

Supplementary material

Table S1. Summary statistics (mean, minimum and maximum values, standard deviation) of richness and environmental variables used in regression analyses.

Variable	Code	Mean	Min	Max	SD
Carabid species richness – total	–	469.9	87.0	1273.0	245.5
Carabid species richness – widespread species	–	402.1	81.0	804.0	159.0
Carabid species richness – endemics	–	67.8	0.0	469.0	109.0
Latitude (decimal degrees)	lat	46.5	25.0	64.0	9.5
Longitude (decimal degrees)	long	15.0	–8.0	33.0	11.3
Area (10 ³ km ²)	area	290.6	9.2	2381.7	473.3
Elevation range (m)	elev	2170.8	180.0	4809.0	1307.6
Mean annual temperature (°C)	temp	10.3	1.5	22.5	5.3
Mean temperature coldest month (°C)	cold	0.6	–11.3	12.9	6.4
Mean temperature warmest month (°C)	warm	19.6	11.7	32.4	4.8
Temperature seasonality (°C)	seast	19.0	9.8	26.6	3.8
Mean annual precipitation (mm)	prec	712.0	51.0	1537.0	313.7
Mean precipitation March–November (mm)	prec_mn	514.7	30.2	713.9	182.3
Seasonality precipitation (mm)	seasp	51.0	6.4	106.6	23.5
Potential evapotranspiration (mm yr ⁻¹)	PET	709.1	461.6	1192.5	187.5
Actual evapotranspiration (mm yr ⁻¹)	AET	504.3	56.4	683.7	151.6
Frost frequency (d)	frost	98.0	14.1	203.5	54.1

Table S2. Coefficients of determination for linear regressions of total, widespread and endemic carabid diversity against single environmental variables for large countries (>10⁶ km²) of the study region. Function: polynomial terms were fitted for curvilinear relationships (e.g. “factor–factor²” or “factor+factor²”), (+) indicates positive linear relationships.

Variable	Total		Widespread		Endemic	
	function	R ² _{adj}	function	R ² _{adj}	function	R ² _{adj}
Latitude (decimal degrees)	lat–lat ² +lat ³	0.75*	lat–lat ² +lat ³	0.79*	lat–lat ² +lat ³	0.83**
Longitude (decimal degrees)	n.s.		n.s.		n.s.	
Area (km ²) (log ₁₀)	n.s.		n.s.		n.s.	
Elevation range (m)	elev (+)	0.40**	elev (+)	0.25*	elev (+)	0.59**
Mean annual temperature (°C)	temp–temp ²	0.52*	temp–temp ²	0.58*	temp–temp ²	0.71**
Mean temperature coldest month (°C)	n.s.		cold–cold ²	0.54*	cold–cold ²	0.62*
Mean temperature warmest month (°C)	n.s.		n.s.		warm–warm ²	0.60*
Temperature seasonality (°C)	n.s.		n.s.		n.s.	
Mean annual precipitation (mm)	prec–prec ²	0.41*	prec–prec ²	0.55**	n.s.	
Mean precipitation March–November (mm)	prec_mn (+)	0.35*	prec_mn (+)	0.50*	n.s.	
Seasonality precipitation (mm)	n.s.		n.s.		n.s.	
Potential evapotranspiration (mm yr ⁻¹)	PET–PET ²	0.57*	PET–PET ²	0.61*	PET–PET ²	0.75**
Actual evapotranspiration (mm yr ⁻¹)	AET (+)	0.39*	AET (+)	0.54*	n.s.	
Frost frequency (d)	n.s.		n.s.		frost (+)	0.52*

p-values corrected for spatial autocorrelation: *** p<0.001; ** p<0.01; *p<0.08 ; n.s. not significant.

Table S3. Results (coefficients of determination, F-values, degrees of freedom and probabilities) of regression modelling for total, widespread and endemic species diversity for large countries (>10⁶ km²) in the Western Palaearctic study region. Variable abbreviations see Table S1.

Modeltype	Model (function)	R ² _{adj}	F	DF	p
Total					
Spatial (S)	lat–lat ² +lat ³	0.75	16.82	3, 16	<0.001
Topographic (T)	elev	0.40	11.99	1, 18	0.003
Climatic (C)	PET+PET ²	0.57	11.36	2, 17	<0.001
Combined (T+C)	elev; PET+PET ²	0.72	15.50	3, 16	<0.001
Total (S+T+C)	lat–lat ² +lat ³ ; elev; PET+PET ²	0.93	28.88	6, 13	<0.001
Widespread					
Spatial (S)	lat–lat ² +lat ³	0.79	21.05	3, 16	<0.001
Topographic (T)	elev	0.25	5.99	1, 18	0.025
Climatic (C)	cold–cold ² ; prec–prec ²	0.68	9.25	4, 15	<0.001
Combined (T+C)	elev; cold–cold ² ; prec–prec ²	0.84	17.58	5, 14	<0.001
Total (S+T+C)	lat–lat ² +lat ³ ; elev; cold–cold ² ; prec–prec ²	0.95	23.88	8, 11	<0.001
Endemic					
Spatial (S)	lat–lat ² +lat ³	0.83	27.30	3, 16	<0.001
Topographic (T)	elev	0.59	25.65	1, 18	<0.001
Climatic (C)	PET+PET ²	0.75	25.27	2, 17	<0.001
Combined (T+C)	elev; PET+PET ²	0.89	43.51	3, 16	<0.001
Total (S+T+C)	lat–lat ² +lat ³ ; elev; PET+PET ²	0.96	48.91	6, 13	<0.001

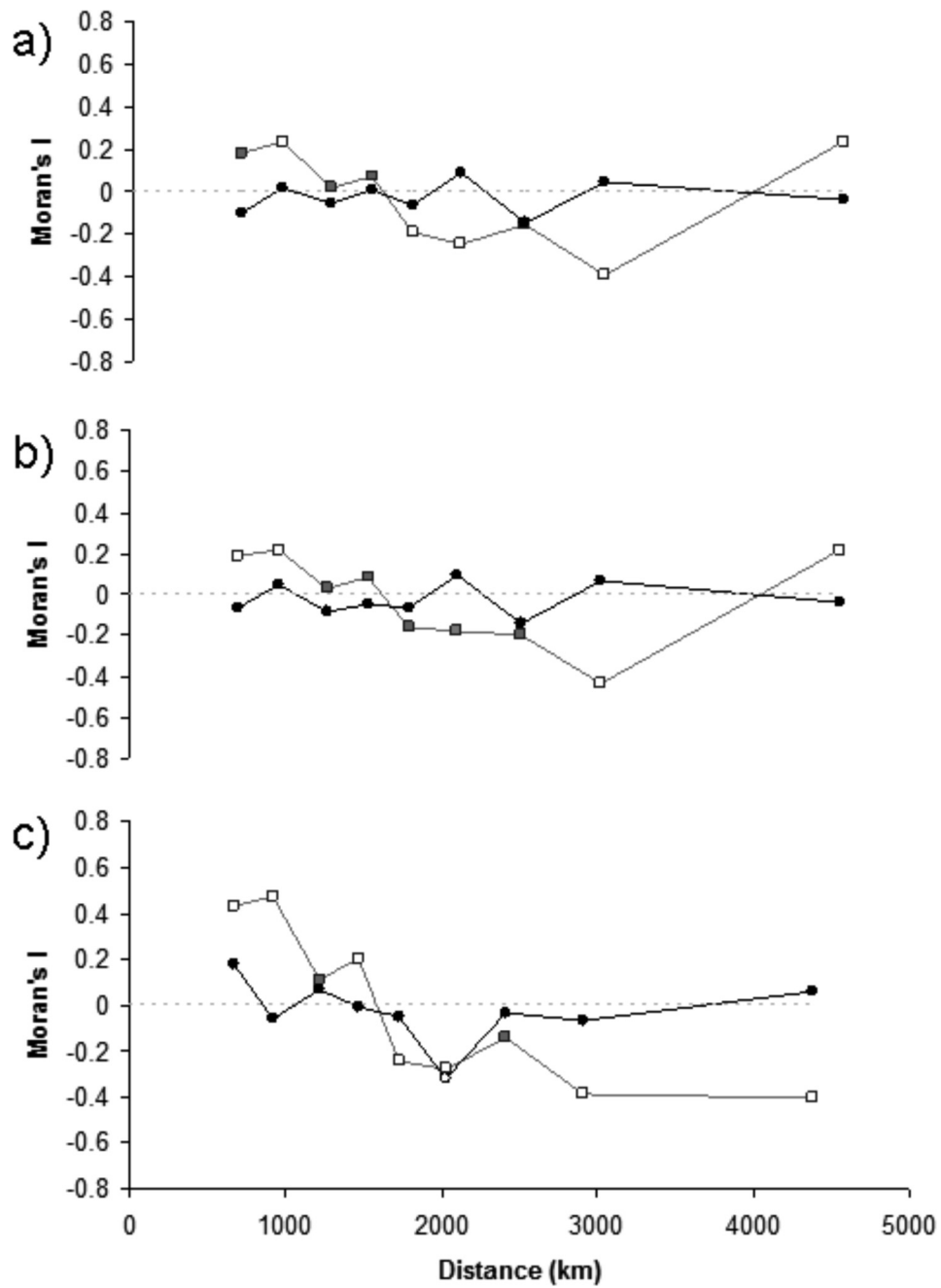


Figure S1. Spatial correlograms for carabid diversity before (grey line) and after (black line) fitting the environmental models: a) total diversity; b) widespread species diversity; c) endemic diversity. Open symbols: significant autocorrelation, filled symbols: no significant autocorrelation in the data.

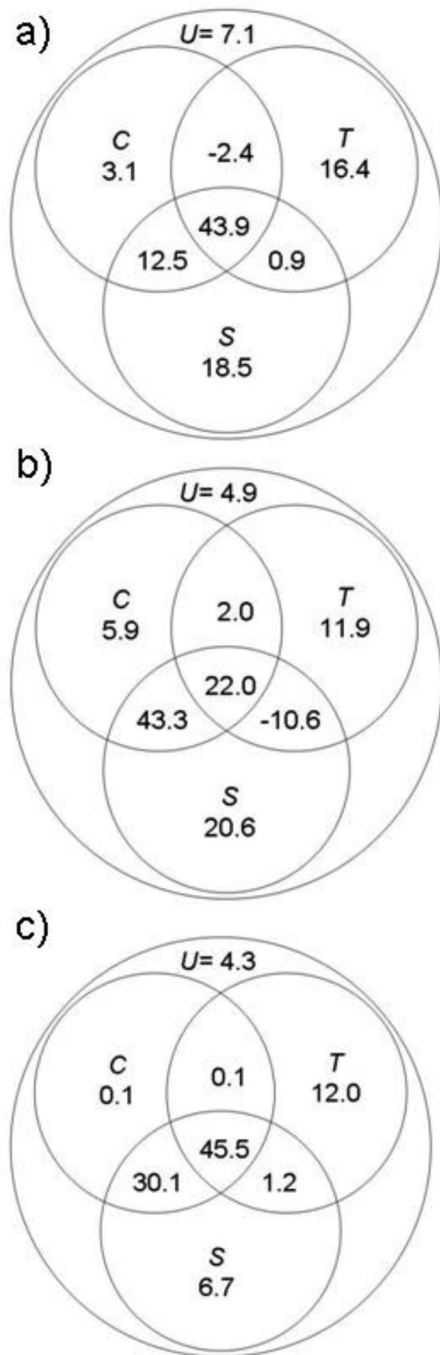


Figure S2. Variation partitioning for a) total diversity, b) richness of widespread species and c) endemic richness of large countries (>10⁶ km²) between independent and shared effects of spatial (S), topographic (T) and climate (C) models. U is the unexplained variation. All numbers indicate % of total variation.