.003 |
|  | CBio56 | 0.002 | 0.028 | 0.060 | 0.791 | 0.076 | 0.939 |
|  | CBio57 | -0.014 | 0.021 | -0.430 | 0.661 | -0.651 | 0.515 |
|  | CBio59 | -0.015 | 0.022 | -0.503 | 0.717 | -0.701 | 0.484 |
|  | CBio60 | -0.002 | 0.024 | -0.062 | 0.890 | -0.069 | 0.945 |
|  | CBio64 | -0.030 | 0.019 | -1.277 | 0.824 | -1.550 | 0.122 |
|  | CBio67 | 0.004 | 0.021 | 0.184 | 1.088 | 0.169 | 0.866 |
|  | CBio68 | -0.017 | 0.020 | -0.970 | 1.093 | -0.888 | 0.375 |
|  | CBio69 | -0.021 | 0.032 | -1.324 | 2.017 | -0.656 | 0.512 |
|  | CBio74 | 0.025 | 0.021 | 2.558 | 2.107 | 1.214 | 0.225 |
|  | CBio75 | 0.009 | 0.029 | 1.186 | 3.695 | 0.321 | 0.748 |
|  | CBio77 | -0.021 | 0.021 | -3.226 | 3.194 | -1.010 | 0.313 |
|  | CBio79 | 0.089 | 0.075 | 22.401 | 18.982 | 1.180 | 0.238 |
|  | CBio80 | 0.017 | 0.040 | 5.723 | 13.725 | 0.417 | 0.677 |
|  | CBio82 | 0.015 | 0.027 | 7.977 | 14.503 | 0.550 | 0.583 |
|  | CPA1 | -0.129 | 0.084 | -0.116 | 0.076 | -1.532 | 0.126 |
|  | CPA2 | -0.154 | 0.069 | -0.167 | 0.074 | -2.240 | 0.025 |
|  | CPA3 | -0.011 | 0.049 | -0.015 | 0.070 | -0.213 | 0.831 |
|  | CPA4 | 0.101 | 0.043 | 0.175 | 0.074 | 2.371 | 0.018 |
|  | CPA5 | -0.079 | 0.032 | -0.164 | 0.067 | -2.441 | 0.015 |
|  | CPA6 | -0.066 | 0.030 | -0.143 | 0.064 | -2.249 | 0.025 |
|  | CPA7 | -0.086 | 0.032 | -0.200 | 0.075 | -2.660 | 0.008 |
|  | CPA8 | 0.075 | 0.034 | 0.180 | 0.082 | 2.196 | 0.029 |
|  | CPA11 | 0.011 | 0.026 | 0.028 | 0.066 | 0.424 | 0.672 |
|  | CPA17 | -0.038 | 0.025 | -0.114 | 0.076 | -1.501 | 0.134 |
|  | CPA22 | -0.049 | 0.024 | -0.168 | 0.083 | -2.033 | 0.043 |
|  | CPA39 | 0.023 | 0.026 | 0.121 | 0.138 | 0.872 | 0.384 |
|  | CPA43 | 0.042 | 0.031 | 0.255 | 0.185 | 1.377 | 0.169 |
|  | CPA50 | 0.001 | 0.032 | 0.010 | 0.268 | 0.039 | 0.969 |
|  | CPA59 | 0.010 | 0.028 | 0.116 | 0.330 | 0.352 | 0.725 |
|  | CPA73 | 0.011 | 0.028 | 0.286 | 0.747 | 0.382 | 0.702 |
|  | CPA74 | 0.022 | 0.026 | 0.588 | 0.723 | 0.813 | 0.417 |
|  | CPA79 | 0.059 | 0.076 | 2.113 | 2.752 | 0.768 | 0.443 |
|  | CPA82 | 0.023 | 0.052 | 1.151 | 2.577 | 0.447 | 0.655 |
|  | CPA83 | -0.005 | 0.020 | -0.363 | 1.324 | -0.275 | 0.784 |