Supplementary Table 1. Overview of sampling events with the number (no.) of collected samples and species richness based on 300 cell counts. Temperature (mean ± standard deviation) was counted for the 30 days preceding a sampling event. The number of samples and species richness values are given separately for epipelon (EPI) and *Sphagnum* spp. periphyton (PERI) microhabitats

Sampling event	*Date*	*Temperature [°C]*	*No. of samples*		*Species richness*		
			EPI	*PERI*	*EPI*	*PERI*	*Total*
spring 1	18.5.2010	11.6 ± 2.9	6	0	44	0	44
summer 1	31.8.2010	18.2 ± 3.1	6	0	43	0	43
autumn 1	4.11.2010	7.1 ± 2.7	6	6	41	34	47
winter 1	3.2.2011	– 0.3 ± 4.8	6	6	44	47	52
spring 2	4.5.2011	11.2 ± 3.7	6	6	41	33	46
summer 2	30.8.2011	19.4 ± 3.2	6	6	41	35	45
autumn 2	5.11.2011	7.3 ± 2.7	6	6	43	31	47
winter 2	18.3.2012	4.9 ± 3.3	6	6	43	38	49

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Supplementary Table 2. Species richness and Shannon diversity index for individual samples. EPI = epipelon, PERI = *Sphagnum* spp. periphyton

Nr. sample	*Sampling event*	*Site*	*Microhabitat*	*Species richness*	*Shannon diversity index*
1	spring 1	1	EPI	13	1.280
2	spring 1	2	EPI	11	1.543
3	spring 1	5	EPI	17	1.477
4	spring 1	3	EPI	16	1.685
5	spring 1	4	EPI	14	1.981
6	spring 1	6	EPI	5	0.637
7	summer 1	1	EPI	20	2.159
8	summer 1	2	EPI	11	1.441
9	summer 1	5	EPI	12	1.393
10	summer 1	3	EPI	17	1.916
11	summer 1	4	EPI	12	1.913
12	summer 1	6	EPI	5	0.690
13	autumn 1	1	PERI	14	1.731
14	autumn 1	1	EPI	18	1.978
15	autumn 1	2	PERI	13	0.921
16	autumn 1	2	EPI	14	1.596
17	autumn 1	5	PERI	6	0.275
18	autumn 1	5	EPI	9	0.710
19	autumn 1	3	PERI	9	1.267
20	autumn 1	3	EPI	15	1.732
21	autumn 1	4	PERI	12	1.175
22	autumn 1	4	EPI	10	1.252
23	autumn 1	6	PERI	4	0.348
24	autumn 1	6	EPI	3	0.183
25	winter 1	1	PERI	26	2.665
26	winter 1	1	EPI	19	2.119
27	winter 1	2	PERI	16	1.800
28	winter 1	2	EPI	12	1.403
29	winter 1	5	PERI	10	1.113
30	winter 1	5	EPI	5	0.501
31	winter 1	3	PERI	16	1.612
32	winter 1	3	EPI	22	1.897
33	winter 1	4	PERI	7	1.247
34	winter 1	4	EPI	11	1.628
35	winter 1	6	PERI	4	0.328
36	winter 1	6	EPI	5	0.546
37	spring 2	1	PERI	15	2.127
38	spring 2	1	EPI	15	1.808
39	spring 2	2	PERI	12	0.987
40	spring 2	2	EPI	15	1.652
41	spring 2	5	PERI	5	0.618
42	spring 2	5	EPI	11	0.740

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Supplementary Table 2. Species richness and Shannon diversity index for individual samples. EPI = epipelon, PERI = *Sphagnum* spp. periphyton *(continued)*

Nr. sample	*Sampling event*	*Site*	*Microhabitat*	*Species richness*	*Shannon diversity index*
43	spring 2	3	PERI	10	1.409
44	spring 2	3	EPI	16	1.566
45	spring 2	4	PERI	8	1.497
46	spring 2	4	EPI	13	1.764
47	spring 2	6	PERI	2	0.500
48	spring 2	6	EPI	4	0.292
49	summer 2	1	PERI	15	1.960
50	summer 2	1	EPI	15	1.658
51	summer 2	2	PERI	11	1.288
52	summer 2	2	EPI	13	1.696
53	summer 2	5	PERI	5	0.277
54	summer 2	5	EPI	10	0.815
55	summer 2	3	PERI	10	1.298
56	summer 2	3	EPI	14	1.483
57	summer 2	4	PERI	14	1.454
58	summer 2	4	EPI	13	1.135
59	summer 2	6	PERI	3	0.326
60	summer 2	6	EPI	3	0.208
61	autumn 2	1	PERI	17	1.913
62	autumn 2	1	EPI	15	1.882
63	autumn 2	2	PERI	15	1.741
64	autumn 2	2	EPI	14	1.927
65	autumn 2	5	PERI	3	0.493
66	autumn 2	5	EPI	10	1.225
67	autumn 2	3	PERI	10	1.171
68	autumn 2	3	EPI	14	1.279
69	autumn 2	4	PERI	9	0.994
70	autumn 2	4	EPI	13	1.933
71	autumn 2	6	PERI	3	0.354
72	autumn 2	6	EPI	5	0.259
73	winter 2	1	PERI	18	2.131
74	winter 2	1	EPI	20	2.123
75	winter 2	2	PERI	15	1.786
76	winter 2	2	EPI	14	1.565
77	winter 2	5	PERI	6	0.752
78	winter 2	5	EPI	9	0.962
79	winter 2	3	PERI	12	1.004
80	winter 2	3	EPI	15	1.338
81	winter 2	4	PERI	7	0.863
82	winter 2	4	EPI	12	1.675
83	winter 2	6	PERI	8	0.776
84	winter 2	6	EPI	4	0.318

Supplementary Table 3. Complete list of 73 diatom species identified in 84 samples based on 300 cell counts per sample. The most abundant species (top 25%) are highlighted in bold

Adlafia minuscula (Grunow) Lange-Bertalot
Achnanthes sp.
***Achnanthidium minutissimum* (Kützing) Czarnecki**
Amphora ovalis (Kützing) Kützing
Brachysira brebissonii R.Ross
***Brachysira neoexilis* Lange-Bertalot**
***Brachysira* cf. *neoexilis* Lange-Bertalot**
Brachysira procera Lange-Bertalot & Gerd Moser
***Brachysira serians* (Brébisson) Round & D.G. Mann**
Caloneis tenuis (W.Gregory) Krammer
***Cymbella falaisensis* (Grunow) Krammer & Lange-Bertalot**
Cymbopleura inaequalis (Ehrenberg) Krammer
Denticula kuetzingii Grunow
Encyonema gracile Rabenhorst
Encyonema silesiacum (Bleisch) D.G.Mann
***Encyonopsis* cf. *delicatissima* (Hustedt) Krammer**
Epithemia adnata (Kützing) Brébisson
Eucocconeis flexella (Kützing) Meister
***Eunotia* cf. *arcubus* Nörpel & Lange-Bertalot**
Eunotia arculus Lange-Bertalot & Nörpel
***Eunotia bilunaris* (Ehrenberg) Schaarschmidt**
***Eunotia exigua* (Brébisson ex Kützing) Rabenhorst**
***Eunotia glacialis* Meister**
Eunotia implicata Nörpel, Lange-Bertalot & Alles
Eunotia incisa W.Smith ex W.Gregory
Eunotia intermedia (Krasske ex Hustedt) Nörpel & Lange-Bertalot
Eunotia minuta F.W.Hilse
Eunotia naegelii Migula
***Eunotia paludosa* Grunow**
Eunotia pectinalis var. *ventralis* (Ehrenberg) Hustedt
Eunotia praerupta Ehrenberg
Eunotia rhomboidea Hustedt
Eunotia tenella (Grunow) Hustedt
Fallacia vitrea (Østrup) D.G.Mann
Fragilaria brevistriata Grunow
Fragilaria capucina Desmazières
***Fragilaria construens* (Ehrenberg) Grunow**
Fragilaria tenera var. *nanana* (Lange-Bertalot) Lange-Bertalot & S.Ulrich
Fragilariforma exigua (Grunow) M.G.Kelly
***Frustulia saxonica* Rabenhorst**
Gomphonema acuminatum Ehrenberg
Gomphonema gracile Ehrenberg

Supplementary Table 3. Complete list of 73 diatom species identified in 84 samples based on 300 cell counts per sample. The most abundant species (top 25%) are highlighted in bold *(continued)*

Gomphonema parvulum(Kützing) Kützing
Hantzschia sp.
Chamaepinnularia mediocris (Krasske) Lange-Bertalot & Krammer
Chamaepinnularia soehrensis (Krasske) Lange-Bertalot & Krammer
***Kobayasiella* sp.**
Kobayasiella subtilissima (Cleve) Lange-Bertalot
Meridion circulare (Greville) C.Agardh
Neidium bisulcatum (Lagerstedt) Cleve
Nitzschia dissipata (Kützing) Rabenhorst
***Nitzschia* sp. 1**
Nitzschia sp. 2
Nitzschia sp. 3
Nitzschia sp. 4
Pinnularia cf. *frequentis* Krammer
Pinnularia gibbiformis Krammer
Pinnularia interrupta W.Smith
***Pinnularia macilenta* Ehrenberg**
***Pinnularia pseudogibba* Krammer**
***Pinnularia rhombarea* Krammer**
Pinnularia rupestris Hantzsch
Pinnularia sp.
Pinnularia subcapitata var. *elongata* Krammer
Pinnularia viridiformis Krammer
Placoneis cf. *explanata* (Hustedt) Lange-Bertalot
Rhopalodia gibba (Ehrenberg) Otto Müller
Staurosirella leptostauron (Ehrenberg) D.M.Williams & Round
Staurosirella pinnata (Ehrenberg) D.M.Williams & Round
Stenopterobia curvula (W.Smith) Krammer
Stenopterobia delicatissima (F.W.Lewis) Brébisson ex Van Heurck
Tabellaria fenestrata (Lyngbye) Kützing
***Tabellaria flocculosa* (Roth) Kützing**

Supplementary Table 4. Complete results of individual permutational MANOVA tests, partitioning variation in the diatom community structure on a large scale (*i.e.*, among six sampling sites), using the Bray-Curtis similarity index and 9999 permutations. The analysis considered the effect of the *time*, *space*, and *environment* factor groups. *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, n.s. $P > 0.05$

		df	*Sums of squares*	*F ratio*	R^2	*Adjusted* R^2	*P value*
model A-1	environment	3	6.876	15.715	0.255	0.227	***
	space	13	10.147	5.351	0.376	0.260	***
	time	6	1.083	1.237	0.040	0	n.s.
	residuals	61	8.897	–	0.330	–	–
model A-2	time	7	1.096	1.073	0.041	0	n.s.
	environment	2	6.990	23.963	0.259	0.241	***
	space	13	10.019	5.284	0.371	0.254	***
	residuals	61	8.897	–	0.330	–	–
model A-3	space	13	16.199	8.544	0.600	0.526	***
	time	7	1.081	1.059	0.040	0	n.s.
	environment	2	0.825	2.829	0.031	0.007	**
	residuals	61	8.897	–	0.330	–	–

Supplementary Table 5. Complete results of individual permutational MANOVA tests, partitioning variation in the diatom community structure on a large scale (*i.e.*, among six sampling sites) using the Bray-Curtis similarity index and 9999 permutations. The analysis considered the effects of individual factors GPS, microhabitat, pH, conductivity, and temperature. *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, n.s. $P > 0.05$

		df	*Sums of squares*	*F ratio*	R^2	*Adjusted* R^2	*P value*
model B-1	pH	1	6.054	40.646	0.224	0.215	***
	conductivity	1	0.499	3.349	0.019	0.007	*
	temperature	1	0.323	2.169	0.012	0	n.s.
	microhabitat	1	0.334	2.243	0.012	0	n.s.
	GPS	12	9.813	5.490	0.363	0.256	***
	residuals	67	9.980	–	0.370	–	–
model B-2	GPS	12	15.877	8.883	0.588	0.518	***
	pH	1	0.116	0.781	0.004	0	n.s.
	conductivity	1	0.647	4.340	0.024	0.012	**
	temperature	1	0.062	0.417	0.002	0	n.s.
	microhabitat	1	0.321	2.156	0.012	0	n.s.
	residuals	67	9.979	–	0.370	–	–
model B-3	microhabitat	1	0.367	2.462	0.014	0.002	n.s.
	GPS	12	15.832	8.858	0.586	0.516	***
	pH	1	0.116	0.782	0.004	0	n.s.
	conductivity	1	0.642	4.311	0.024	0.012	**
	temperature	1	0.065	0.436	0.002	0	n.s.
	residuals	67	9.979	–	0.370	–	–
model B-4	temperature	1	0.137	0.921	0.005	0	n.s.
	microhabitat	1	0.356	2.391	0.013	0.001	n.s.
	GPS	12	15.825	8.854	0.586	0.516	***
	pH	1	0.119	0.802	0.004	0	n.s.
	conductivity	1	0.585	3.924	0.022	0.010	**
	residuals	67	9.979	–	0.370	–	–
model B-5	conductivity	1	3.286	22.064	0.122	0.110	***
	temperature	1	0.234	1.569	0.009	0	n.s.
	microhabitat	1	0.387	2.596	0.014	0.002	*
	GPS	12	12.969	7.256	0.480	0.392	***
	pH	1	0.147	0.985	0.005	0	n.s.
	residuals	67	9.979	–	0.370	–	–