Unravelling Spatial Scale Effects on Elevational Diversity Gradients: Insights from Montane Small Mammals in Kenya

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Additional files, Fig. S1 - Fig. S8

Abbreviations common across figures include diversity indices (SR: species richness; PD: phylogenetic richness—diversity; FD: functional richness—diversity; PD^{MNTD}: mean nearest taxa distance—phylogenetic divergence; FD^{MNTD}: mean nearest taxa distance—functional divergence) and environmental variables used as predictors of diversity indices across regression models (PAM: annual mean precipitation; TRI: terrain ruggedness index; NDVI: Normalized difference vegetation index quantify vegetation greenness; AET: average evapotranspiration; TAS: annual temperature seasonality; TAM: annual average temperature; PAS: annual precipitation seasonality, for the environmental variables used as diversity predictors; HFP: human ecological footprint).

Fig. S1 The geographical regionalization of the studied mountains based on species composition (**a**) and multiple diversity indices (**b**). (**a**) shows a biplot from a canonical correspondence analysis (CCA) based on the predictor variables (environmental and human footprint factors). The lengths and directions of the arrows indicate how each variable influences the species composition. The clustering of points suggests similar species composition in those regions, influenced by the environmental gradients indicated by the arrows. (**b**) shows the Principal component analysis (PCA) of the diversity indices across the studied mountains, illustrating grid clustering based on these diversity indices to aid in visualizing geographical affinities between mountains.

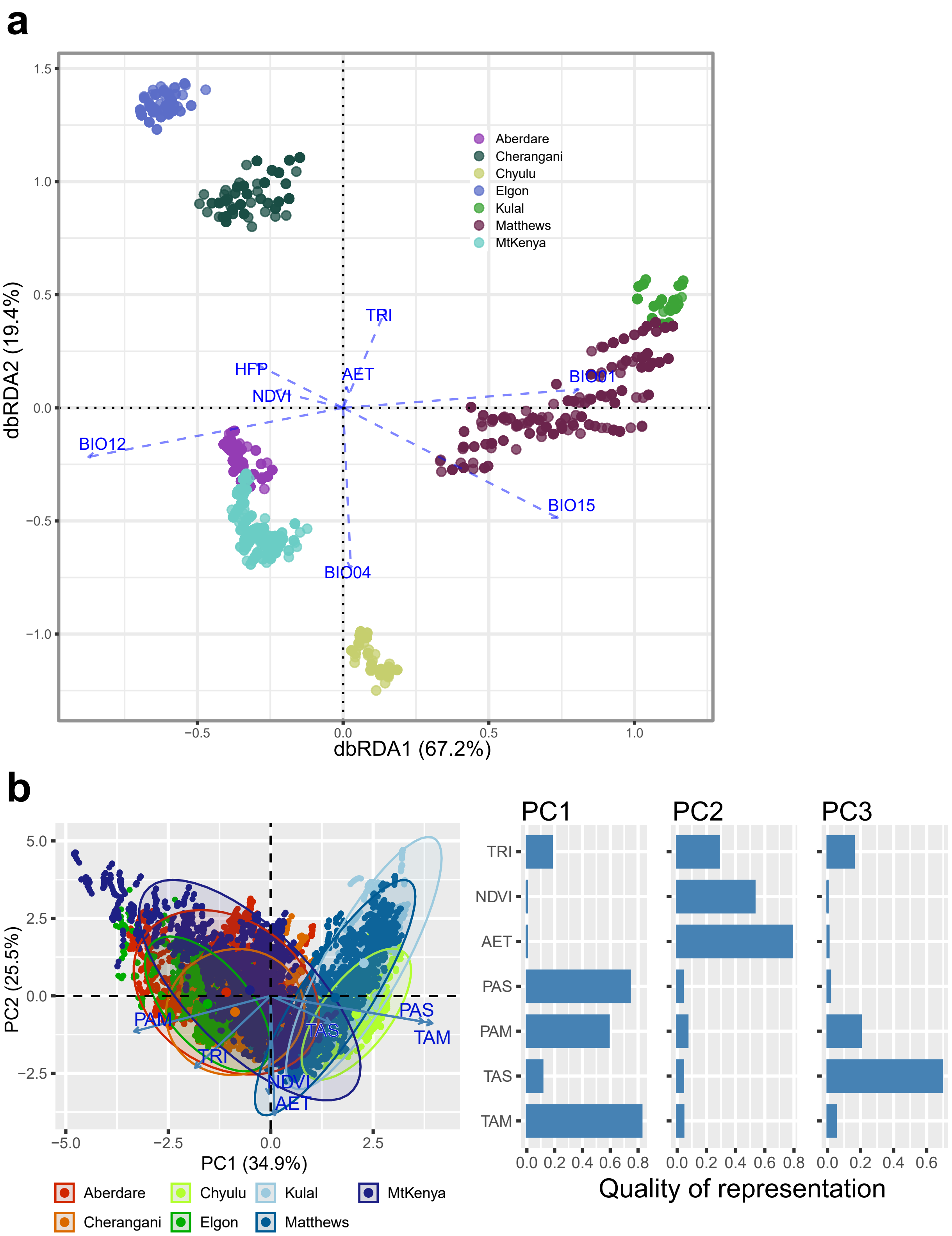

Fig. S2 The influence of spatial scale variations on bivariate correlations between the diversity indices. The correlations were inferred using Pearson correlation coefficient.

Fig. S3 Spatial grain influence on species richness distribution under the mid-domain effect hypothesis across Kenya's montane ecosystems. '**a**' shows the observed elevational distribution of species richeness in the top panel while the bottom panel shows the distribution of species richness modelled under a mid domain effect null model. '**b**' shows the magnitude of the deviation of the observed species richness from the mid domain effect null species richness.

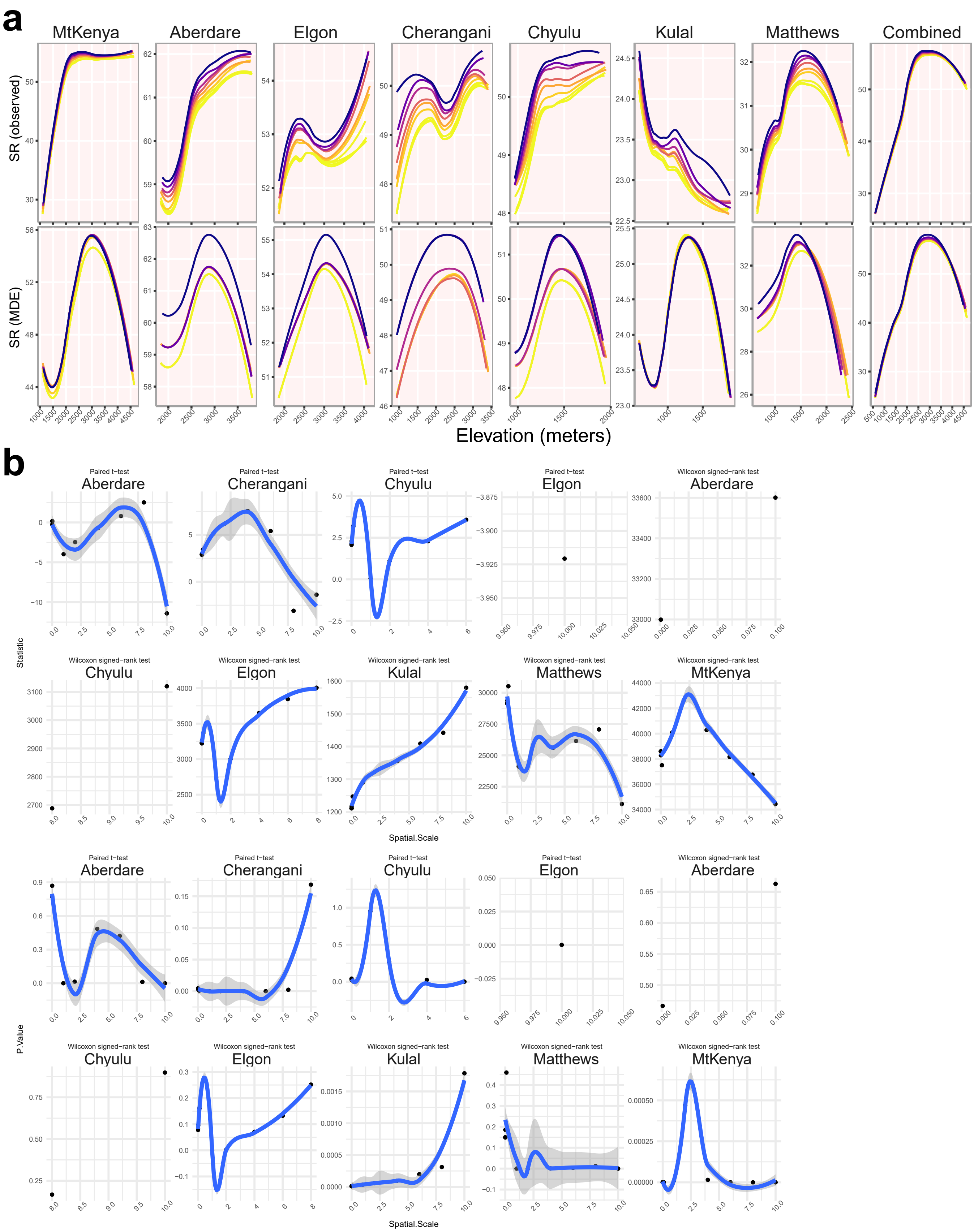

Fig. S4 Influence of spatial grain on diversity-elevation relationships. The curves illustrate the association between diversity and elevation without confidence intervals to facilitate easier visualization. '**a**' is derived from linear regression, while '**b**' is derived from nonlinear generalized additive regression. The color gradient from yellow (0.0001 km²) to dark blue (10 km²) represents the variations of spatial grains used for sampling.

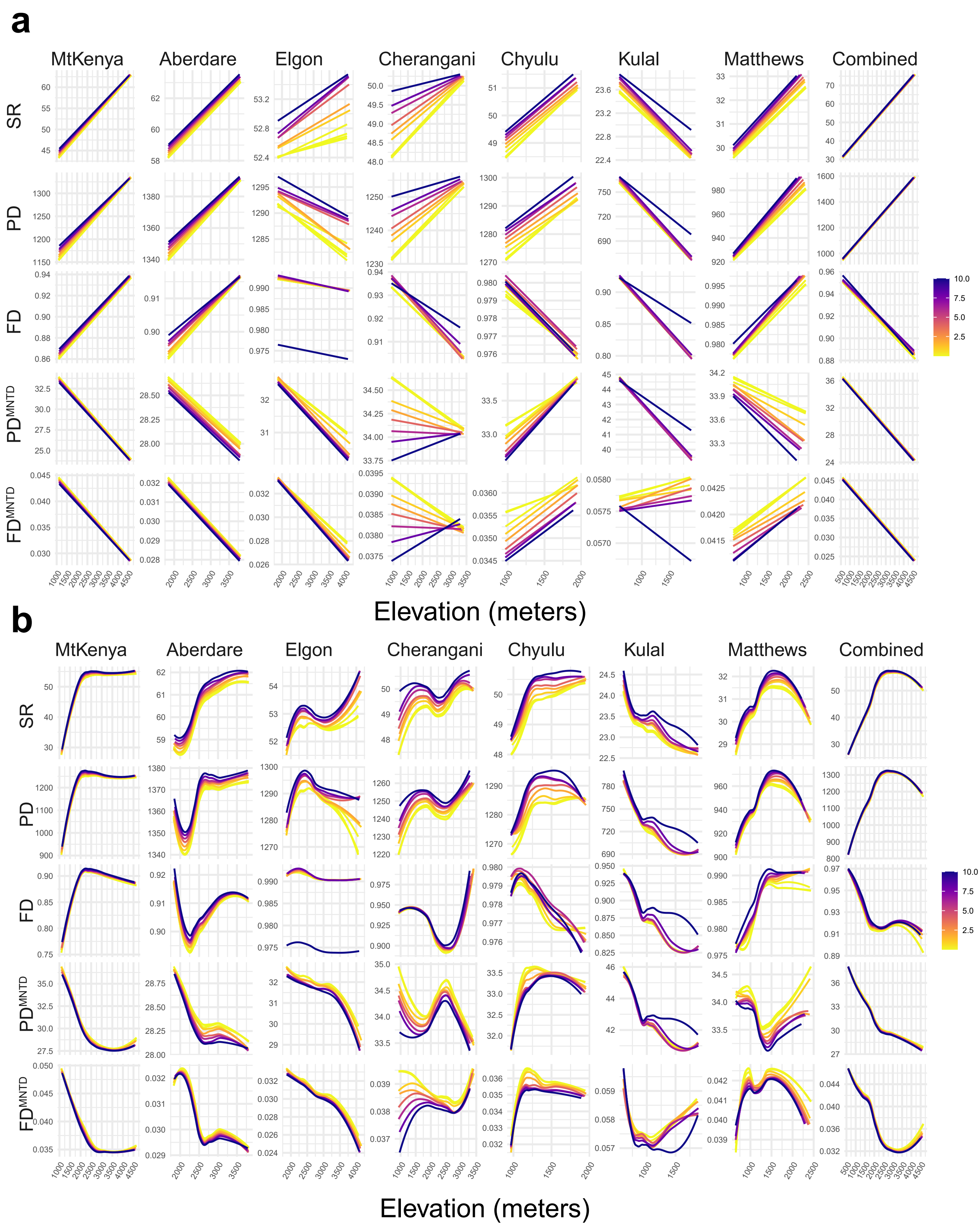

Fig. S5 The influence of spatial scale on diversity-environment associations across different elevation bands. Each plot within the panels corresponds to a diversity index at a specific mountain. Distinct color-coded symbols represent various elevation bands as described in the legends. ‘**a**’ shows the Akaike Information Criterion, AIC, values and ‘**b**’ shows the coefficient of determination, R^2.

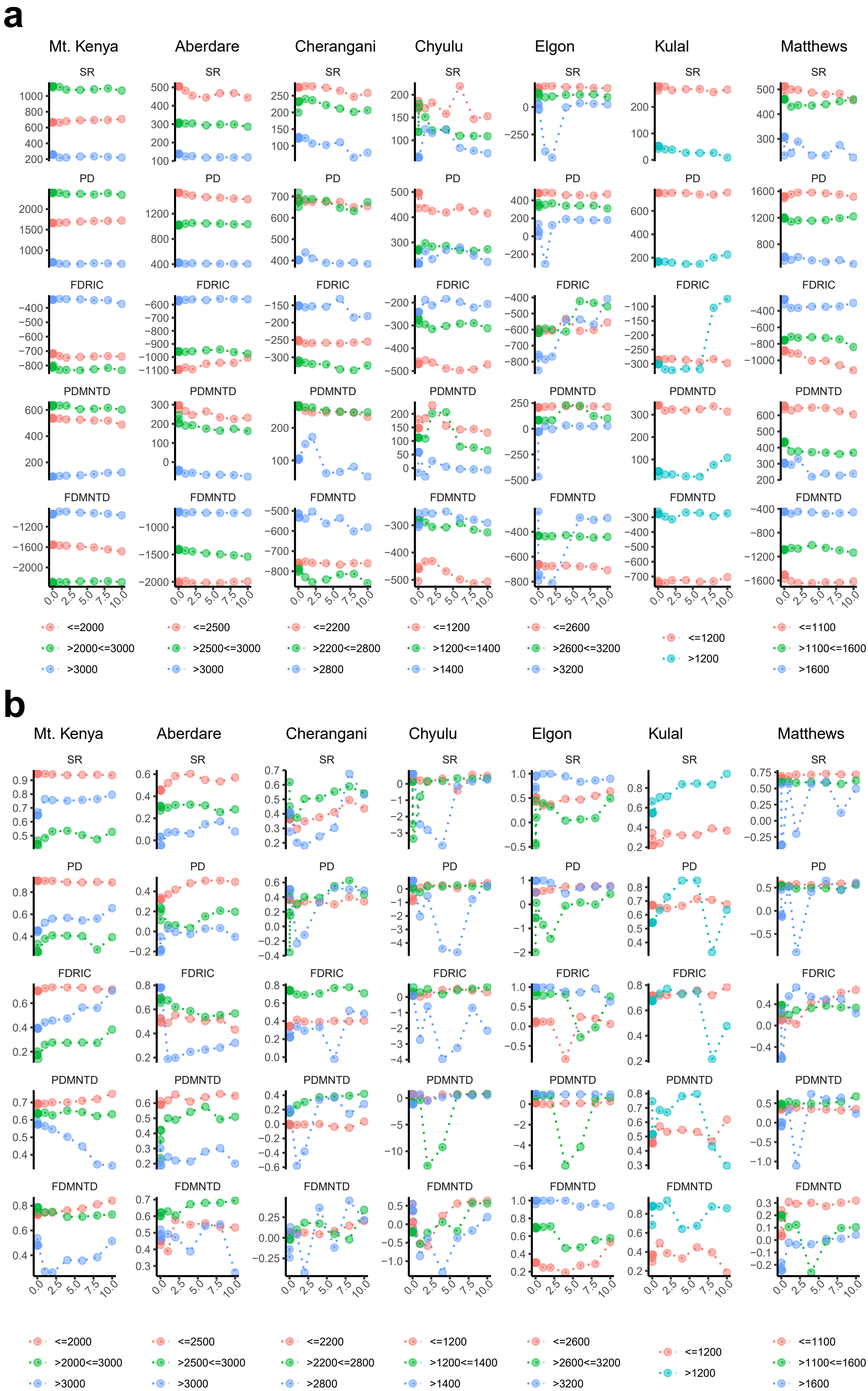

Fig. S6 The influence of spatial scale on associations between human ecological footprint index (HFP) and diversity patterns across mountains in Kenya. **a** illustrates the variation in the Akaike Information Criterion (AIC) and **b** shows variations in the coefficient of determination (R^2). The blue lines with shaded 95% confidence intervals are derived from generalized linear models to visulize the topology of spatial scale influence.

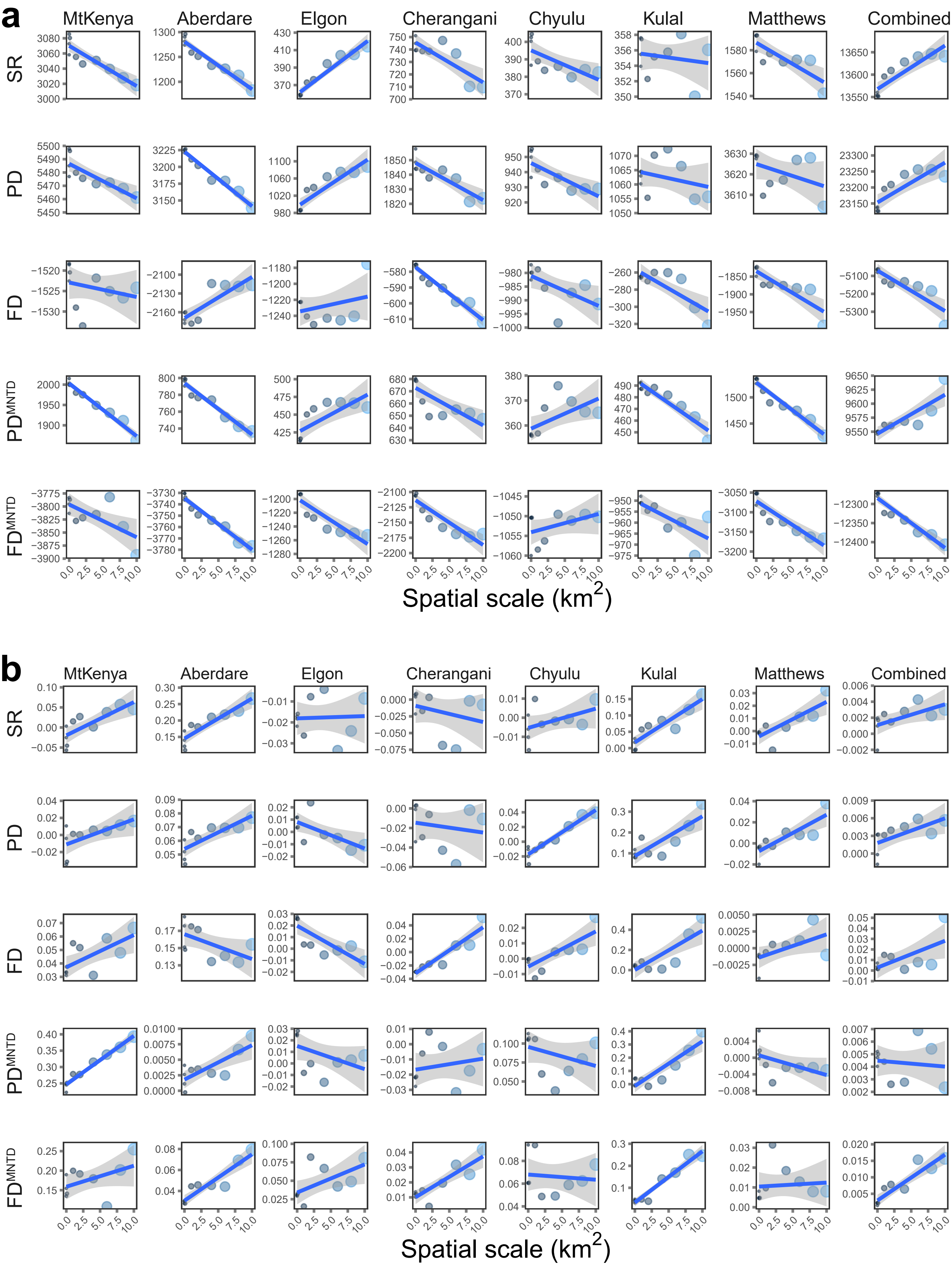

Fig. S7 The influence of spatial grain on relationships between human ecological footprint (HFP) and diversity patterns. The figure displays the variation in diversity-HFP patterns across different spatial grains depicted by the different line colors represented in the legend.

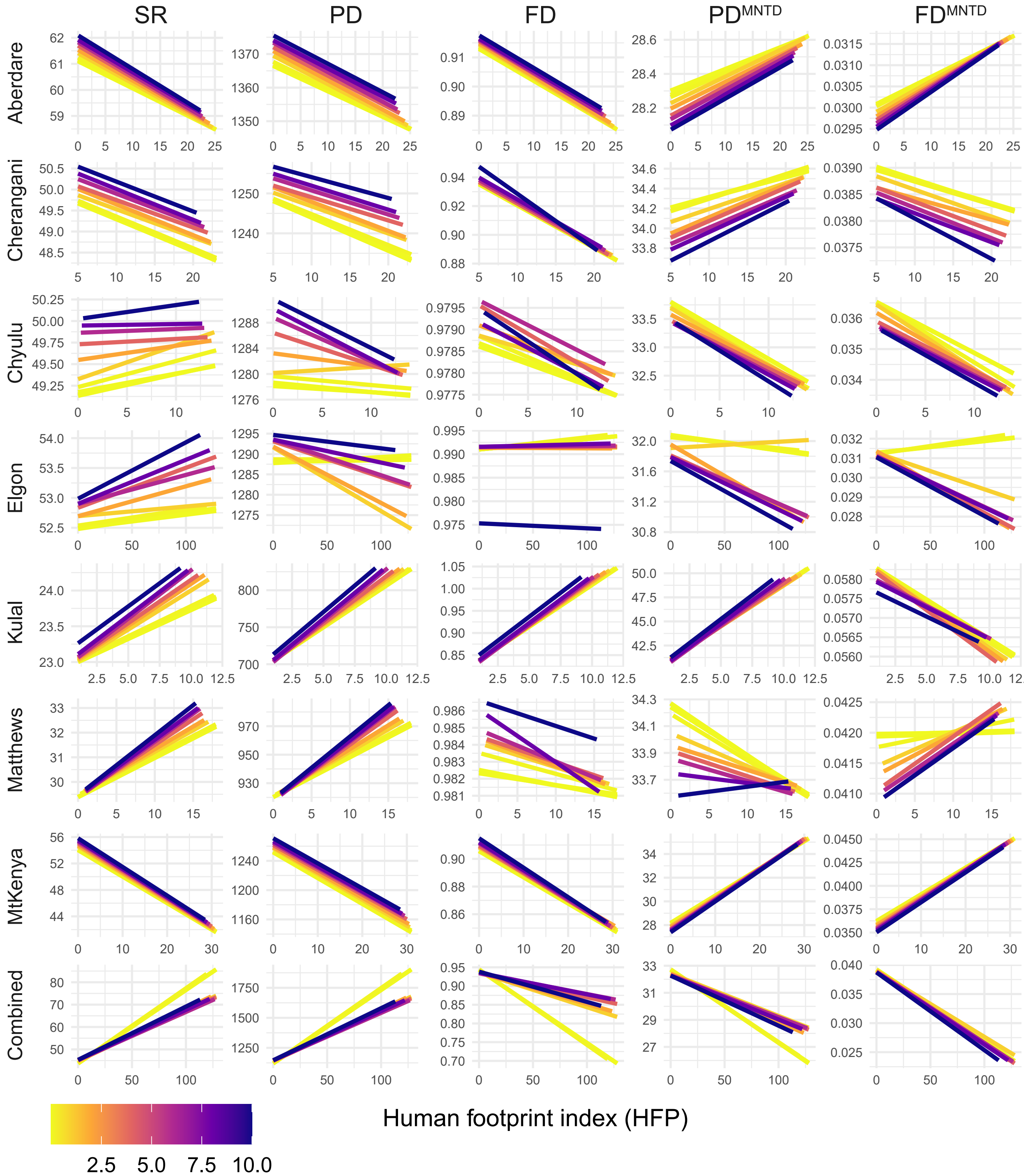

Fig. S8 The relationships between diversity indices and environmental predictors across spatial scales. The principal component analysis (PCA) presented in (A) is further explored in linear and nonlinear plots (B) displaying the correlation between a composite diversity index derived from the first component of a PCA of all diversity indices versus a composite predictor variable derived from the environmental predictor variables' PCA.