New Phytologist Supporting Information

Title: Structural diversity and tree density drives variation in the biodiversity-ecosystem function relationship of woodlands and savannas

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Figs. S1 and S2 - Frequency distribution of observed variables

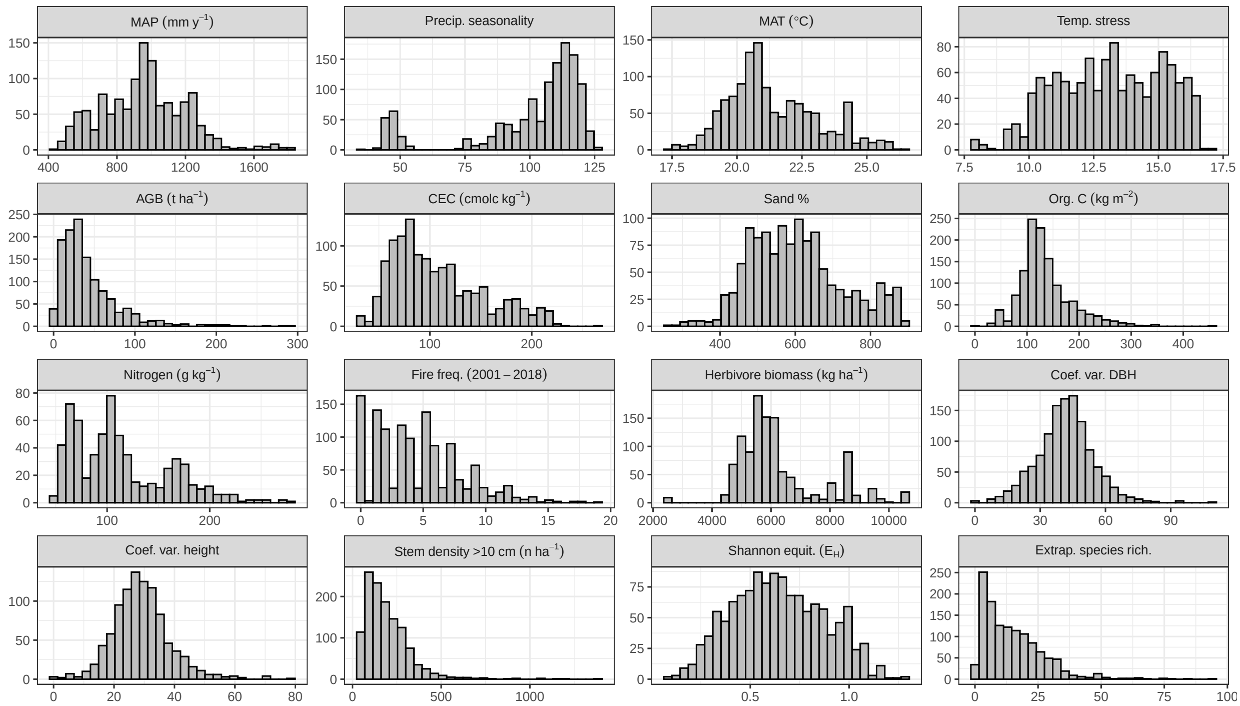

Fig. S1. Histograms of raw untransformed observed variables used in final analyses.

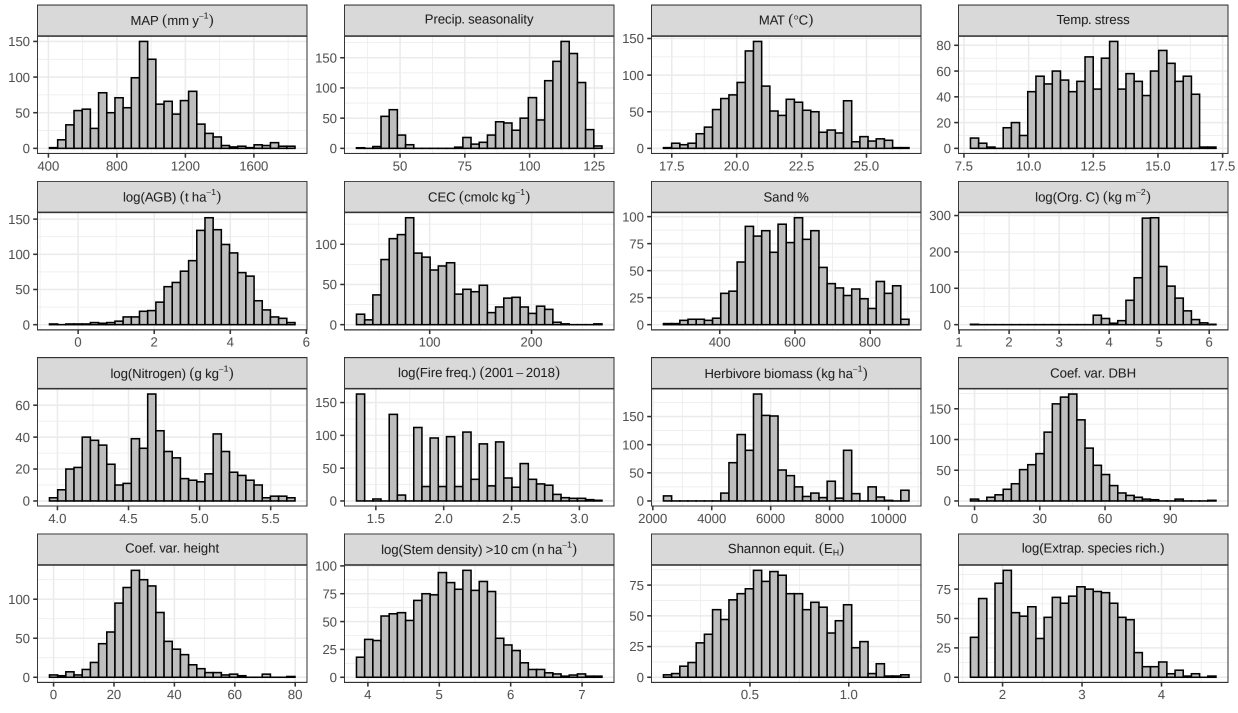

Fig. S2. Histograms of observed variables transformed to achieve a normal frequency distribution.

Table S1 - Table of correlation fit statistics

Table S1: Table of correlation fit statistics for all observed variables used in final analyses, showing the Pearson correlation coefficient (r), the correlation confidence interval upper and lower bounds, number of plots used in the correlation (n), and the p-value of the correlation.

X	Y	r	Lower bound	Upper bound	n	Prob.
Soil CEC	Soil C	0.260	0.210	0.310	1239	p <0.01
Soil N	Soil C	0.850	0.820	0.870	644	p <0.01
Fire freq.	Soil C	-0.070	-0.130	-0.010	1239	p <0.05
MAP	Soil C	0.510	0.460	0.550	1239	p <0.01
Precip. seas.	Soil C	-0.560	-0.600	-0.520	1239	p <0.01
Temp. stress	Soil C	-0.630	-0.670	-0.600	1239	p <0.01
Sand %	Soil C	-0.570	-0.610	-0.540	1239	p <0.01
Extrap. sp. rich.	Soil C	0.250	0.200	0.300	1239	p <0.01
Shannon equit	Soil C	0.230	0.180	0.280	1239	p <0.01
Tree height CoV	Soil C	0.230	0.170	0.290	981	p <0.01
DBH CoV	Soil C	0.160	0.110	0.220	1237	p <0.01
Stem density	Soil C	0.070	0.020	0.130	1239	p <0.05
AGB	Soil C	0.260	0.210	0.320	1239	p <0.01
Soil N	Soil CEC	0.440	0.370	0.500	644	p <0.01
Fire freq.	Soil CEC	-0.470	-0.510	-0.430	1239	p <0.01
MAP	Soil CEC	-0.280	-0.330	-0.220	1239	p <0.01
Precip. seas.	Soil CEC	-0.710	-0.730	-0.680	1239	p <0.01
Temp. stress	Soil CEC	-0.250	-0.300	-0.200	1239	p <0.01
Sand %	Soil CEC	-0.210	-0.270	-0.160	1239	p <0.01
Extrap. sp. rich.	Soil CEC	-0.380	-0.430	-0.330	1239	p <0.01
Shannon equit	Soil CEC	-0.090	-0.150	-0.040	1239	p <0.01
Tree height CoV	Soil CEC	-0.110	-0.170	-0.050	981	p <0.01

Table S1: Table of correlation fit statistics for all observed variables used in final analyses, showing the Pearson correlation coefficient (r), the correlation confidence interval upper and lower bounds, number of plots used in the correlation (n), and the p-value of the correlation.

X	Y	r	Lower bound	Upper bound	n	Prob.
DBH CoV	Soil CEC	-0.010	-0.070	0.040	1237	p = 0.62
Stem density	Soil CEC	-0.020	-0.080	0.030	1239	p = 0.43
AGB	Soil CEC	-0.040	-0.090	0.020	1239	p = 0.17
Fire freq.	Soil N	-0.250	-0.320	-0.180	644	p <0.01
MAP	Soil N	0.370	0.300	0.440	644	p <0.01
Precip. seas.	Soil N	-0.760	-0.790	-0.730	644	p <0.01
Temp. stress	Soil N	-0.800	-0.820	-0.770	644	p <0.01
Sand %	Soil N	-0.660	-0.700	-0.610	644	p <0.01
Extrap. sp. rich.	Soil N	0.440	0.380	0.500	644	p <0.01
Shannon equit	Soil N	0.350	0.280	0.420	644	p <0.01
Tree height CoV	Soil N	0.270	0.180	0.360	386	p <0.01
DBH CoV	Soil N	0.260	0.180	0.330	642	p <0.01
Stem density	Soil N	-0.030	-0.110	0.050	644	p = 0.47
AGB	Soil N	0.310	0.240	0.380	644	p <0.01
MAP	Fire freq.	0.370	0.320	0.420	1239	p <0.01
Precip. seas.	Fire freq.	0.360	0.310	0.410	1239	p <0.01
Temp. stress	Fire freq.	0.210	0.160	0.260	1239	p <0.01
Sand %	Fire freq.	0.060	0	0.110	1239	p <0.05
Extrap. sp. rich.	Fire freq.	0.380	0.340	0.430	1239	p <0.01
Shannon equit	Fire freq.	0.120	0.070	0.180	1239	p <0.01
Tree height CoV	Fire freq.	0.150	0.090	0.220	981	p <0.01
DBH CoV	Fire freq.	0.120	0.070	0.180	1237	p <0.01
Stem density	Fire freq.	-0.020	-0.070	0.040	1239	p = 0.52
AGB	Fire freq.	0.030	-0.030	0.080	1239	p = 0.33
Precip. seas.	MAP	-0.070	-0.120	-0.010	1239	p <0.05
Temp. stress	MAP	-0.490	-0.530	-0.440	1239	p <0.01
Sand %	MAP	-0.330	-0.380	-0.280	1239	p <0.01
Extrap. sp. rich.	MAP	0.410	0.360	0.450	1239	p <0.01
Shannon equit	MAP	0.150	0.100	0.200	1239	p <0.01
Tree height CoV	MAP	0.250	0.190	0.300	981	p <0.01
DBH CoV	MAP	0.110	0.060	0.170	1237	p <0.01
Stem density	MAP	0.020	-0.030	0.080	1239	p = 0.47
AGB	MAP	0.240	0.180	0.290	1239	p <0.01
Temp. stress	Precip. seas.	0.500	0.450	0.540	1239	p <0.01
Sand %	Precip. seas.	0.310	0.260	0.360	1239	p <0.01
Extrap. sp. rich.	Precip. seas.	0.120	0.070	0.180	1239	p <0.01
Shannon equit	Precip. seas.	-0.070	-0.120	-0.010	1239	p <0.05
Tree height CoV	Precip. seas.	-0.050	-0.110	0.010	981	p = 0.11
DBH CoV	Precip. seas.	-0.100	-0.150	-0.040	1237	p <0.01
Stem density	Precip. seas.	-0.040	-0.100	0.010	1239	p = 0.12
AGB	Precip. seas.	-0.180	-0.230	-0.130	1239	p <0.01
Sand %	Temp. stress	0.300	0.250	0.350	1239	p <0.01
Extrap. sp. rich.	Temp. stress	-0.130	-0.180	-0.070	1239	p <0.01
Shannon equit	Temp. stress	-0.130	-0.180	-0.070	1239	p <0.01
Tree height CoV	Temp. stress	-0.140	-0.200	-0.080	981	p <0.01
DBH CoV	Temp. stress	-0.040	-0.100	0.010	1237	p = 0.12
Stem density	Temp. stress	0.030	-0.020	0.090	1239	p = 0.27
AGB	Temp. stress	-0.170	-0.220	-0.110	1239	p <0.01

Table S1: Table of correlation fit statistics for all observed variables used in final analyses, showing the Pearson correlation coefficient (r), the correlation confidence interval upper and lower bounds, number of plots used in the correlation (n), and the p-value of the correlation.

X	Y	r	Lower bound	Upper bound	n	Prob.
Extrap. sp. rich.	Sand %	-0.270	-0.320	-0.220	1239	$p < 0.01$
Shannon equit	Sand %	-0.210	-0.260	-0.160	1239	$p < 0.01$
Tree height CoV	Sand %	-0.240	-0.300	-0.180	981	$p < 0.01$
DBH CoV	Sand %	-0.160	-0.210	-0.100	1237	$p < 0.01$
Stem density	Sand %	-0.140	-0.190	-0.080	1239	$p < 0.01$
AGB	Sand %	-0.220	-0.270	-0.160	1239	$p < 0.01$
Shannon equit	Extrap. sp. rich.	0.600	0.560	0.630	1249	$p < 0.01$
Tree height CoV	Extrap. sp. rich.	0.310	0.250	0.360	981	$p < 0.01$
DBH CoV	Extrap. sp. rich.	0.320	0.260	0.360	1247	$p < 0.01$
Stem density	Extrap. sp. rich.	0.230	0.170	0.280	1249	$p < 0.01$
AGB	Extrap. sp. rich.	0.330	0.280	0.380	1249	$p < 0.01$
Tree height CoV	Shannon equit	0.140	0.070	0.200	981	$p < 0.01$
DBH CoV	Shannon equit	0.230	0.170	0.280	1247	$p < 0.01$
Stem density	Shannon equit	0.410	0.360	0.450	1249	$p < 0.01$
AGB	Shannon equit	0.380	0.330	0.420	1249	$p < 0.01$
DBH CoV	Tree height CoV	0.490	0.440	0.540	981	$p < 0.01$
Stem density	Tree height CoV	0	-0.060	0.060	981	$p = 0.95$
AGB	Tree height CoV	0.240	0.180	0.300	981	$p < 0.01$
Stem density	DBH CoV	0.110	0.050	0.160	1247	$p < 0.01$
AGB	DBH CoV	0.440	0.400	0.490	1247	$p < 0.01$
AGB	Stem density	0.570	0.530	0.610	1249	$p < 0.01$

Fig. S3 - Bivariate relationships of model variables

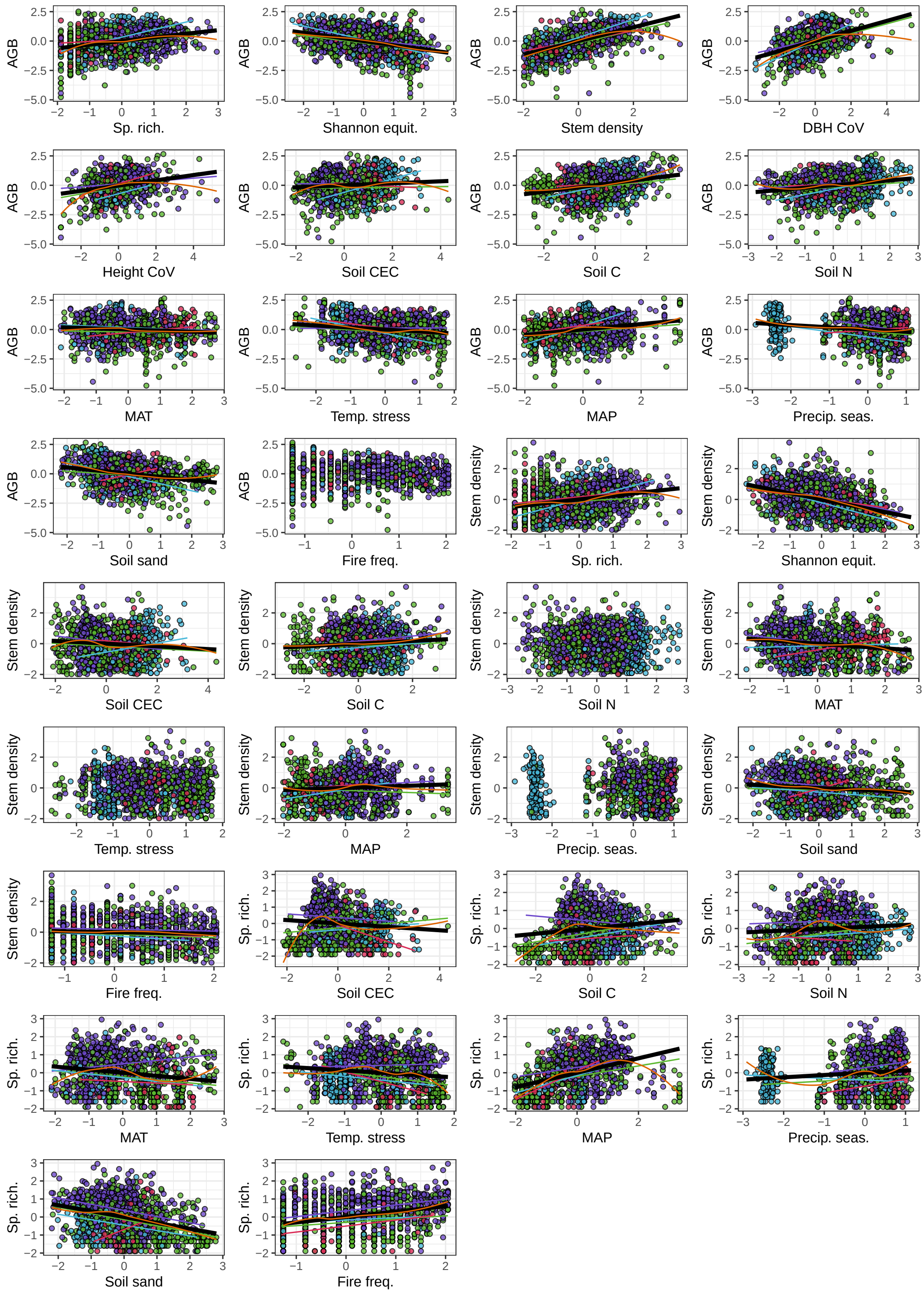

Fig. S3. Bivariate scatter plots for each observed variable used in the SEMs (Structural Equation Models), based on hypothesised paths of causality. Points are coloured according to vegetation type: green = Sparse miombo/Baikiaea, purple = Core miombo, blue = ex-Acacia, red = Mopane. The black line combines all vegetation types in a single linear regression, while loess trend lines are fitted for each vegetation type, separately. An orange loess trend line is fitted for all the data. All data is standardised to a mean of zero and a standard deviation of one. Variables are transformed where it was appropriate for analysis.

Fig. S4 - Path coefficients for model incorporating environmental covariates

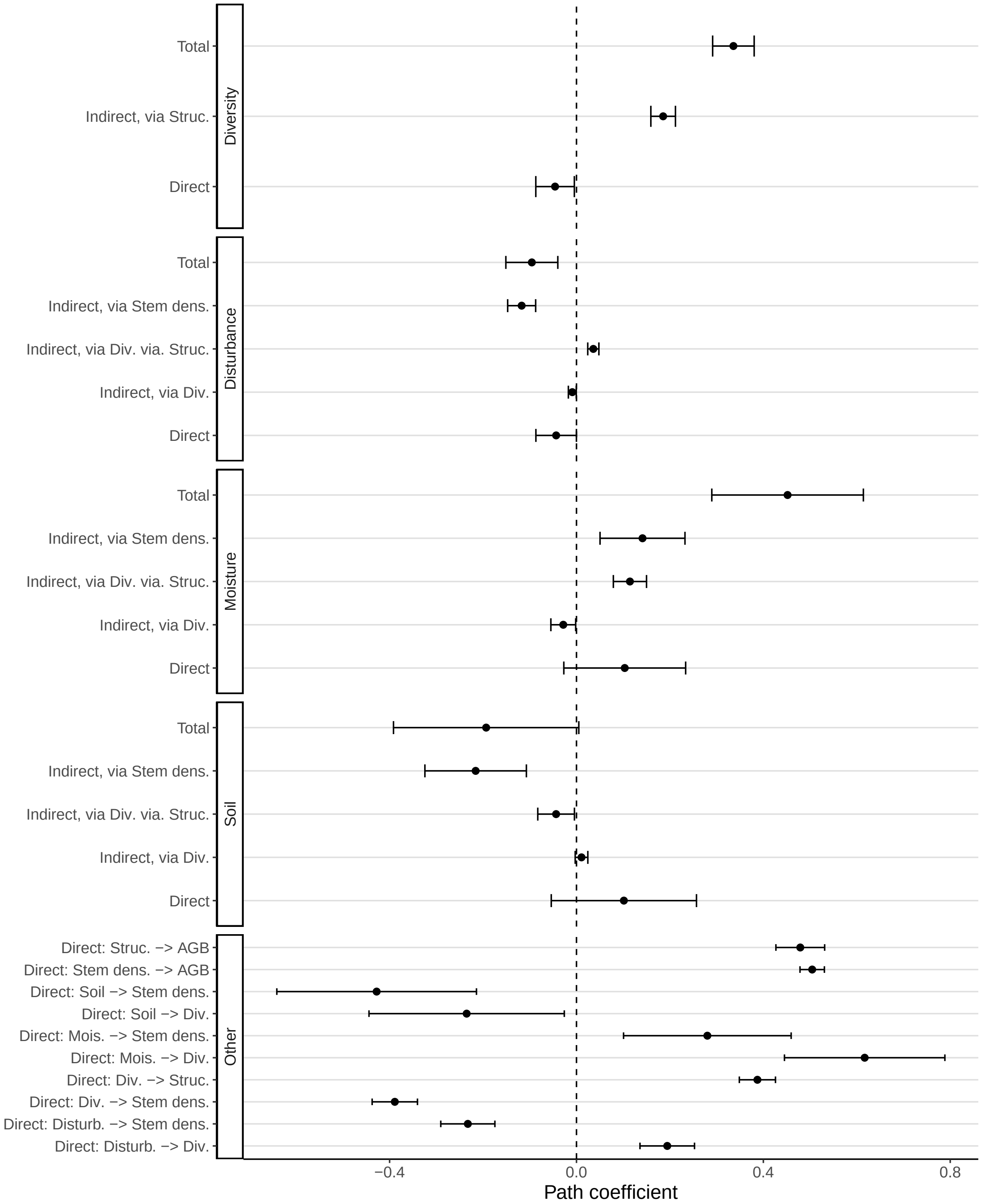

Fig. S4. Unstandardised path coefficients for the full model including tree species diversity, environmental covariates and stem density. Path coefficients are ±1 standard error. Path coefficients where the interval (standard error) does not overlap zero are considered to be significant effects.