# Ecography

## Supplementary material

### Appendix S1

Simultaneous autoregressive models explicitly account for spatial autocorrelation in the model formulation. See Anselin (1988), Haining (2003), Dormann et al. (2007) and Kissling and Carl (2008) for further details.

Here we fitted a SAR error model which explicitly incorporated autocorrelation in the error term:

$$WC = TS + VEGTYPE \times (DW + DW^2 + DW^3) + \lambda W \mu + \varepsilon \tag{S1}$$

with WC a vector of woody cover, TS a third-order polynomial trend surface, VEGTYPE a categorical vector identifying vegetation types, DW a vector of distance-to-water, $\lambda$ a spatial autoregression coefficient, W a spatial weight matrix which elements represent a measure of the connection between locations (here neighbourhood follows a rook's rule, i.e. neighbours are adjacent cells), $\mu$ the spatially-dependent error term, and $\varepsilon$ the spatially-independent errors. We also fitted a SAR mixed model which explicitly accounted for autocorrelation in both the response and the explanatory variables:

$$WC = \rho W \times WC + TS + VEGTYPE \times (DW + DW^2 + DW^3) + \gamma WX + \varepsilon$$

with $\rho$ and $\gamma$ autoregression coefficients, and X a matrix of the explanatory variables. Others parameters are like in eq. S1.

Lagrange multiplier tests (LM) and their robust forms (RLM; Anselin 1988) indicated that the SAR mixed model should be favoured over the SAR error model:

Lmerr = 22599.62, $p < 0.0001$; LMlag = 24128.40, $p < 0.0001$.
RLMerr = 238.05, $p < 0.0001$; RLMlag = 1766.82, $p < 0.0001$.

# Appendix S2

Statistics of OLS third- and lower order polynomial regression models of woody cover in relation to distance-to-water, aggregated (i.e. averaged) across 500 m classes. Sample size (n), log-likelihood, number of free parameters (Np), Akaike information criterion (AIC), ΔAIC, Akaike weights (w) and R² are shown. Models with ΔAIC < 2 are in bold. There was no data in the latest distance class for the "Baikiaea" and "Mopane" vegetation types.

| Vegetation type | Model | Log-likelihood | Np | AIC | ΔAIC | w | R² |
|---|---|---|---|---|---|---|---|
| Baikiaea | **Null** | **99.439** | **1** | **−194.878** | **0.841** | **0.202** | |
| (n= 38) | **Poly. Order 1** | **100.844** | **2** | **−195.689** | **0.030** | **0.303** | **0.071** |
| | **Poly. Order 2** | **101.357** | **3** | **−194.714** | **1.005** | **0.186** | **0.096** |
| | **Poly. Order 3** | **102.860** | **4** | **−195.719** | **0.000** | **0.308** | **0.165** |
| Mopane | Null | 93.491 | 1 | −182.982 | 25.579 | 0.000 | |
| (n=38) | Poly. Order 1 | 93.491 | 2 | −180.983 | 27.578 | 0.000 | 0.000 |
| | **Poly. Order 2** | **108.280** | **3** | **−208.561** | **0.000** | **0.605** | **0.541** |
| | **Poly. Order 3** | **108.854** | **4** | **−207.708** | **0.852** | **0.395** | **0.555** |
| Various | Null | 94.316 | 1 | −184.632 | 48.327 | 0.000 | |
| (n=39) | Poly. Order 1 | 98.943 | 2 | −191.886 | 41.073 | 0.000 | 0.211 |
| | Poly. Order 2 | 115.930 | 3 | −223.860 | 9.099 | 0.010 | 0.670 |
| | **Poly. Order 3** | **121.479** | **4** | **−232.959** | **0.000** | **0.990** | **0.752** |