Ecography

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Supplementary material

Supplementary material

Appendix 1 – Descriptive data tables

Table A1. General characteristics of the 28 catchments analyzed in this study. total_HEADW = number of headwater sites; total_RIVER = number of downstream sites; Richness = Number of species found in the catchment, SA = catchment surface area. Numbers beside catchment names refer to their codes in Fig 1.

Catchment	total_HEADW	total_RIVER	Richness	SA (km^2)
Adour (1)	59	112	45	16878
Allier (2)	73	78	44	14338
Aube (3)	33	62	38	10367
Aude (4)	56	45	42	5234
Charente (5)	23	29	44	9510
Cher (6)	31	69	42	13700
Dordogne (7)	64	62	45	15681
Doubs (8)	24	56	40	7828
Drôme (9)	16	17	21	1645
Durance (10)	65	75	37	13162
Garonne (11)	29	50	43	15180
Rhône (12)	59	78	40	16309
Ill (13)	99	65	38	4724
Isère (14)	58	55	33	11755
Loire (15)	268	127	49	18288
Lot (16)	25	41	36	11573
Marne (17)	72	92	43	12731
Mayenne (18)	26	18	35	5846
Chiers (19)	59	34	36	4158
Meuse (20)	38	16	35	2140
Moselle (21)	129	68	45	28212
Oise (22)	83	99	42	16857
Saône (23)	87	84	43	11842
Sarthe (24)	21	20	41	7979
Tarn (25)	42	36	38	9743
Vienne (26)	66	81	42	21123
Vilaine (27)	20	20	41	10477
Yonne (28)	65	74	39	10802

Table A2. List of species used in this study with the number of sites and catchments that they are present.

Species name	Number of sites	Number of catchments
Abramis brama	426	26
Alburnoides bipunctatus	602	25
Alburnus alburnus	763	28
Alosa alosa	6	6
Ambloplites rupestris	11	1
Ameiurus melas	328	24
Anguilla anguilla	728	28
Aspius aspius	11	4
Barbatula barbatula	2073	28
Barbus barbus	871	27
Barbus meridionalis	80	6
Blicca bjoerkna	394	26
Carassius auratus	59	19
Carassius carassius	251	25
Carassius gibelio	47	16
Chondrostoma nasus	421	19
Cobitis taenia	112	11
Cottus gobio	1619	28
Cyprinus carpio	405	27
Esox lucius	770	27
Gambusia affinis	32	7
Gasterosteus aculeatus	408	25
Gobio gobio	1792	28
Gymnocephalus cernuus	354	26
Lampetra fluviatilis	7	4
Lampetra planeri	825	26
Lepomis gibbosus	751	27
Leucaspius delineatus	107	19
Leuciscus burdigalensis	67	14
Leuciscus idus	14	6
Leuciscus leuciscus	941	28
Lota lota	150	14
Micropterus salmoides	73	18
Misgurnus fossilis	9	1
Pachychilon pictum	28	5
Parachondrostoma toxostoma	172	16
Perca fluviatilis	1094	27
Petromyzon marinus	71	8
Phoxinus phoxinus	1974	28
Potamoschistus minutus	0	0
Pseudorasbora parva	213	22
Pungitius pungitius	339	17
Rhodeus amarus	426	27
Rutilus rutilus	1409	27
Salaria fluviatilis	2	2
Salmo salar	167	10
Salmo trutta fario	2310	28
Salmo trutta trutta	2	2
Salvelinus fontinalis	45	15
Sander lucioperca	222	26
Scardinius erythrophthalmus	628	28
Silurus glanis	206	25
Squalius cephalus	1741	28
Telestes souffia	200	11
Thymallus thymallus	164	21
Tinca tinca	650	27
Zingel asper	11	2

Table A3. Descriptive statistics of environmental variables computed across sampling sites. Min = minimum value, max = maximum value, mean = average value, std = standard deviation.

Variable name	Code	min	max	mean	std
Elevation (m)	ELE	2	2239.00	352.64	296.91
Slope (‰)	SLO	0	272.00	11.03	19.20
Mean stream width (m)	WID	0.2	790.00	12.15	24.77
Mean discharge (m^3/s)	MD	0	522.15	10.20	34.46
River bed surface grain size*	RBSGS	-8.42	5.17	-3.46	2.78
Annual mean temperature	BIO1	3.21	15.02	10.91	1.44
Mean diurnal range	BIO2	8.87	19.59	12.56	1.21
Isothermality	BIO3	30.35	72.21	43.72	4.36
Temperature seasonality	BIO4	425.72	712.74	602.77	40.80
Max temperature of warmest month	BIO5	15.85	28.26	25.01	1.35
Min temperature of coldest month	BIO6	-10.59	2.23	-3.76	1.87
Temperature annual range	BIO7	22.07	31.50	28.78	1.48
Mean temperature of wettest quarter	BIO8	2.02	19.87	8.70	3.66
Mean temperature of driest quarter	BIO9	-2.26	23.20	9.76	6.24
Mean temperature of warmest quarter	BIO10	10.17	23.20	18.67	1.45
Mean temperature of coldest quarter	BIO11	-2.72	9.21	3.66	1.60
Annual precipitation	BIO12	587.37	2194.46	988.27	256.77
Precipitation of wettest month	BIO13	64.46	290.04	108.52	31.25
Precipitation of driest month	BIO14	16.35	150.68	60.64	18.56
Precipitation seasonality	BIO15	8.24	48.03	18.13	6.13
Precipitation of wettest quarter	BIO16	178.80	750.05	300.14	81.26
Precipitation of driest quarter	BIO17	74.54	471.95	198.30	57.68
Precipitation of warmest quarter	BIO18	74.54	550.98	228.98	56.73
Precipitation of coldest quarter	BIO19	104.33	729.32	247.06	81.47

*RBSBS was computed as $-\log_2(D)$, where D is the average grain size of the sediment. Refer to Snelder et al. (2011) for more details.

Appendix 2 – Graph Theory Metrics

All node metrics were normalized before being included in the spatial model and they were calculated using the *igraph* R package (Csardi and Nepus 2006).

Degree

Description: It is simply the number of edges connected to a node

Formula:

$$DE(i) = \sum g(i)$$

Where $g(i)$ is the number of edges connected to i

Normalized Degree

Description: Is the degree divided by the total number of edges in the network

Formula:

$$DE_{norm}(i) = \frac{DE(i)}{(g-1)}$$

Where g is the total number of edges in the network

Visualization:

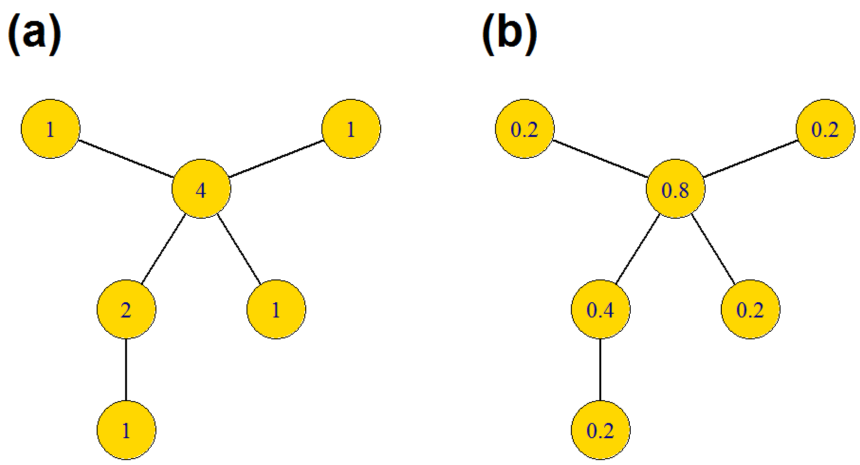

Figure A1. Example for the degree (DE) metric**.** (a) DE (b) Normalized DE. Numbers inside each node represent their value for these metrics.

Closeness centrality

Description: It is a measure of how close a given node is to all other nodes in the network. It is calculated as the inverse of the sum of the shortest distance between a given node and all other nodes in the network

Formula:

$$CC(i) = \frac{1}{\sum_{1}^{n-1} d_{ij}}$$

Where d_{ij} is the shortest distance between the focal node i and all other nodes j. $n-1$ refers to all nodes in the network except the focal node. In the following example, all edges have a distance of 1.

Normalized Closeness centrality

Description: It is the closeness centrality standardized by the total number of nodes connected to the focal node (i.e., $n - 1$).

Formula:

$$CC_{norm}(i) = CC * (n - 1)$$

Where n is the total number of nodes in the network

Visualization:

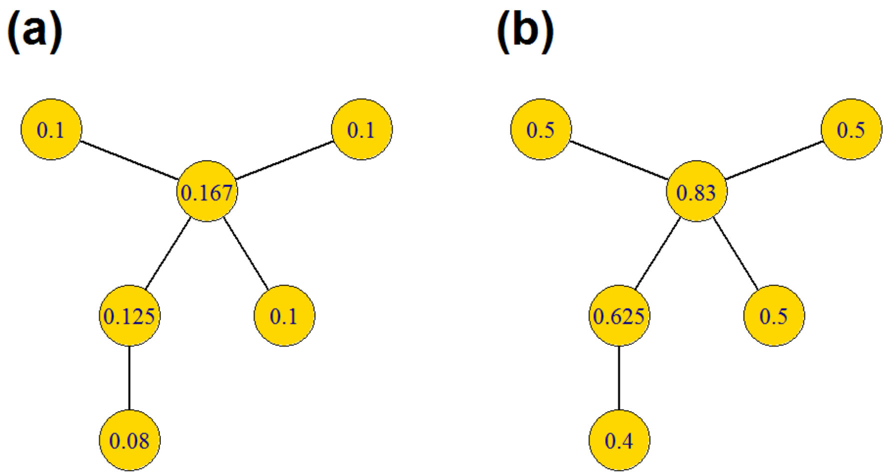

Figure A2. Example for the closeness centrality (CC) metric**.** (a) CC (b) Normalized CC. Numbers inside each node represent their value for these metrics.

Betweenness centrality

Description: It is an indication of node's centrality in the network. It is calculated as the number of shortest paths between any given pair of nodes in the network that goes through the focal node.

Formula:

$$BC(i) = \sum_{i \neq j \neq k} d_{jk}(i)$$

Where $d_{jk}(i)$ is the shortest distance between node j and k that goes through i.

Normalized Betweenness centrality

Description: It is the closeness centrality standardized by the total number of shortest paths among all nodes in the network.

$$BC_{norm}(i) = \sum_{i \neq j \neq k} \frac{d_{jk}(i)}{d_{jk}}$$

Where d_{jk} is the shortest distance between node j and k.

Visualization:

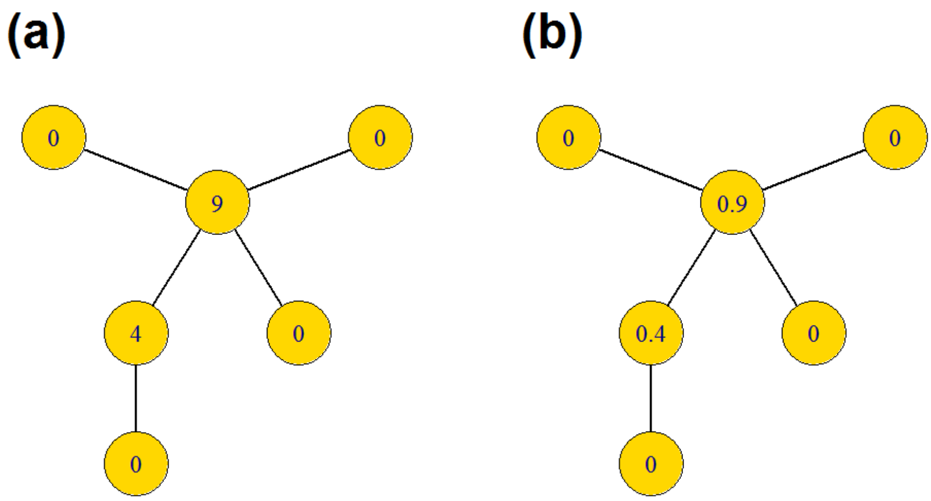

Figure A3. Example for the betweenness centrality (BC) metric**.** (a) BC (b) Normalized BC. Numbers inside each node represent their value for these metrics.

Homogenously and heterogeneously-connected networks

Visualization:

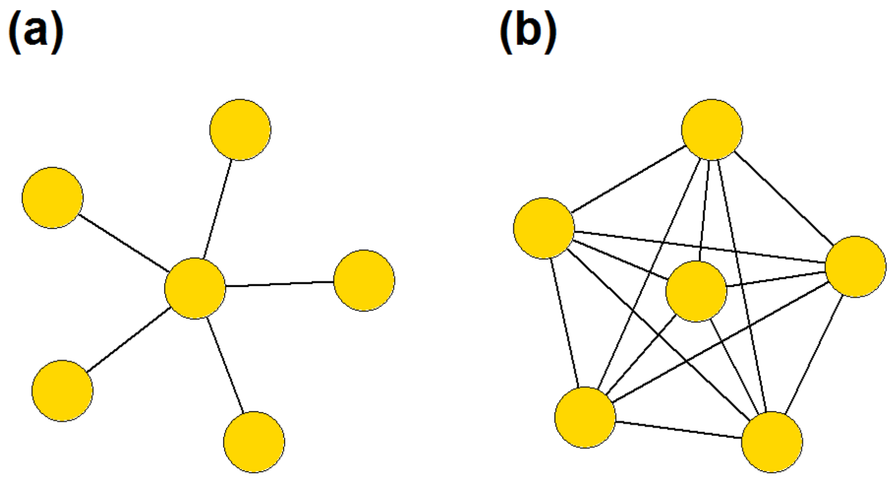

Figure A4. Examples of a (a) star-shaped graph and a (b) complete graph. The first has high among-site variation in connectivity and hence a centralization CC (i.e., network-scale closeness centrality) equal to 1. The second graph has no among-site variation in connectivity as all sites are connected to each other by one edge, thus its centralization CC is equal to 0.

Appendix 3 – Spatial Eigenfunction Analysis

To generate spatial predictors we used principal coordinate of neighboring matrices (PCNM; Griffith and Peres-Neto 2006), which were computed for headwater and downstream reaches separately. This undirected method is recommended for constrained ordination (Dray et al. 2006) and models spatially-autocorrelated processes that act at different spatial scales and could be generated by spatially contagious processes such as dispersal. We first created a connectivity matrix in which 1 was assigned to a pair of sites that were adjacent to each other and 0 otherwise. Further, we computed a distance matrix for each catchment by calculating watercourse distances among sites using the Network Analysist extension of Arcmap 10.3 (ESRI 2014). We then weighted the distance matrix using the following weighting function: $w_{ij} = 1 - (d_{ij}/d_{MAX})^3$, where d_{ij} is the distance between site *i* and *j* and d_{MAX} is the maximum distance found between any two sites in the catchment. These weights represent the ease of dispersal among sites and the exponent decrease the importance of sites that are very distant from each other (Borcard et al. 2011, Zhao et al. 2017). We combined the weighted distance and connectivity matrices for each catchment through Hadamard product, and used these matrices to generate the spatial eigenvectors with the *vegan* R package (Oksanen et al. 2015). Our final spatial models were constructed using only the spatial eigenvectors with positive spatial autocorrelation (i.e., eigenvalues >0) (Borcard et al. 2011).

Appendix 4 – Mantel Analysis

In order to test whether community dissimilarity was related to either environmental differences or distances among sites, we used mantel and partial mantel tests (Smouse et al. 1986). All analyses described below were performed for headwater and downstream reaches separately in each catchment. Similarly to the variation partitioning analysis, we standardized species' abundances by the surface area of the sampling operation, given that it varied across stations. We followed Brown and Swan (2010) and computed Bray-Curtis dissimilarity matrices on these standardized abundances. To compute environmental distances among sites, we first reduced the environmental dataset of each catchment by computing variance inflation factor and excluding highly collinear variables. We then computed a principal components analysis (PCA; Legendre and Legendre 1998) on this reduced dataset. Further, we selected the principal components with eigenvalues larger > 1 and computed Euclidean-distances among sites. Similarly to the network metrics and spatial eigenfunction analysis, we weighted the watercourse distances using the following weighting function: $w_{ij} = 1 - (d_{ij}/d_{MAX})^3$, where d_{ij} is the distance between site *i* and *j* and d_{MAX} is the maximum distance found between any two sites in the catchment. Finally, we computed Mantel tests between community dissimilarity and environmental distance or weighted watercourse distances. We also computed partial-Mantel tests wherein we took into account spatial distances while testing for pure environmental effect and environmental distances while testing for pure spatial effect. Both Mantel and partial-Mantel tests were performed with 999 permutations and the NPH was evaluated similarly to the variation partition analysis. Results from these analyses are present in Appendix 6.

Appendix 5 – Complete results for the variation partitioning analysis (VPA)

Table A4. Complete results for the VPA performed on headwater sites using river configuration metrics to model spatial predictors ($VP_{NETWORK}$). [E] = pure environmental fraction; [S] = pure spatial fraction; [E+S] = spatially-structured environmental fraction; [R] = residual fraction; *Adj.* R^2 = Adjusted r-square; *P* = p-value; Significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	[E]			[S]			[E+S]	[R]
Catchment	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Adj* R^2
Adour (1)	0.069	2.651	**0.001**	0.051	1.998	**0.003**	0.327	0.553
Allier (2)	0.186	17.169	**0.001**	0.032	1.581	0.06	0.011	0.772
Aube (3)	0.071	3.204	**0.009**	0.038	1.276	0.171	0.027	0.864
Aude (4)	0.264	6.989	**0.001**	0.032	1.598	**0.041**	0.152	0.551
Charente (5)	0.086	2.189	**0.006**	0.231	2.506	**0.001**	0.07	0.614
Cher (6)	0.127	2.13	**0.007**	0.027	1.199	0.216	0.144	0.702
Dordogne (7)	0.177	7.743	**0.001**	-0.008	0.874	0.614	0.069	0.762
Doubs (8)	0.116	1.886	**0.049**	-0.033	0.831	0.745	0.13	0.787
Drôme (9)	-0.203	0.742	0.7	-0.081	0.884	0.633	0.163	1.121
Durance (10)	0.037	2.046	**0.036**	0.057	1.996	**0.02**	0.209	0.697
Garonne (11)	0.148	3.372	**0.014**	-0.04	0.71	0.759	0.175	0.717
Rhône (12)	0.164	12.126	**0.001**	0.03	1.44	0.129	0.027	0.779
Ill (13)	0.247	12.225	**0.001**	0.028	1.786	**0.008**	0.043	0.682
Isère (14)	0.144	5.821	**0.001**	0.025	1.355	0.119	0.052	0.779
Loire (15)	0.206	13.97	**0.001**	0.003	1.257	0.177	0.096	0.694
Lot (16)	0.41	14.635	**0.001**	0.087	1.698	0.052	-0.068	0.571
Marne (17)	0.096	2.809	**0.001**	0.019	1.293	0.114	0.01	0.875
Mayenne (18)	0.118	1.312	0.123	0.043	1.163	0.301	-0.005	0.844
Chiers (19)	0.099	2.98	**0.001**	0.014	1.179	0.222	0.005	0.882
Meuse (20)	0.06	3.398	**0.005**	0.066	1.599	**0.031**	0.077	0.797
Moselle (21)	0.116	4.226	**0.001**	0.025	1.831	**0.002**	0.122	0.737
Oise (22)	0.126	4.011	**0.001**	0.033	1.645	**0.03**	0.038	0.803
Saône (23)	0.124	4.238	**0.001**	0.052	2.102	**0.001**	0.05	0.774
Sarthe (24)	0.108	1.727	**0.025**	-0.015	0.93	0.581	0.163	0.744
Tarn (25)	0.289	6.479	**0.001**	0.019	1.222	0.299	0.059	0.633
Vienne (26)	0.061	2.163	**0.001**	0.033	1.514	**0.025**	0.118	0.787
Vilaine (27)	0.108	1.771	0.051	-0.03	0.855	0.657	0.267	0.655
Yonne (28)	0.143	6.803	**0.001**	0.136	3.324	**0.001**	-0.003	0.725

Table A5. Complete results for the VPA performed on downstream sites using river configuration metrics to model spatial predictors ($VP_{NETWORK}$) [E] = pure environmental fraction; [S] = pure spatial fraction; [E+S] = spatially-structured environmental fraction; [R] = residual fraction; *Adj.* R^2 = Adjusted r-square; *P* = p-value; Significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	[E]			[S]			[E+S]	[R]
Catchment	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Adj* R^2
Adour (1)	0.16	6.133	**0.001**	0.029	2.116	**0.003**	0.258	0.552
Allier (2)	0.168	3.903	**0.001**	0.057	2.352	**0.001**	0.18	0.595
Aube (3)	0.174	5.782	**0.001**	0.054	1.933	**0.001**	0.095	0.677
Aude (4)	0.313	5.985	**0.001**	0.022	1.346	0.099	0.175	0.49
Charente (5)	0.113	2.736	**0.003**	0.054	1.372	0.055	0.084	0.749
Cher (6)	0.03	1.773	**0.007**	0.035	1.56	**0.012**	0.129	0.807
Dordogne (7)	0.129	3.74	**0.001**	0.03	1.512	**0.031**	0.181	0.66
Doubs (8)	0.216	3.859	**0.001**	0.045	1.699	**0.018**	0.111	0.629
Drôme (9)	-0.003	0.955	0.442	0.149	1.613	0.101	0.124	0.73
Durance (10)	0.085	2.74	**0.001**	0.069	2.674	**0.001**	0.281	0.565
Garonne (11)	0.269	6.532	**0.001**	0.04	1.827	**0.001**	0.262	0.428
Rhône (12)	0.263	7.434	**0.001**	0.011	1.27	0.183	0.138	0.588
Ill (13)	0.136	3.682	**0.001**	0.018	1.293	0.123	0.1	0.746
Isère (14)	0.125	3.937	**0.001**	0.027	1.395	0.104	0.153	0.695
Loire (15)	0.19	4.413	**0.001**	0.041	2.415	**0.001**	0.094	0.675
Lot (16)	0.144	3.111	**0.001**	0.045	1.538	0.059	0.213	0.598
Marne (17)	0.142	4.464	**0.001**	0.024	1.594	**0.011**	0.127	0.707
Mayenne (18)	0.117	1.832	**0.023**	0.038	1.192	0.249	0.283	0.561
Chiers (19)	0.1	2.253	**0.002**	0.093	1.748	**0.005**	0.06	0.747
Meuse (20)	-0.033	0.637	0.711	-0.079	0.755	0.86	0.206	0.906
Moselle (21)	0.119	3.596	**0.001**	0.03	1.536	**0.011**	0.141	0.71
Oise (22)	0.073	2.614	**0.001**	0.067	2.759	**0.001**	0.162	0.698
Saône (23)	0.175	3.639	**0.001**	0.036	1.839	**0.005**	0.141	0.647
Sarthe (24)	0.058	2.461	**0.034**	0.102	1.664	**0.027**	0.286	0.554
Tarn (25)	0.161	3.152	**0.001**	0.035	1.382	0.091	0.241	0.563
Vienne (26)	0.138	3.265	**0.001**	0.037	1.839	**0.001**	0.174	0.651
Vilaine (27)	0.073	1.557	0.151	0.019	1.099	0.351	0.301	0.608
Yonne (28)	0.091	3.743	**0.001**	0.087	2.626	**0.001**	0.073	0.749

Table A6. Complete results for the VPA performed on headwater sites using spatial eigenfunction analysis to model spatial predictors (VP_{PCNM}). [E] = pure environmental fraction; [S] = pure spatial fraction; [E+S] = spatially-structured environmental fraction; [R] = residual fraction; *Adj.* R^2 = Adjusted r-square; P = p-value; Significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	[E]			[S]			[E+S]	[R]
Catchment	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Adj* R^2
Adour (1)	0.028	1.678	**0.019**	0.104	2.119	**0.001**	0.367	0.501
Allier (2)	0.064	7.181	**0.001**	0.138	2.837	**0.001**	0.132	0.666
Aube (3)	-0.055	0.297	0.938	-0.04	0.934	0.67	0.153	0.943
Aude (4)	0.188	5.19	**0.001**	0.024	1.43	0.093	0.229	0.56
Charente (5)	0.152	1.873	0.108	0.06	1.118	0.345	0.003	0.785
Cher (6)	0.152	2.503	**0.001**	0.046	1.584	**0.037**	0.118	0.683
Dordogne (7)	0.146	7.098	**0.001**	0.047	2.023	**0.004**	0.1	0.706
Doubs (8)	0.087	1.395	0.213	0.019	1.04	0.457	0.159	0.735
Drôme (9)	-0.579	0.284	0.946	-0.366	0.674	0.784	0.598	1.347
Durance (10)	0.172	3.615	**0.008**	0.098	1.268	0.116	0.074	0.656
Garonne (11)	0.047	1.915	0.085	0.016	1.319	0.256	0.277	0.661
Rhône (12)	0.01	1.315	0.235	-0.011	0.976	0.541	0.181	0.82
Ill (13)	0.173	8.666	**0.001**	0.025	1.499	**0.014**	0.117	0.685
Isère (14)	0.053	2.939	**0.001**	0.059	2.463	**0.003**	0.143	0.744
Loire (15)	0.139	9.922	**0.001**	0.026	2.114	**0.001**	0.163	0.672
Lot (16)	0.481	12.137	**0.001**	0.182	1.679	**0.028**	-0.139	0.476
Marne (17)	0.052	1.48	0.104	-0.047	0.908	0.77	0.054	0.941
Mayenne (18)	-0.504	0.513	0.962	-0.494	0.56	0.973	0.617	1.381
Chiers (19)	0.068	2.464	**0.001**	0.112	2.127	**0.001**	0.036	0.784
Meuse (20)	0.064	2.027	0.077	-0.14	0.76	0.919	0.072	1.004
Moselle (21)	0.034	1.946	**0.001**	0.059	2.026	**0.001**	0.204	0.703
Oise (22)	0.127	2.483	**0.001**	0.065	1.144	0.142	0.037	0.771
Saône (23)	0.07	1.825	**0.007**	-0.019	0.959	0.675	0.104	0.846
Sarthe (24)	0.187	1.855	0.073	0.073	1.172	0.269	0.084	0.656
Tarn (25)	0.35	4.727	**0.001**	0.12	1.356	0.193	-0.002	0.532
Vienne (26)	0.047	1.932	**0.004**	0.067	2.089	**0.001**	0.133	0.753
Vilaine (27)	0.481	2.976	**0.025**	0.057	1.133	0.372	-0.106	0.568
Yonne (28)	0.099	5.049	**0.001**	0.1	5.073	**0.001**	0.04	0.761

Table A7. Complete results for the VPA performed on downstream sites using spatial eigenfunction analysis to model spatial predictors (VP_{PCNM}) [E] = pure environmental fraction; [S] = pure spatial fraction; [E+S] = spatially-structured environmental fraction; [R] = residual fraction; *Adj.* R^2 = Adjusted r-square; P = p-value; Significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	[E]			[S]			[E+S]	[R]
Catchment	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Pseudo-F*	*P*	*Adj* R^2	*Adj* R^2
Adour (1)	0.106	4.502	**0.001**	0.038	3.479	**0.001**	0.313	0.543
Allier (2)	0.204	4.255	**0.001**	0.007	1.159	0.258	0.143	0.645
Aube (3)	0.124	4.381	**0.001**	0.036	1.757	**0.009**	0.144	0.696
Aude (4)	0.089	2.578	**0.001**	0.072	2.275	**0.001**	0.399	0.44
Charente (5)	0.072	2.237	**0.003**	0.08	1.957	**0.008**	0.126	0.723
Cher (6)	0.094	2.163	**0.003**	0.038	1.08	0.258	0.065	0.804
Dordogne (7)	0.08	2.739	**0.001**	0.077	1.901	**0.002**	0.23	0.612
Doubs (8)	0.111	2.725	**0.001**	0.058	1.76	**0.011**	0.2	0.631
Drôme (9)	0.02	1.416	0.236	0.169	4.564	**0.006**	0.101	0.71
Durance (10)	0.109	3.276	**0.001**	0.083	3.036	**0.001**	0.257	0.551
Garonne (11)	0.082	2.719	**0.001**	0.075	2.055	**0.001**	0.449	0.393
Rhône (12)	0.225	6.888	**0.001**	0.019	3.345	**0.006**	0.176	0.58
Ill (13)	0.175	2.592	**0.001**	0.077	1.173	0.149	0.061	0.687
Isère (14)	0.109	3.905	**0.001**	0.099	3.029	**0.001**	0.169	0.623
Loire (15)	0.143	3.631	**0.001**	0.092	2.548	**0.001**	0.141	0.624
Lot (16)	0.228	4.796	**0.001**	0.071	3.23	**0.002**	0.129	0.572
Marne (17)	0.191	4.942	**0.001**	0.013	1.503	0.06	0.085	0.711
Mayenne (18)	-0.063	0.896	0.592	-0.186	0.731	0.782	0.497	0.751
Chiers (19)	0.187	2.105	**0.043**	0.109	1.223	0.144	-0.027	0.731
Meuse (20)	0.191	2.318	0.14	0.103	1.199	0.262	-0.018	0.724
Moselle (21)	0.055	2.145	**0.002**	0.065	1.549	**0.002**	0.205	0.675
Oise (22)	0.126	2.134	**0.002**	-0.034	0.929	0.762	0.109	0.799
Saône (23)	0.153	3.316	**0.001**	0.079	1.982	**0.001**	0.163	0.604
Sarthe (24)	0.147	2.288	0.125	-0.027	0.945	0.623	0.197	0.684
Tarn (25)	0.182	3.584	**0.001**	0.017	1.46	0.123	0.221	0.58
Vienne (26)	0.149	3.379	**0.001**	0.007	1.194	0.179	0.163	0.681
Vilaine (27)	0.148	2.327	**0.011**	-0.005	0.934	0.479	0.225	0.632
Yonne (28)	0.07	3.016	**0.001**	0.073	1.962	**0.002**	0.094	0.763

Table A8. Partial results for the variation partitioning analysis performed on headwater and downstream sites across all 28 catchments using river network configuration metrics ($VP_{NETWORK}$). For simplicity, the results presented below refer only to the pure environmental fraction [E] and pure spatial fraction [S]. The complete results of the variation partition analysis are presented in the supplementary material, Appendix 4, Table A3, A4. HW = Headwater; DS = Downstream; *Adj.* R^2 = Adjusted r-square; *P* = p-value; NPH = Network Position Hypothesis; *Su* = Supported; *NSu* = Not Supported; *PSu* = Partially Supported. Refer to the methods section for how these categories were defined. Significant p-values (α = 0.05) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	Environment [E]				Space [S]				
	HW		DS		HW		DS		
Catchment	*Adj* R^2	*P*	*Adj* R^2	*P*	*Adj* R^2	*P*	*Adj* R^2	*P*	NPH
Adour (1)	0.069	**0.001**	0.16	**0.001**	0.051	**0.003**	0.029	**0.003**	*PSu*
Allier (2)	0.186	**0.001**	0.168	**0.001**	0.032	0.06	0.057	**0.001**	*Su*
Aube (3) **	0.071	**0.009**	0.174	**0.001**	0.038	0.171	0.054	**0.001**	*Su*
Aude (4)	0.264	**0.001**	0.313	**0.001**	0.032	**0.041**	0.022	0.099	*NSu*
Charente (5)	0.086	**0.006**	0.113	**0.003**	0.231	**0.001**	0.054	0.055	*NSu*
Cher (6)	0.127	**0.007**	0.03	**0.007**	0.027	0.216	0.035	**0.012**	*Su*
Dordogne (7)	0.177	**0.001**	0.129	**0.001**	-0.008	0.614	0.03	**0.031**	*Su*
Doubs (8)	0.116	**0.049**	0.216	**0.001**	-0.033	0.745	0.045	**0.018**	*Su*
Drôme (9)	-0.203	0.7	-0.003	0.442	-0.081	0.633	0.149	0.101	*NSu*
Durance (10)	0.037	**0.036**	0.085	**0.001**	0.057	**0.02**	0.069	**0.001**	*PSu*
Garonne (11)	0.148	**0.014**	0.269	**0.001**	-0.04	0.759	0.04	**0.001**	*Su*
Rhône (12)	0.164	**0.001**	0.263	**0.001**	0.03	0.129	0.011	0.183	*NSu*
Ill (13) **	0.247	**0.001**	0.136	**0.001**	0.028	**0.008**	0.018	0.123	*NSu*
Isère (14)	0.144	**0.001**	0.125	**0.001**	0.025	0.119	0.027	0.104	*NSu*
Loire (15)	0.206	**0.001**	0.19	**0.001**	0.003	0.177	0.041	**0.001**	*Su*
Lot (16)	0.41	**0.001**	0.144	**0.001**	0.087	0.052	0.045	0.059	*NSu*
Marne (17)	0.096	**0.001**	0.142	**0.001**	0.019	0.114	0.024	**0.011**	*Su*
Mayenne (18)	0.118	0.123	0.117	**0.023**	0.043	0.301	0.038	0.249	*NSu*
Chiers (19)	0.099	**0.001**	0.1	**0.002**	0.014	0.222	0.093	**0.005**	*Su*
Meuse (20)	0.06	**0.005**	-0.033	0.711	0.066	**0.031**	-0.079	0.86	*NSu*
Moselle (21)	0.116	**0.001**	0.119	**0.001**	0.025	**0.002**	0.03	**0.011**	*PSu*
Oise (22) **	0.126	**0.001**	0.073	**0.001**	0.033	**0.03**	0.067	**0.001**	*PSu*
Saône (23) *	0.124	**0.001**	0.175	**0.001**	0.052	**0.001**	0.036	**0.005**	*PSu*
Sarthe (24)	0.108	**0.025**	0.058	**0.034**	-0.015	0.581	0.102	**0.027**	*Su*
Tarn (25)	0.289	**0.001**	0.161	**0.001**	0.019	0.299	0.035	0.091	*NSu*
Vienne (26)	0.061	**0.001**	0.138	**0.001**	0.033	**0.025**	0.037	**0.001**	*PSu*
Vilaine (27)	0.108	0.051	0.073	0.151	-0.03	0.657	0.019	0.351	*NSu*
Yonne (28)	0.143	**0.001**	0.091	**0.001**	0.136	**0.001**	0.087	**0.001**	*PSu*

* Partial RDA using sampling year as a covariable showed that it was significant in downstream sites (see Appendix 7, Table A12)

** Partial RDA using sampling year as a covariable showed that it was significant in headwater sites (see Appendix 7, Table A13)

Table A9. Partial results for the variation partitioning analysis performed on headwater and downstream sites across all 28 catchments using spatial eigenfunction analysis (VP_{PCNM}). The complete results of the variation partition analysis are presented in Table A5 and A6. HW = Headwater; DS = Downstream; *Adj.* R^2 = Adjusted r-square; *P* = p-value; NPH = Network Position Hypothesis; *Su* = Supported; *NSu* = Not Supported; *PSu* =Partially Supported. Refer to the methods section for how these categories were defined. Significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	Environment [E]				Space [S]				
	HW		DS		HW		DS		
Catchment	*Adj* R^2	*P*	*Adj* R^2	*P*	*Adj* R^2	*P*	*Adj* R^2	*P*	NPH
Adour (1)	0.028	**0.024**	0.105	**0.001**	0.103	**0.001**	0.038	**0.001**	*PSu*
Allier (2)	0.064	**0.001**	0.204	**0.001**	0.138	**0.001**	0.007	0.24	*NSu*
Aube (3)	-0.055	0.947	0.124	**0.001**	-0.04	0.65	0.036	**0.012**	*NSu*
Aude (4)	0.187	**0.001**	0.089	**0.001**	0.023	0.07	0.072	**0.001**	*Su*
Charente (5)	0.152	0.114	0.071	**0.004**	0.061	0.323	0.079	**0.007**	*NSu*
Cher (6)	0.152	**0.001**	0.093	**0.001**	0.046	**0.046**	0.038	0.24	*NSu*
Dordogne (7)	0.146	**0.001**	0.08	**0.001**	0.047	**0.007**	0.077	**0.001**	*PSu*
Doubs (8)	0.089	0.232	0.111	**0.001**	0.018	0.482	0.052	**0.015**	*NSu*
Drôme (9)	-0.579	0.956	0.02	0.228	-0.366	0.773	0.169	**0.007**	*NSu*
Durance (10)	0.172	**0.003**	0.125	**0.001**	0.098	0.132	0.063	**0.001**	*Su*
Garonne (11)	0.046	0.094	0.082	**0.001**	0.016	0.261	0.075	**0.001**	*NSu*
Rhône (12)	0.009	0.263	0.224	**0.001**	-0.012	0.553	0.019	**0.004**	*NSu*
Ill (13)	0.173	**0.001**	0.175	**0.001**	0.025	**0.021**	0.077	0.132	*NSu*
Isère (14)	0.031	**0.018**	0.1	**0.001**	0.089	**0.002**	0.094	**0.001**	*PSu*
Loire (15)	0.139	**0.001**	0.133	**0.001**	0.026	**0.001**	0.099	**0.001**	*PSu*
Lot (16)	0.481	**0.001**	0.228	**0.001**	0.182	**0.025**	0.071	**0.002**	*PSu*
Marne (17)	0.052	0.086	0.181	**0.001**	-0.046	0.766	0.01	0.112	*NSu*
Mayenne (18)	-0.503	0.959	0.098	0.384	-0.494	0.978	0.009	0.536	*NSu*
Chiers (19)	0.068	**0.002**	0.187	**0.039**	0.112	**0.001**	0.109	0.132	*NSu*
Meuse (20)	0.064	0.075	0.191	0.097	-0.14	0.926	0.103	0.266	*NSu*
Moselle (21)	0.036	**0.001**	0.055	**0.003**	0.071	**0.001**	0.065	**0.002**	*PSu*
Oise (22)	0.127	**0.004**	0.126	**0.001**	0.066	0.151	-0.035	0.779	*NSu*
Saône (23)	0.07	**0.008**	0.153	**0.001**	-0.019	0.642	0.079	**0.001**	*Su*
Sarthe (24)	0.187	0.076	0.147	0.122	0.073	0.312	-0.023	0.59	*NSu*
Tarn (25)	0.346	**0.001**	0.182	**0.001**	0.118	0.205	0.017	0.125	*NSu*
Vienne (26)	0.047	**0.003**	0.126	**0.001**	0.067	**0.001**	0.005	0.293	*NSu*
Vilaine (27)	0.481	**0.022**	0.148	**0.019**	0.057	0.375	-0.005	0.49	*NSu*
Yonne (28)	0.099	**0.001**	0.072	**0.001**	0.1	**0.001**	0.048	**0.005**	*PSu*

Appendix 6 – Complete results of Mantel and partial Mantel analyses

Table A10 - Results for the Mantel test performed on headwater and downstream sites across all 28 catchments. HW = Headwater; DS = Downstream; *r* = Pearson correlation; *P* = p-value; NPH = Network Position Hypothesis; *Su* = Supported; *NSu* = Not Supported; *PSu* =Partially Supported. Refer to the methods section for how these categories were defined. Significant p-values (*P* < 0.05) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	Environment [E]				Space [S]				
	HW		DS		HW		DS		
Catchment	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*	NPH
Adour (1)	0.345	**0.001**	0.387	**0.001**	0.126	**0.002**	0.187	**0.001**	*PSu*
Allier (2)	0.2	**0.001**	0.268	**0.001**	0.139	**0.003**	-0.016	0.679	*NSu*
Aube (3)	0.177	**0.018**	0.346	**0.001**	-0.023	0.635	-0.031	0.724	*NSu*
Aude (4)	0.267	**0.001**	0.383	**0.001**	0.079	**0.045**	0.459	**0.001**	*PSu*
Charente (5)	0.057	0.301	0.31	**0.006**	-0.159	0.945	0.135	**0.045**	*NSu*
Cher (6)	0.405	**0.001**	0.148	**0.014**	0.274	**0.001**	0.116	**0.004**	*PSu*
Dordogne (7)	0.181	**0.003**	0.309	**0.001**	0.072	**0.032**	0.19	**0.001**	*PSu*
Doubs (8)	0.133	0.051	0.24	**0.001**	0.025	0.274	0.199	**0.001**	*NSu*
Drôme (9)	0.052	0.293	0.194	**0.028**	-0.014	0.517	0.352	**0.002**	*NSu*
Durance (10)	0.167	**0.017**	0.339	**0.001**	-0.154	0.999	0.015	0.349	*NSu*
Garonne (11)	0.218	**0.008**	0.537	**0.001**	0.066	0.151	0.403	**0.001**	*Su*
Rhône (12)	0.138	**0.037**	0.338	**0.001**	0.06	0.144	0.14	**0.003**	*Su*
Ill (13)	0.206	**0.001**	0.353	**0.001**	0.005	0.454	0.1	**0.008**	*Su*
Isère (14)	0.126	**0.043**	0.216	**0.001**	-0.025	0.671	0.114	**0.009**	*Su*
Loire (15)	0.27	**0.001**	0.281	**0.001**	0.188	**0.001**	0.158	**0.001**	*PSu*
Lot (16)	0.334	**0.001**	0.421	**0.001**	0.167	**0.036**	0.253	**0.001**	*PSu*
Marne (17)	0.07	0.079	0.18	**0.001**	0.125	**0.01**	0.004	0.453	*NSu*
Mayenne (18)	0.255	**0.009**	0.318	**0.003**	0.158	0.072	0.365	**0.003**	*Su*
Chiers (19)	0.118	**0.009**	0.13	0.089	-0.007	0.541	0.059	0.209	*NSu*
Meuse (20)	0.199	**0.019**	0.159	0.094	0.093	0.082	0.031	0.39	*NSu*
Moselle (21)	0.147	**0.001**	0.359	**0.001**	0.069	**0.003**	0.144	**0.002**	*PSu*
Oise (22)	0.387	**0.001**	0.204	**0.001**	0.017	0.35	0.084	**0.005**	*Su*
Saône (23)	0.184	**0.001**	0.193	**0.001**	0.042	0.15	0.009	0.377	*NSu*
Sarthe (24)	0.504	**0.001**	0.428	**0.001**	0.394	**0.001**	0.164	**0.04**	*PSu*
Tarn (25)	0.492	**0.001**	0.521	**0.001**	-0.04	0.804	0.062	0.12	*NSu*
Vienne (26)	0.226	**0.001**	0.297	**0.001**	0.097	**0.001**	0.085	**0.042**	*PSu*
Vilaine (27)	0.103	0.161	0.422	**0.001**	-0.024	0.576	0.288	**0.003**	*NSu*
Yonne (28)	-0.004	0.52	0.206	**0.001**	0.245	**0.001**	0.181	**0.001**	*NSu*

Table A11 - Results for the partial Mantel test performed on headwater and downstream sites across all 28 catchments. HW = Headwater; DS = Downstream; *r* = Pearson correlation; *P* = p-value; NPH = Network Position Hypothesis; *Su* = Supported; *NSu* = Not Supported; *PSu* =Partially Supported. Refer to the methods section for how these categories were defined. Significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

Fraction	Environment [E]				Space [S]				
	HW		DS		HW		DS		
Catchment	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*	NPH
Adour (1)	0.324	**0.001**	0.363	**0.001**	-0.01	0.599	0.12	**0.001**	*Su*
Allier (2)	0.179	**0.003**	0.285	**0.001**	0.106	**0.004**	-0.102	0.999	*NSu*
Aube (3)	0.192	**0.01**	0.366	**0.001**	-0.081	0.944	-0.132	0.997	*NSu*
Aude (4)	0.259	**0.001**	0.237	**0.001**	-0.041	0.818	0.357	**0.001**	*Su*
Charente (5)	0.116	0.148	0.281	**0.01**	-0.188	0.972	0.011	0.446	*NSu*
Cher (6)	0.317	**0.001**	0.112	0.058	0.068	0.087	0.064	0.064	*NSu*
Dordogne (7)	0.171	**0.002**	0.27	**0.001**	0.039	0.143	0.109	**0.004**	*Su*
Doubs (8)	0.131	0.08	0.201	**0.001**	-0.01	0.489	0.148	**0.002**	*NSu*
Drôme (9)	0.052	0.304	0.012	0.36	-0.016	0.509	0.299	**0.006**	*NSu*
Durance (10)	0.211	**0.003**	0.348	**0.001**	-0.2	1	-0.084	0.974	*NSu*
Garonne (11)	0.208	**0.022**	0.433	**0.001**	0.015	0.383	0.209	**0.002**	*Su*
Rhône (12)	0.13	**0.036**	0.322	**0.001**	0.04	0.232	0.089	**0.02**	*Su*
Ill (13)	0.206	**0.001**	0.341	**0.001**	0.001	0.481	0.006	0.425	*NSu*
Isère (14)	0.178	**0.005**	0.189	**0.004**	-0.129	0.998	0.04	0.17	*NSu*
Loire (15)	0.224	**0.001**	0.247	**0.001**	0.108	**0.001**	0.075	**0.024**	*PSu*
Lot (16)	0.298	**0.001**	0.352	**0.001**	0.051	0.274	0.06	0.106	*NSu*
Marne (17)	0.046	0.174	0.199	**0.001**	0.113	**0.011**	-0.085	0.976	*NSu*
Mayenne (18)	0.203	**0.03**	0.079	0.2	0.001	0.449	0.203	**0.01**	*NSu*
Chiers (19)	0.121	**0.012**	0.116	0.118	-0.027	0.706	0.015	0.396	*NSu*
Meuse (20)	0.178	**0.029**	0.165	0.106	0.022	0.409	-0.054	0.677	*NSu*
Moselle (21)	0.13	**0.001**	0.332	**0.001**	-0.012	0.655	0.003	0.473	*NSu*
Oise (22)	0.388	**0.001**	0.191	**0.001**	-0.034	0.767	0.042	0.097	*NSu*
Saône (23)	0.18	**0.001**	0.198	**0.001**	-0.019	0.685	-0.046	0.902	*NSu*
Sarthe (24)	0.386	**0.004**	0.414	**0.001**	0.189	**0.024**	-0.112	0.919	*NSu*
Tarn (25)	0.491	**0.001**	0.521	**0.001**	-0.033	0.781	-0.063	0.877	*NSu*
Vienne (26)	0.214	**0.001**	0.287	**0.001**	0.064	**0.04**	-0.024	0.714	*NSu*
Vilaine (27)	0.141	0.121	0.363	**0.002**	-0.099	0.831	0.176	**0.024**	*NSu*
Yonne (28)	-0.121	0.974	0.182	**0.006**	0.272	**0.001**	0.154	**0.001**	*NSu*

Appendix 7 – Results for partial redundancy analysis (RDA) with sampling year as a covariable

Table A12 - Results for the partial RDA performed on headwater sites across all 28 catchments between sampling year and community data [Y] after taking into account both environmental and spatial predictors. *Adj.* R^2 = Adjusted r-square; P = p-value. Catchments with significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

	Sampling year		
Catchment	*Adj-R²*	*P*	*Pseudo-F*
Adour (1)	0.001	0.339	1.074
Allier (2)	-0.002	0.525	0.811
Aube (3)	0	0.393	0.993
Aude (4)	-0.001	0.446	0.947
Charente (5)	0.002	0.391	1.037
Cher (6)	0.007	0.288	1.2
Dordogne (7)	0.003	0.235	1.23
Doubs (8)	0.024	0.179	1.477
Drôme (9)	-0.225	0.585	0.498
Durance (10)	0	0.355	1.01
Garonne (11)	-0.007	0.465	0.792
Rhône (12)	0.009	0.158	1.589
Ill (13)	0.002	0.224	1.301
Isère (14)	0.006	0.232	1.376
Loire (15)	0.002	0.109	1.666
Lot (16)	-0.008	0.536	0.756
Marne (17)	0.007	0.162	1.464
Mayenne (18)	0.021	0.273	1.275
Chiers (19)	-0.006	0.697	0.666
Meuse (20)	0.005	0.281	1.19
Moselle (21)	0.004	0.103	1.627
Oise (22)	0.004	0.218	1.324
Saône (23)	**0.016**	**0.008**	**2.58**
Sarthe (24)	0.022	0.215	1.366
Tarn (25)	-0.013	0.711	0.354
Vienne (26)	0.007	0.143	1.508
Vilaine (27)	0.026	0.218	1.447
Yonne (28)	-0.002	0.553	0.84

Table A13 - Results for the partial RDA performed on downstream sites across all 28 catchments between sampling year and community data [Y] after taking into account both environmental and spatial predictors. *Adj.* R^2 = Adjusted r-square; P = p-value. Catchments with significant p-values ($P < 0.05$) are depicted in bold. Numbers beside catchment names refer to their codes in Fig 1.

	Sampling year		
Catchment	*Adj-*R^2	*P*	*Pseudo-F*
Adour (1)	0.002	0.175	1.413
Allier (2)	-0.002	0.565	0.805
Aube (3)	0.022	0.009	2.772
Aude (4)	-0.003	0.587	0.767
Charente (5)	-0.012	0.729	0.671
Cher (6)	0.003	0.25	1.225
Dordogne (7)	0.002	0.287	1.186
Doubs (8)	-0.006	0.794	0.607
Drôme (9)	-0.028	0.629	0.626
Durance (10)	0.01	0.043	2.174
Garonne (11)	-0.002	0.672	0.794
Rhône (12)	-0.004	0.729	0.595
Ill (13)	**0.018**	**0.014**	**2.334**
Isère (14)	0.014	0.1	1.945
Loire (15)	0.003	0.139	1.476
Lot (16)	0.015	0.084	1.793
Marne (17)	0.004	0.136	1.501
Mayenne (18)	-0.007	0.511	0.887
Chiers (19)	0.016	0.117	1.542
Meuse (20)	-0.037	0.701	0.648
Moselle (21)	0.007	0.107	1.582
Oise (22)	**0.012**	**0.011**	**2.48**
Saône (23)	0.002	0.233	1.255
Sarthe (24)	-0.014	0.702	0.688
Tarn (25)	0.009	0.189	1.442
Vienne (26)	0.006	0.095	1.597
Vilaine (27)	0.044	0.119	1.865
Yonne (28)	0.002	0.29	1.171

Appendix 8 – Results for the cross-validation (CV) performed on the Classification Tree Analysis (CTA)

Table A14. Results from CV analysis on CTA performed on the $VP_{NETWORK}$. CP = error rate of the model; Split = identifier of each split in the tree; Relative error = error of a given split relative to the error of the root; CV error = cross-validation error rates; CV std = standard deviation of the cross-validation errors. R^2 = 1 – relative error = 64.7%. The split with lowest CV error is highlighted in bold.

CP	Split	Relative error	CV error	CV std
0.353	0	1	1.471	0.096
0.294	1	0.647	1.294	0.128
0.01	**2**	**0.353**	**1.118**	**0.145**

Appendix 9 – Evaluation of the NPH through the relative importance of environmental and spatial factors

Instead of evaluating the NPH strictly through p-values, one could use a more nuanced approach; i.e., analyzing how the relative importance of environmental [E] and spatial [S] factors change from headwaters (HW) to downstream (DS) sites. In this case, if the NPH is true, we should expect that [S]/[E] should be larger in downstream than headwaters (DS > HW). Under this framework, 17 out the 28 catchments support the NPH. Note that if we convert non-significant fractions to 0, the number of catchments supporting the NPH falls to 13 (*results not shown*).

Table A15. Partial results for the variation partitioning analysis performed on headwater and downstream sites across all 28 catchments using river configuration metrics to model spatial predictors ($VP_{NETWORK}$). The complete results of the variation partition analysis are presented in Table A5 and A6. HW = Headwater; DS = Downstream; *Adj.* R^2 = Adjusted r-square; *P* = p-value; NPH = Network Position Hypothesis; *Su* = Supported; *NSu* = Not Supported. Numbers beside catchment names refer to their codes in Fig 1.

	Headwater (HW)			Downstream (DS)				
Catchment	[E]	[S]	[S] / [E]	[E]	[S]	[S] / [E]	DS>HW	NPH
Adour (1)	0.069	0.051	0.741	0.16	0.029	0.183	No	*NSu*
Allier (2)	0.186	0.032	0.17	0.168	0.057	0.342	Yes	*Su*
Aube (3)	0.071	0.038	0.545	0.174	0.054	0.314	No	*NSu*
Aude (4)	0.264	0.032	0.122	0.313	0.022	0.069	No	*NSu*
Charente (5)	0.086	0.231	2.692	0.113	0.054	0.474	No	*NSu*
Cher (6)	0.127	0.027	0.212	0.03	0.035	1.171	Yes	*Su*
Dordogne (7)	0.177	-0.008	-0.044	0.129	0.03	0.229	Yes	*Su*
Doubs (8)	0.116	-0.033	-0.286	0.216	0.045	0.208	Yes	*Su*
Drôme (9)	-0.203	-0.081	0.402	-0.003	0.149	-50.129	No	*NSu*
Durance (10)	0.037	0.057	1.535	0.085	0.069	0.814	No	*NSu*
Garonne (11)	0.148	-0.04	-0.27	0.269	0.04	0.15	Yes	*Su*
Rhône (12)	0.164	0.03	0.184	0.263	0.011	0.042	No	*NSu*
Ill (13)	0.247	0.028	0.114	0.136	0.018	0.134	Yes	*Su*
Isère (14)	0.144	0.025	0.174	0.125	0.027	0.215	Yes	*Su*
Loire (15)	0.206	0.003	0.017	0.19	0.041	0.216	Yes	*Su*
Lot (16)	0.41	0.087	0.211	0.144	0.045	0.31	Yes	*Su*
Marne (17)	0.096	0.019	0.199	0.142	0.024	0.172	No	*NSu*
Mayenne (18)	0.118	0.043	0.363	0.117	0.038	0.329	No	*NSu*
Chiers (19)	0.099	0.014	0.145	0.1	0.093	0.929	Yes	*Su*
Meuse (20)	0.06	0.066	1.111	-0.033	-0.079	2.403	Yes	*Su*
Moselle (21)	0.116	0.025	0.217	0.119	0.03	0.254	Yes	*Su*
Oise (22)	0.126	0.033	0.264	0.073	0.067	0.918	Yes	*Su*
Saône (23)	0.124	0.052	0.42	0.175	0.036	0.207	No	*NSu*
Sarthe (24)	0.108	-0.015	-0.141	0.058	0.102	1.767	Yes	*Su*
Tarn (25)	0.289	0.019	0.064	0.161	0.035	0.215	Yes	*Su*
Vienne (26)	0.061	0.033	0.543	0.138	0.037	0.272	No	*NSu*
Vilaine (27)	0.108	-0.03	-0.274	0.073	0.019	0.259	Yes	*Su*
Yonne (28)	0.143	0.136	0.953	0.091	0.087	0.96	Yes	*Su*

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