

## Supplementary materials

**Table S1.** Two-way ANOVA of chemical and physical parameters by year and season. Significance is highlighted in bold ( $n=120$  for all comparisons).

Parameter	Source	d.f.	SS	MS	F	p-level
Depth	Year	1	2.060	2.059	6.470	0.055
	Season	3	1.180	0.394	1.238	0.297
	Year x Season	3	0.130	0.045	0.141	0.936
Temperature	Year	1	0.158	0.158	18.720	<b>&lt;0.001</b>
	Season	3	2.280	0.760	90.300	<b>&lt;0.001</b>
	Year x Season	3	0.442	0.147	17.500	<b>&lt;0.001</b>
Dissolved oxygen	Year	1	0.605	0.605	21.979	<b>&lt;0.001</b>
	Season	3	1.605	0.535	19.447	<b>&lt;0.001</b>
	Year x Season	3	0.557	0.186	6.754	<b>&lt;0.001</b>
pH	Year	1	0.681	0.681	817.720	<b>&lt;0.001</b>
	Season	3	0.148	0.049	59.360	<b>&lt;0.001</b>
	Year x Season	3	0.071	0.024	28.390	<b>&lt;0.001</b>
Conductivity	Year	1	0.970	0.970	129.630	<b>&lt;0.001</b>
	Season	3	0.108	0.036	4.793	<b>&lt;0.001</b>
	Year x Season	3	0.129	0.043	5.743	<b>&lt;0.001</b>
Soča River hydrometric level	Year	1	0.800	0.800	164.704	<b>&lt;0.001</b>
	Season	3	0.130	0.043	8.913	<b>&lt;0.001</b>
	Year x Season	3	0.012	0.004	0.833	0.477
Rainfall	Year	1	36.190	36.190	58.327	<b>&lt;0.001</b>
	Season	3	5.210	1.740	2.798	0.041
	Year x Season	3	4.990	1.660	2.682	0.048

**Table S2.** Correlations (highest values of Pearson coefficient in bold,  $p<0.001$ ) between parameters and PCA axes (first three axes are shown).

Parameter	PC1	PC2	PC3
Depth	0.488	0.416	<b>-0.665</b>
Temperature	-0.359	<b>0.693</b>	0.515
Dissolved oxygen	-0.302	<b>-0.785</b>	0.007
pH	<b>0.660</b>	-0.482	0.130
Conductivity	<b>0.820</b>	0.043	0.136
Rainfall	<b>0.740</b>	0.094	0.363
Soča	<b>0.895</b>	0.024	0.074
Explained variability (%)	41.64	21.62	12.68
Cumulative proportion (%)	41.64	63.26	75.93

**Table S3.** Results of the Kruskal Wallis nonparametric test and of the Conover-Iman test for the seasonal comparisons between the values of the community indices calculated from the 2021-2022 dataset. Significance is enlightened in bold.

Number of observed taxa: Kruskal-Wallis chi-squared = 9.4549, df = 3, <i>p</i> -value = 0.02				
	Spring	Summer	Autumn	Winter
Spring		-2.596	-2.451	-2.886
Summer	<b>0.006</b>		0.145	-0.290
Autumn	<b>0.009</b>	0.443		-0.435
Winter	<b>0.003</b>	0.387	0.333	

  

Shannon-Wiener Index: Kruskal-Wallis chi-squared = 32.5973, df = 3, <i>p</i> -value <0.001				
	Spring	Summer	Autumn	Winter
Spring		-5.002	-6.098	-7.932
Summer	<b>&lt;0.001</b>		-1.096	-2.931
Autumn	<b>&lt;0.001</b>	0.139		-1.835
Winter	<b>&lt;0.001</b>	<b>0.002</b>	<b>0.036</b>	

  

Evenness: Kruskal-Wallis chi-squared = 12.6131, df = 3, <i>p</i> -value = 0.01				
	Spring	Summer	Autumn	Winter
Spring		-2.171	-2.808	-3.750
Summer	<b>0.017</b>		-0.638	-1.579
Autumn	<b>0.003</b>	0.263		-0.942
Winter	<b>&lt;0.001</b>	0.060	0.175	

  

Dominance: Kruskal-Wallis chi-squared = 30.4007, df = 3, <i>p</i> -value <0.001				
	Spring	Summer	Autumn	Winter
Spring		3.920	5.793	7.285
Summer	<b>&lt;0.001</b>		1.872	3.365
Autumn	<b>&lt;0.001</b>	0.033		1.492
Winter	<b>&lt;0.001</b>	<b>&lt;0.001</b>	0.071	

**Table S4.** Results of the Wilcoxon nonparametric test for the comparisons of the community indices values between autumn 2016-17 and 2021-22, between spring 2016-17 and 2021-22 and between values seasonally observed (spring and autumn) in the 2016-2017-period. Significance is enlightened in bold.

	Autumn: 2016-17 vs 2021-22		Spring: 2016-17 vs 2021-22	
	<i>W</i>	<i>p</i> -value	<i>W</i>	<i>p</i> -value
Number of Taxa	19.5	<b>0.005</b>	52.5	0.045
Shannon Wiener index	19.0	<b>0.003</b>	158.0	<b>0.004</b>
Evenness	90.0	<b>0.194</b>	153.0	<b>0.010</b>
Dominance	104.0	<b>0.030</b>	44.0	<b>0.013</b>

  

2016-17: Autumn vs Spring		
	<i>W</i>	<i>p</i> -value
Number of Taxa	46.5	0.715
Shannon Wiener index	48.5	0.828
Evenness	66.0	0.336
Dominance	51.0	0.972

**Table S5.** Seasonal percentage frequencies of macrobenthic invertebrate taxa collected via leaf bags technique in Doberdò Lake.

Class/order	Family/genus	FFG	Spring	Summer	Autumn	Winter
Tricladida	<i>Dugesia</i>	Predators	0.06	4.70	1.01	2.41
	<i>Dendrocoelum</i>	Predators	0.24	1.37	1.53	1.76
	<i>Polycelis</i>	Predators	0.32	3.85	0.68	5.06
Oligochaeta	Naididae					
	Naidinae					
	<i>Uncinaiis</i>	Collector-gatherers		0.01	0.01	0.07
	<i>Stilaria</i>	Collector-gatherers	0.06	0.57	0.26	0.58
	Tubificinae					
	<i>Limnodrilus</i>	Collector-gatherers	0.13	2.23	0.68	0.67
	<i>Potamothrinx</i>	Collector-gatherers	0.02	0.32	0.29	0.18
	<i>Psammoryctides</i>	Collector-gatherers		0.01	0.03	
	<i>Tubifex</i>	Collector-gatherers	0.06	0.54	0.31	0.03
	Lumbricidae					
	<i>Eiseniella tetraedra</i>	Collector-gatherers	<0.01			
Hirudinea	Lumbriculidae	Collector-gatherers	0.01	0.14	0.10	
	<i>Erpobdella</i>	Predators	1.92	4.05	15.89	9.30
	<i>Glossiphonia</i>	Predators	0.09	0.22	1.12	0.18
	<i>Hemiclepsis</i>	Predators	0.04	0.70	0.75	0.51
	<i>Protoclepsis</i>	Predators			0.07	0.01
Arachnida	Hydracarina	Predators	0.03	4.41	0.49	0.61
Malacostraca	<i>Asellus</i>	Shredders	78.23	51.99	23.73	22.53
	<i>Gammarus</i>	Shredders	14.65	2.26	4.88	4.62
	<i>Niphargus</i>	Shredders	0.34		1.63	2.04
Bivalvia	<i>Sphaerium</i>	Collector-filterers	0.01	0.22	0.16	0.54
Gastropoda	<i>Bithynia</i>	Scrapers	0.29	0.60	1.22	1.41
	<i>Gyraulus</i>	Scrapers	0.05	0.53	1.25	0.36
	<i>Lymnaea</i>	Scrapers			0.03	
	<i>Physa</i>	Scrapers	<0.01	0.01		0.01
	<i>Planorbis</i>	Scrapers	0.06	0.07	0.16	0.39
	<i>Theodoxus</i>	Scrapers		0.01		
	<i>Emmericia</i>	Scrapers		0.06	0.07	0.06
	<i>Valvata</i>	Scrapers	0.17	0.51	1.62	1.00
Class/order	Family/genus	FFG	Spring	Summer	Autumn	Winter
Hexapoda						
Coleoptera	<i>Hydroporus</i>	Predators		0.01		0.03
	<i>Dryops</i>	Shredders				0.01
	<i>Elmis</i>	Collector-gatherers	0.02	0.10	0.19	0.24
	<i>Halipilus</i>	Shredders	0.04	0.27	0.81	0.44
	Hydrophilidae	Predators	<0.01	0.01	0.03	
Ephemeroptera	Gyrinidae	Predators			0.04	
	<i>Baetis</i>	Collector-gatherers		0.03	0.01	0.01
	<i>Ephemerella</i>	Collector-gatherers		0.33		
Diptera	Ceratopogonidae					
	<i>Palpomyia</i>	Predators	0.68	12.80	26.50	15.20
	Chironomidae	Collector-gatherers				
	Tanypodinae	Predators	0.07	0.24	4.26	0.58
	Chironominae	Collector-gatherers	1.69	4.96	5.46	18.30
	Orthoclaudiinae	Collector-gatherers	0.19	0.81	2.40	4.55
	Empididae	Predators		0.02		0.01
	Athericidae	Predators	0.01			
	Muscidae					
	<i>Limnophora</i>	Predators		0.01		
	Simuliidae	Collector-filterers	<0.01	0.21	0.15	
	Tabanidae	Predators	<0.01		0.03	0.03
	Tipuliidae	Shredders/Predators			0.03	
Heteroptera	<i>Hebrus</i>	Predators	0.05	0.22		
Odonata	<i>Anax</i>	Predators			0.01	
	<i>Calopteryx</i>	Predators	0.02			
	<i>Coenagrion</i>	Predators	<0.01		0.10	0.12
	<i>Lestidae</i>	Predators			0.13	
	<i>Sympecma</i>	Predators	0.01	0.22		
Trichoptera	<i>Lepidostoma</i>	Shredders	0.02			
	Leptoceridae	Collector-gatherers	0.39	0.32	0.62	1.15
	Limnephilidae	Shredders	<0.01			0.06
	<i>Hydropsyche</i>	Collector-filterers	<0.01	0.01		0.07
	<i>Hydroptila</i>	Scrapers		0.01	1.24	4.85

**Table S6.** Results of the ANCOVA application to compare organic matter decomposition rates between the sampling seasons in the Doberdò Lake. F values are reported in the upper-right side and *p*-levels are reported in the lower-left side of the table, *n*=80 for all comparisons. Significant *p*-levels are highlighted in bold.

	Spring	Summer	Autumn	Winter
Spring		$F_{1,158} = 2.250$	$F_{1,158} = \mathbf{17.730}$	$F_{1,158} = \mathbf{37.320}$
Summer	$p = 0.136$		$F_{1,158} = \mathbf{10.93}$	$F_{1,158} = \mathbf{32.290}$
Autumn	$p < \mathbf{0.001}$	$p = \mathbf{0.001}$		$F_{1,158} = \mathbf{6.259}$
Winter	$p < \mathbf{0.001}$	$p < \mathbf{0.001}$	$p = \mathbf{0.013}$	