

Supplementary Material for the paper “ Diversity of rotifers in small rivers affected by human activity” by Dariusz Halabowski, Irena Bielańska-Grajner, Iga Lewin and Agnieszka Sowa

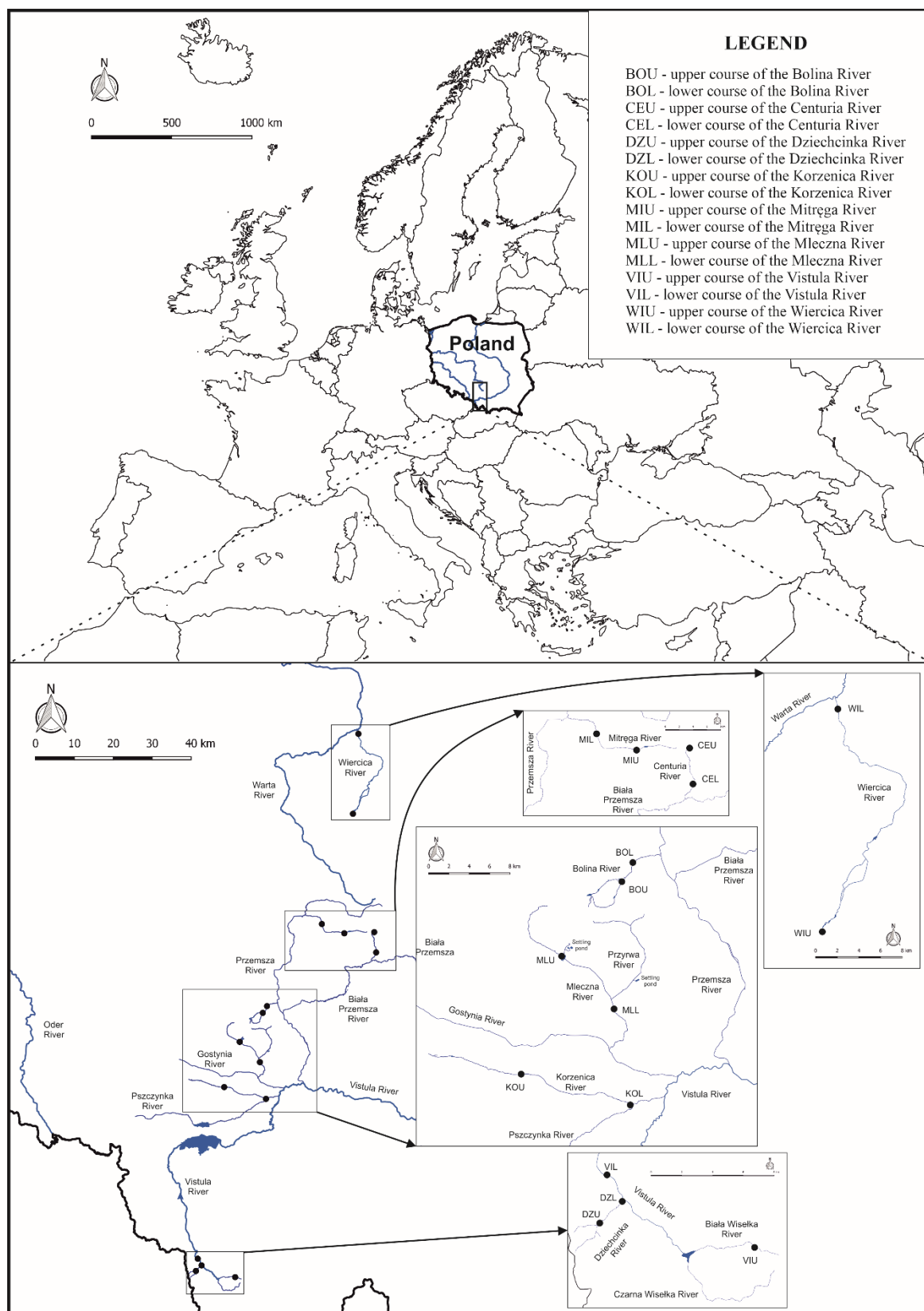


Figure S1. Study area and sampling sites.

Table S1. The physical and chemical parameters of the water of the studied rivers (ranges) and the results of the Kruskal-Wallis one-way ANOVA and Dunn's multiple comparison post hoc tests (superscript ^{a, b, c, d, e, f, g, h} denotes significant differences between the rivers).

Parameter	Bolina	Centuria	Mitřęga	Mleczna	Dziehcinka	Vistula	Korzenica	Wiercica	H value	p value
Altitude [m a.s.l.]	257-262 ^{e,f}	311-343 ^g	300-317	236-248 ^{e,f}	420-544 ^{a,d,g,h}	415-748 ^{a,d,g,h}	234-242 ^{b,e,f}	215-309 ^{e,f}	54.106	<0.001
Width of the riverbed [m]	4.41-7.78 ^g	3.30-5.95	2.87-6.13 ^h	4.41-9.36 ^g	3.49-4.55 ^h	3.47-19.80 ^g	1.85-4.06 ^{a,d,f,h}	5.97-12.05 ^{c,e,g}	37.858	<0.001
Depth of the riverbed [cm]	21.38-34.40 ^d	9.75-58.60	40.00-61.25	36.80-109.17 ^{a,e}	19.30-31.60 ^d	26.17-57.60	38.26-85.00	6.70-98.33	25.064	<0.001
Flow velocity [m s ⁻¹]	0.060-0.510	0.071-0.790	0.007-0.292 ^f	0.099-0.384 ^f	0.229-0.825 ^{c,d}	0.107-0.939	0.057-0.706	0.119-0.376	24.218	0.001
Dissolved oxygen [mg dm ⁻³]	4.65-9.69	4.24-6.61	3.18-6.12	0.69-6.78	4.96-5.77	4.88-5.90	2.98-6.49	4.40-6.03	17.032	0.017
Temperature [°C]	15.5-29.1 ^{b,e,f}	7.5-14.3 ^a	9.4-19.1	14.8-25.1	9.1-23.6 ^a	9.2-23.8 ^a	13.4-23.5	9.7-19.8	27.415	<0.001
Salinity [PSU]	6.57-33.55 ^{b,e,f,g,h}	0.19-0.28 ^a	0.28-0.35 ^{e,f}	0.45-5.16 ^{e,f}	0.04-0.05 ^{a,c,d}	0.02-0.07 ^{a,c,d}	0.17-0.28 ^a	0.22-0.25 ^a	57.933	<0.001
EC [μ S cm ⁻¹]	9130-46 600 ^{b,e,f,g,h}	250-360 ^a	360-460 ^{e,f}	620-7160 ^{e,f}	50-70 ^{a,c,d}	30-90 ^{a,c,d}	220-370 ^a	280-330 ^a	57.933	<0.001
TDS [mg dm ⁻³]	4570-23 300 ^{b,e,f,g,h}	110-180 ^a	170-220 ^{e,f}	300-3570 ^{e,f}	20-30 ^{a,c,d}	10-30 ^{a,c,d}	100-170 ^a	140-160 ^a	58.110	<0.001
Chlorides [mg dm ⁻³]	2823-17 028 ^{b,e,f,h}	8-20 ^a	15-26 ^f	62-1970 ^{e,f,h}	4-9 ^{a,d,g}	5-9 ^{a,c,d,g}	18-25 ^{e,f}	4-17 ^{a,d}	56.707	<0.001
Sulphates [mg dm ⁻³]	320-770 ^{e,f,h}	35-44	22-66 ^f	74-272 ^{e,f,h}	10-18 ^{a,d}	8-16 ^{a,c,d}	31-64	10-16 ^{a,d}	57.548	<0.001
Total hardness [mg CaCO ₃ dm ⁻³]	1071.60-4857.92 ^{e,f,g}	160.00-300.00 ^f	160-330 ^{e,f}	255-560 ^{e,f,g}	36-68 ^{a,c,d}	28-67 ^{a,b,c,d}	110-150 ^{a,d}	145-320	57.623	<0.001
Magnesium [mg dm ⁻³]	124.00-670.00 ^{e,f,h}	1.94-27.55	0.06-32.55	16.31-62-53 ^{e,f,h}	0.26-5.14 ^{a,d}	0.04-3.38 ^{a,d}	5.04-13.77	0.00-19.80 ^{a,d}	46.606	<0.001
Calcium [mg dm ⁻³]	328-1310 ^{e,f,g}	55-76	64-94 ^{e,f}	40-158 ^{e,f}	14-21 ^{a,c,d}	10-18 ^{a,c,d,h}	24-50 ^a	58-82 ^f	56.170	<0.001
Alkalinity [mg CaCO ₃ dm ⁻³]	230.0-380.0 ^{b,e,f,g}	75.0-165.0 ^a	125.0-250.0 ^{e,f}	125.0-275.0 ^{e,f}	2.5-50.0 ^{a,c,d,h}	15-40 ^{a,c,d,h}	20-155 ^a	140-180 ^{e,f}	55.733	<0.001
pH	7.5-7.9	7.2-7.9	7.0-8.1	6.8-8.0	6.5-8.3	6.5-8.4	6.2-7.7	7.4-8.2	9.087	0.247

Nitrates [mg dm ⁻³]	0.00-79.74	0.00-20.82	0.89-15.95	5.32-10.19	0.00-7.38	0.00-9.30	0.44-18.61	0.89-8.42	16.165	<0.024
Nitrites [mg dm ⁻³]	0.675-9.96 e,f,h	0.00-0.15 ^a	0.03-0.31	0.20-0.93 ^{e,f}	0.00-0.00 ^{a,d}	0.00-0.01 ^{a,d}	0.00-0.59	0.00-0.38 ^a	48.921	<0.001
Ammonium [mg dm ⁻³]	0.619-12.12 b,e,f,h	0.00-0.29 ^a	0.26-1.42 ^e	0.23-1.21 ^{e,h}	0.13-0.29 ^{a,c,d}	0.15-0.45 ^a	0.22-0.63	0.00-0.24 ^{a,d}	46.240	<0.001
Phosphates [mg dm ⁻³]	0.02-0.14 ^d	0.00-0.11 ^d	0.08-0.39	0.16-19.20 a,b,e,f	0.00-1.52 ^e	0.00-0.34 ^e	0.09-0.87	0.00-0.66	28.030	<0.001
Iron [mg dm ⁻³]	0.12-0.88	0.03-0.65 ^g	0.25-1.00 ^{e,f}	0.26-1.46 ^{e,f}	0.03-0.34 ^{c,d,g}	0.03-0.23 ^{c,d,g}	0.42-3.11 b,e,f,h	0.03-0.72 ^g	37.793	<0.001

^a – the Bolina River, ^b – the Centuria River, ^c – the Mitrega River, ^d – the Mleczna River, ^e – the Dziehcinka River, ^f – the Vistula River, ^g – the Korzenica River, ^h – the Wiercica River

Table S2. The physical and chemical parameters of the water of sampling sites (ranges) and the results of the Kruskal-Wallis one-way ANOVA and Dunn's multiple comparison post hoc tests (superscript ^{a, b, c, d, e, f, g, h} denotes significant differences among the rivers). Abbreviations: UC – upper course, LC – lower course.

Parameter	Bolina		Centuria		Mitrega		Mleczna		Dziechcinka		Vistula		Korzenica		Wiercica		H value	p value
	UC	LC	UC	LC	UC	LC	UC	LC	UC	LC	UC	LC	UC	LC	UC	LC		
Altitude [m a.s.l.]	262	257	343	311	317	300 ^{i,k}	248	236	544 ^{f,n,r}	420 ^{n,r}	748 ^{f,m,n,r}	415 ^r	242 ^k	234 ^{i,j,k}	309	215 ^{i,j,k,l}	63.000	<0.001
Width of the riverbed [m]	7.24-7.78 ^m	4.41-4.45	4.47-5.95	3.30-4.20	3.97-6.13	2.87-3.39 ^{l,r}	4.41-5.31	6.26-9.36 ⁿ	4.05-4.55	3.49-3.92 ^l	3.47-4.01	17.80-19.80 ^{f,i,m,n}	1.85-2.51 ^{a,h,l,o,r}	2.99-4.06 ^l	5.97-9.60 ^m	9.52-12.05 ^{f,m}	59.410	<0.001
Depth of the riverbed [cm]	25.20-34.40	21.38-25.90	9.75-22.50 ^{h,r}	41.67-58.60	40.00-61.25	40.00-58.60	36.80-62.17	81.40-109.17 ^{c,o}	21.19-31.60	19.30-30.80	26.17-30.88	35.30-57.60	38.26-53.00	40.38-85.00	6.70-14.58 ^{h,r}	76.40-98.33 ^{c,o}	56.081	<0.001
Flow velocity [m s ⁻¹]	0.060-0.420	0.400-0.510	0.071-0.173	0.404-0.790	0.093-0.233	0.007-0.292	0.100-0.384	0.155-0.211	0.229-0.655	0.310-0.825	0.390-0.939	0.107-0.478	0.057-0.533	0.182-0.706	0.136-0.205	0.119-0.376	38.260	<0.001
Dissolved oxygen [mg dm ⁻³]	4.65-7.09	5.13-9.69 ^h	4.89-6.61	4.24-4.96	3.18-5.68	4.62-6.12	2.48-6.78	0.69-4.82 ^b	5.11-5.77	4.96-5.49	4.88-5.24	5.36-5.90	3.96-6.49	2.98-5.49	4.40-6.00	4.71-6.03	26.328	0.035
Temperature [°C]	15.7-28.6	15.5-29.1	7.5-13.6	9.5-14.3	9.4-19.1	10.4-18.4	16.5-24.0	14.8-25.1	9.8-17.8	9.1-23.6	9.2-18.1	9.4-23.8	13.4-23.5	13.4-22.6	9.7-11.3	13.6-19.8	31.570	0.007
Salinity [PSU]	6.57-12.25 ^{i,j,k}	16.34-33.55 ^{i,j,k,l}	0.19-0.21	0.25-0.28	0.28-0.31	0.29-0.35	0.45-0.64 ^k	2.97-5.16 ^{i,k}	0.05 ^{a,b,h}	0.04-0.05 ^{a,b}	0.02-0.04 ^{a,b,g,h}	0.05-0.07 ^b	0.18-0.28	0.17-0.28	0.22-0.25	0.22-0.25	60.291	<0.001
EC [μS cm ⁻¹]	9130-17 020 ^{i,j,k}	22,700-46 600 ^{i,j,k,l}	250-270	330-360	360-400	380-460	620-890 ^k	4120-7160 ^{i,k}	50-70 ^{a,b,h}	50-70 ^{a,b}	30-50 ^{a,b,g,h}	70-90 ^b	240-370	220-360	280-330	280-330	60.291	<0.001
TDS [mg dm ⁻³]	4570-8510 ^{i,j,k,l}	11 360-23 300 ^{i,j,k,l}	110-140	150-180	170-190	180-220	300-440 ^k	2050-3570 ^k	20-20 ^{a,b}	20-30 ^{a,b}	10-20 ^{a,b,g,h}	20-30 ^{a,b}	110-170	100-170	140-160	140-160	60.328	<0.001
Chlorides [mg dm ⁻³]	2823-5590 ^{i,k,l}	7528-17 028 ^{i,j,k,l}	8-20	12-17	15-22	18-26	62-98	1340-1970 ^{i,k}	4-8 ^{a,b,h}	8-9 ^b	5-8 ^{a,b,h}	8-9 ^b	18-25	18-24	4-16	10-17	57.946	<0.001
Sulphates [mg dm ⁻³]	352-770 ^{j,k,l,o,r}	320-550 ^{k,r}	35-44	37-40	22-54	49-66	74-134 ^k	200-272 ^k	13-17	10-18 ^a	8-11 ^{a,b,g,h}	12-16 ^a	31-64	35-60	12-14 ^a	10-16 ^{a,b}	58.752	<0.001
Total hardness [mg CaCO ₃ dm ⁻³]	1071.0-1920.0 ^{i,j,k,l}	2268.2-4857.9 ^{i,j,k,l}	160.0-225.0	195.0-300.0	160.0-310.0	175.0-330.0	255.0-430.0	405.0-560.0 ^k	36.0-63.0 ^{a,b}	42.0-68.0 ^{a,b}	28.0-41.0 ^{a,b,h}	33.0-67.0 ^{a,b}	125.0-150.0	110.0-135.0	150.0-320.0	145.0-215.0	58.434	<0.001

Magnesium [mg dm ⁻³]	124.00-270.00 ^{l,o}	225.00-670.00 ^{k,l,o}	3.80-21.91	1.94-27.55	0.06-32.55	0.69-30.05	16.31-62.53	38.19-60.08	0.26-5.14	0.51-3.89	0.26-3.38 ^b	0.04-2.02 ^{a,b}	5.04-8.80	10.02-13.77	0.01-2.90 ^{a,b}	0.00-13.80	47.608	<0.001
Calcium [mg dm ⁻³]	328-687 ^{i,k,l}	548-1310 ^{ij,k,l}	55-60	67-76	64-94	69-94	40-100	101-158 ^{k,l}	14-18 ^{a,b}	16-21 ^b	10-16 ^{a,b,h}	11-18 ^{a,b,h}	38-50	24-32	59-80	58-82	58.833	<0.001
Alkalinity [mg CaCO ₃ dm ⁻³]	275-380 ^{ij,k,l}	230-320 ^{i,k,l}	75-110	120-165	125-165	165-250	125-240	240-275 ^{i,k}	3-40 ^{a,b,h}	4-50 ^a	15-25 ^{a,b,h}	15-40 ^{a,b}	45-155	20-70	145-175	140-180	58.423	<0.001
pH	7.5-7.8	7.5-7.9	7.5-7.8	7.2-7.9	7.0-7.4	7.3-8.1	6.8-7.9	7.4-8.0	6.5-8.3	6.8-8.2	6.5-8.4	6.9-8.2	7.2-7.7	6.2-7.6	7.4-7.7	7.5-8.2	16.522	0.348
Nitrates [mg dm ⁻³]	0.00-79.74	4.43-10.63	0.00-11.96	0.00-20.82	2.22-12.40	0.89-15.95	5.32-7.09	5.32-10.19	0.00-7.38	0.00-2.66	0.00-0.89	0.00-9.30	0.44-6.20	2.22-18.61	0.89-3.54	4.87-8.42	23.315	0.078
Nitrites [mg dm ⁻³]	0.68-1.44	2.49-9.96 ^{c,ij,k,l}	0.00-0.01 ^b	0.01-0.15	0.03-0.31	0.11-0.24	0.28-0.93	0.20-0.73	0.00-0.00 ^b	0.00-0.00 ^b	0.00-0.01 ^b	0.00-0.00 ^b	0.00-0.26	0.00-0.59	0.00-0.07	0.02-0.38	53.490	<0.001
Ammonium [mg dm ⁻³]	0.62-1.00	1.25-12.12 ^{c,i,o}	0.00-0.23 ^b	0.17-0.29	0.33-1.42	0.26-0.36	0.34-0.56	0.23-1.21	0.13-0.18 ^b	0.13-0.29	0.15-0.45	0.18-0.27	0.22-0.52	0.41-0.63	0.00-0.19 ^b	0.02-0.24	49.924	<0.001
Phosphates [mg dm ⁻³]	0.02-0.14	0.05-0.10	0.00-0.11	0.00-0.10	0.08-0.39	0.08-0.24	0.37-19.20	0.16-3.84	0.00-0.23	0.01-1.52	0.00-0.29	0.01-0.34	0.11-0.56	0.09-0.87	0.00-0.21	0.20-0.66	32.464	0.005
Iron [mg dm ⁻³]	0.13-0.88	0.12-0.39	0.03-0.65	0.12-0.28	0.38-1.00	0.25-0.78	0.28-0.67	0.26-1.46	0.03-0.13 ⁿ	0.04-0.34	0.03-0.18 ⁿ	0.09-0.23	0.42-0.97	0.82-3.11 ^{i,k,o}	0.03-0.11 ⁿ	0.35-0.72	47.794	<0.001

^a – upper course of the Bolina River, ^b – lower course of the Bolina River, ^c – upper course of the Centuria River, ^d – lower course of the Centuria River, ^e – upper course of the Mitręga River, ^f – lower course of the Mitręga River, ^g – upper course of the Mleczna River, ^h – lower course of the Mleczna River, ⁱ – upper course of the Dziechcinka River, ^j – lower course of the Dziechcinka River, ^k – upper course of the Vistula River, ^l – lower course of the Vistula River, ^m – upper course of the Korzenica River, ⁿ – lower course of the Korzenica River, ^o – upper course of the Wiercica River, ^r – lower course of the Wiercica River