

Ecography

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Supplementary material

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Appendix 1

Table A1.1: Initial environmental predictors calculated at the local (lo) or the upper catchment (up) level (LRGB = Geology and Raw Material of Brandenburg).

Predictor	Level	Code	Source
Average yearly mean air temperature (°C)	lo	tavg	MeteoSwiss
Average yearly precipitation (m ³)	up	up_prec	MeteoSwiss and WorldClim
Slope (%)	lo	slop	Swisstopo
Aspect (°)	lo	aspe	Swisstopo
Crystalline rocks (%)	up	up_cryr	Swisstopo and LGRB
Sedimentary rocks (%)	up	up_sedr	Swisstopo and LGRB
Unconsolidated rocks (%)	up	up_uncr	Swisstopo and LGRB
Urban cover (%)	up	up_urba	Corine Land Cover
Agriculture cover (%)	up	up_agri	Corine Land Cover
Forest cover (%)	up	up_fore	Corine Land Cover

Table A1.2: Pearson correlation coefficients between the initial environmental predictors and Variance Inflation Factor values. p-values: * <0.05, ** <0.01, *** <0.001. The eight selected variables are in bold. The Variance Inflation Factor values were calculated before (VIF.1) and after (VIF.2) removing the collinear variables. In all pairs of variables with a Pearson correlation coefficient higher than 0.7, the variable with the highest Variance Inflation Factor (VIF) was excluded.

	tavg	up_prec	slop	aspe	up_cryr	up_sedr	up_uncr	up_urba	up_agri	VIF.1	VIF.2
tavg										4.98	3.48
up_prec	-0.09									1.42	1.27
slop	-0.67***	0.30***								3.28	2.71
aspe	0.22***	-0.02	-0.09							1.10	1.09
up_cryr	-0.48***	0.07	0.54***	-0.15						54.39	1.54
up_sedr	0.19**	0.20***	-0.13*	0.17**	-0.74***					57.01	-
up_uncr	0.45***	-0.39***	-0.58***	-0.03*	-0.33***	-0.37***				29.68	1.89
up_urba	0.46***	-0.23***	-0.50***	-0.01	-0.18**	-0.15*	0.48***			1.70	1.65
up_agri	0.59***	-0.44***	-0.73***	0.08	-0.35***	-0.07	0.60***	0.45***		3.71	-
up_fore	0.55***	0.17**	-0.18**	0.20***	-0.21***	0.26***	-0.05	-0.03	-0.08	2.53	1.87

Appendix 2

Table A2: Significant species indicator ($\alpha = 0.05$). For further details about A, B and IndVal variables, see Dufrêne and Legendre (1997).

Species	Group	A	B	IndVal
<i>Habroleptoides confusa</i>	1	0.50	0.70	35.04
<i>Alainites muticus</i>	1	0.39	0.86	33.12
<i>Epeorus assimilis</i>	1	0.61	0.51	31.12
<i>Potamophylax cingulatus</i>	1	0.40	0.70	27.96
<i>Brachyptera risi</i>	1	0.49	0.57	27.53
<i>Amphinemura sulcicollis</i>	1	0.48	0.54	25.63
<i>Siphonoperla torrentium</i>	1	0.74	0.33	24.68
<i>Odontocerum albicorne</i>	1	0.44	0.52	23.17
<i>Rhithrogena semicolorata</i>	1	0.44	0.43	19.12
<i>Perla marginata</i>	1	0.78	0.20	15.83
<i>Rhyacophila tristis</i>	1	0.37	0.42	15.50
<i>Protonemura intricata</i>	1	0.63	0.25	15.46
<i>Habroleptoides auberti</i>	1	0.50	0.29	14.54
<i>Leuctra major</i>	1	0.53	0.26	13.85
<i>Philopotamus ludificatus</i>	1	0.40	0.33	13.41
<i>Rhithrogena picteti</i>	1	0.52	0.25	12.73
<i>Silo pallipes</i>	1	0.65	0.19	12.31
<i>Electrogena lateralis</i>	1	0.90	0.13	11.69
<i>Leuctra nigra</i>	1	0.45	0.22	9.84
<i>Brachyptera seticornis</i>	1	0.61	0.14	8.91
<i>Ephemerella mucronata</i>	1	0.53	0.14	7.68
<i>Melampophylax mucoreus</i>	1	0.70	0.10	7.13
<i>Protonemura praecox</i>	1	0.79	0.06	4.60
<i>Diplectrona atra</i>	1	1.00	0.04	4.35
<i>Rhyacophila pubescens</i>	1	1.00	0.04	4.35
<i>Rhithrogena loyolaea</i>	2	0.86	0.74	63.16
<i>Protonemura brevistyla</i>	2	0.79	0.53	42.03
<i>Drusus discolor</i>	2	0.61	0.62	37.99
<i>Ecdyonurus alpinus</i>	2	0.75	0.28	20.79
<i>Rhithrogena nivata</i>	2	1.00	0.21	20.69
<i>Siphonoperla montana</i>	2	0.81	0.25	20.40
<i>Cryptothrix nebulicola</i>	2	0.74	0.26	19.67
<i>Rhithrogena alpestris</i>	2	0.59	0.31	18.46
<i>Rhithrogena puthzi</i>	2	0.49	0.32	15.86
<i>Metanoea rhaetica</i>	2	0.72	0.20	14.12
<i>Rhyacophila intermedia</i>	2	0.54	0.24	12.92

<i>Rhithrogena degrangei</i>	2	0.77	0.15	11.51
<i>Drusus melanchaetes</i>	2	0.81	0.13	10.20
<i>Rhyacophila hirticornis</i>	2	0.51	0.18	9.32
<i>Drusus muelleri</i>	2	1.00	0.09	9.20
<i>Drusus biguttatus</i>	2	0.60	0.14	8.34
<i>Dictyogenus alpinus</i>	2	0.86	0.09	7.89
<i>Drusus nigrescens</i>	2	0.84	0.08	6.77
<i>Rhyacophila glareosa</i>	2	1.00	0.05	4.60
<i>Dictyogenus fontium</i>	2	0.79	0.06	4.55
<i>Nemoura mortoni</i>	3	0.46	0.80	36.85
<i>Protonemura lateralis</i>	3	0.42	0.77	32.68
<i>Baetis alpinus</i>	3	0.32	0.98	31.04
<i>Chloroperla susemicheli</i>	3	0.64	0.45	29.31
<i>Ecdyonurus helveticus</i>	3	0.38	0.77	29.28
<i>Epeorus alpicola</i>	3	0.52	0.53	27.81
<i>Nemoura minima</i>	3	0.47	0.56	26.13
<i>Capnioneura nemuroides</i>	3	0.55	0.39	21.78
<i>Allogamus auricollis</i>	3	0.30	0.71	21.30
<i>Rhithrogena hybrida</i>	3	0.75	0.27	20.38
<i>Ecdyonurus picteti</i>	3	0.53	0.35	18.43
<i>Leuctra braueri</i>	3	0.42	0.39	16.62
<i>Metanoea flavipennis</i>	3	0.63	0.20	12.44
<i>Protonemura nimborum</i>	3	0.54	0.20	10.58
<i>Micrasema morosum</i>	3	1.00	0.09	9.09
<i>Perla grandis</i>	3	0.49	0.17	8.11
<i>Protonemura auberti</i>	3	0.59	0.12	7.16
<i>Lithax niger</i>	3	0.69	0.08	5.21
<i>Perlodes intricatus</i>	3	0.57	0.09	5.17
<i>Leuctra schmidi</i>	3	0.73	0.06	4.39
<i>Paraleptophlebia submarginata</i>	4	0.85	0.49	41.20
<i>Halesus digitatus</i>	4	0.66	0.56	36.56
<i>Baetis rhodani</i>	4	0.35	0.97	33.61
<i>Habrophlebia lauta</i>	4	0.61	0.47	28.55
<i>Baetis lutheri</i>	4	0.62	0.40	24.73
<i>Ephemera danica</i>	4	0.66	0.37	24.64
<i>Hydropsyche siltalai</i>	4	0.72	0.33	23.52
<i>Lype reducta</i>	4	0.94	0.23	21.49
<i>Centroptilum luteolum</i>	4	0.57	0.37	21.26
<i>Ecdyonurus venosus</i>	4	0.52	0.40	21.00
<i>Serratella ignita</i>	4	0.78	0.26	20.06
<i>Ecdyonurus torrentis</i>	4	0.93	0.20	18.65
<i>Electrogena ujhelyii</i>	4	0.71	0.14	10.16
<i>Baetis vernus</i>	4	0.90	0.10	8.97
<i>Silo nigricornis</i>	4	0.85	0.09	7.28

<i>Psychomyia pusilla</i>	4	0.83	0.07	5.94
<i>Baetis buceratus</i>	4	1.00	0.06	5.71
<i>Baetis fuscatus</i>	4	1.00	0.04	4.29

Reference

Dufrêne, M. and Legendre, P. 1997. Species assemblages and indicator species: the need for a flexible asymmetrical approach. - Ecol. Monogr. 67: 345–366.