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SUPPLEMENTARY MATERIAL TO

Groundwater quality assessment of protected aquatic eco-systems in cross-border areas of Serbia and Croatia

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SAMPLING SITES

Lake Zobnatica with an area of 250 ha is in the North Bačka District near the town of Bačka Topola. Zobnatica was declared as the national Nature Park in 1976. Water from the Lake is applied for irrigation of agricultural land as main human activity in this region. Industrial facilities, predominantly meat industry, are located 7 km from the Lake. The urbanization of the surrounding area resulted in the development of tourist attractions (sport facilities, beaches, catering, and hospitality industry facilities, *etc.).* Wetlands Tompojevci are wetlands of 5700 ha located in the eastern part of Vukovar-Srijem District, Tompojevci municipality. Agriculture is one of the main activities in the Tompojevci region. The total length of Tompojevci Wetland is 48 km, with a natural depression depth of up to 15 m where run-off water from agricultural land is naturally aggregated.

Within the IPA Project 8 piezometers surrounding the Lake Zobnatica (B1––B8) and Wetlands Tompojevci (P1–P8) were constructed (Fig. S-1 and GPRS coordinates in Table S-I) and used for collection of groundwater sample. The sampling campaigns were conducted for period of two years, from May of 2018 until February of 2020. Analyses were carried out in accredited laboratory for environmental and occupational monitoring, Department of Environmental Engineering and Occupational Safety, Faculty of Technical sciences, University of Novi Sad.

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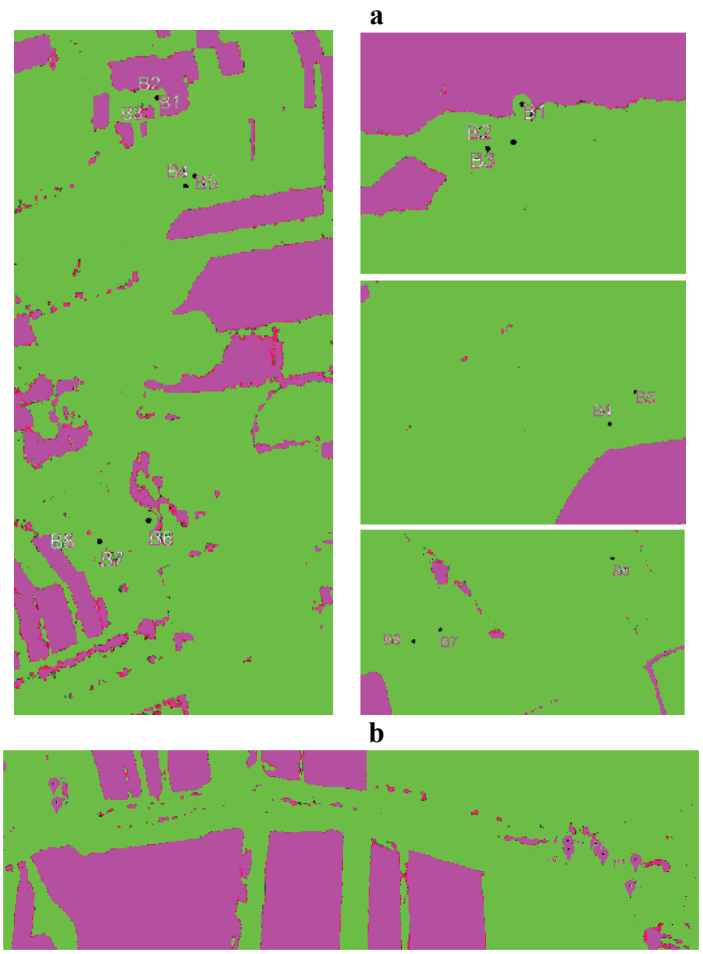

Fig. S-1. Sampling site for a) Zobnatica Lake and b) Wetlands Tompojevci.

TABLE S-I. GPRS coordinates of water sampling sites from Serbia and Croatia

Location	Zobnatica lake, Serbia	Location	Wetlands Tompojevci, Croatia
B1	(45° 53’ 9.1’’ N, 19° 36’ 55.25’’ E)	P1	(45° 14’ 35.78’’ N, 19° 6’ 39.72’’ E)
B2	(45° 53’ 8.58’’ N, 19° 36’54.78’’ E)	P2	(45° 14’ 34.05’’ N, 19° 6’ 38.89’’ E)
B3	(45° 53’ 8.68’’ N, 19° 36’ 55.16’’ E)	P3	(45° 14’ 35.99’’ N, 19° 6’ 37.13’’ E)
B4	(45° 52’ 45.94’’ N, 19° 37’ 5.01’’ E)	P4	(45° 14’ 36.54’’ N, 19° 6’ 36.60’’ E)
B5	(45° 52’ 48.69’’ N, 19° 37’ 7.82’’ E)	P5	(45° 14’ 36.65’’ N, 19° 6’ 34.37’’ E)
B6	(45° 51’ 26.94’’ N, 19° 36’ 57.38’’ E)	P6	(45° 14’ 36.07’’ N, 19° 6’ 34.36’’ E)
B7	(45° 51’ 21.73’’ N, 19° 36’ 43.64’’ E)	P7	(45° 14’ 38.05’’ N, 19° 05 ’51.56’’ E)
B8	(45° 51’ 20.88’’ N, 19° 36’ 41.56’’ E)	P8	(45° 14’ 36.80’’ N, 19° 05 ’52.11’’ E)

TABLE S-II. Mean value for piezometer B1 to B8 in Zobnatica Lake

Parameter	Location							
	B1	B2	B3	B4	B5	B6	B7	B8
σ / μS cm^{-1}	853.1	1147.1	918.9	931.5	1506.4	998.1	1021	839.5
c_{O_2} / mg L^{-1} (DO)	5.04	4.64	5.69	5.14	5.15	4.53	5.17	4.77
$c_{PO_4^{3-}}$ / mg L^{-1}	0.46	0.26	0.48	0.61	0.25	0.32	0.43	1.04
$c_{NO_2^-}$ / mg L^{-1}	0.09	0.22	0.04	0.1	0.08	0	0.04	0.04
$c_{NO_3^-}$ / mg L^{-1}	1.12	1.82	1.18	0.6	1.45	0.06	1.04	0.39
$c_{NH_4^+}$ / mg L^{-1}	0.07	0.06	0.21	0.02	0.04	0.07	0.07	0.47
$c_{SO_4^{2-}}$ / mg L^{-1}	36.38	55.13	42.5	35.75	74.38	15.38	78	29.86
c_{Cl^-} / mg L^{-1}	28.93	43.58	32.92	41.89	104.86	38.77	16.34	37.84
c_{Ntot} / mg L^{-1}	19.11	17.95	7.28	7.93	22.76	1.02	10.38	9.71
c_{Fe} / mg L^{-1}	0.06	0.11	0.08	0.08	0.1	0.09	0.13	0.31
c_{Zn} / mg L^{-1}	0.33	0.44	0.39	0.31	0.9	0.32	0.4	0.58
c_{O_2} / mg L^{-1} (COD)	20.15	35.45	6.7	13.49	11.89	14.13	18.51	23.07

DO: dissolved oxygen; N_{tot}: total nitrogen COD: chemical oxygen demand

TABLE S-III. Mean value for piezometer P1 to P8 in Wetlands Tompojevci

Parameters	P1	P2	P3	P4	P5	P6	P7	P8
σ / μS cm^{-1}	855.5	558	934.33	903.37	911.11	772	856.33	1051.33
c_{O2} / mg L^{-1} (DO)	4.93	4.57	3.69	4.55	4.91	4.81	5.03	3.36
c_{PO43-} / mg L^{-1}	0.541	0.523	0.604	0.556	0.876	1.09	0.444	3.15
c_{NO2-} / mg L^{-1}	0.007	0.135	0.009	0.019	0.008	0.033	0.017	0.018
c_{NO3-} / mg L^{-1}	0.07	1.496	0.086	0.15	0.086	0.954	0.155	0.046
c_{NH4+} / mg L^{-1}	0.216	0.328	0.213	0.44	1.335	2.715	0.43	1.572
c_{SO42-} / mg L^{-1}	57	62.8	7.71	11.5	15.14	6.75	28.25	7.4
c_{Cl-} / mg L^{-1}	13.36	8.98	10.7	12.61	12.45	6.65	22.27	28.04
c_{Ntot} / mg L^{-1}	1.358	6.57	4.58	2.81	7.22	33.43	2.47	7.34
c_{Fe} / mg L^{-1}	0.128	0.194	0.301	0.35	0.614	0.355	0.287	1.72
c_{Zn} / mg L^{-1}	0.373	0.414	0.467	0.508	0.517	0.382	0.495	0.55
c_{O2} / mg L^{-1} (COD)	18.9	10.76	19.07	23.26	27.08	55.58	67.05	45.32

DO: dissolved oxygen; N_{tot} – total nitrogen; COD – chemical oxygen demand

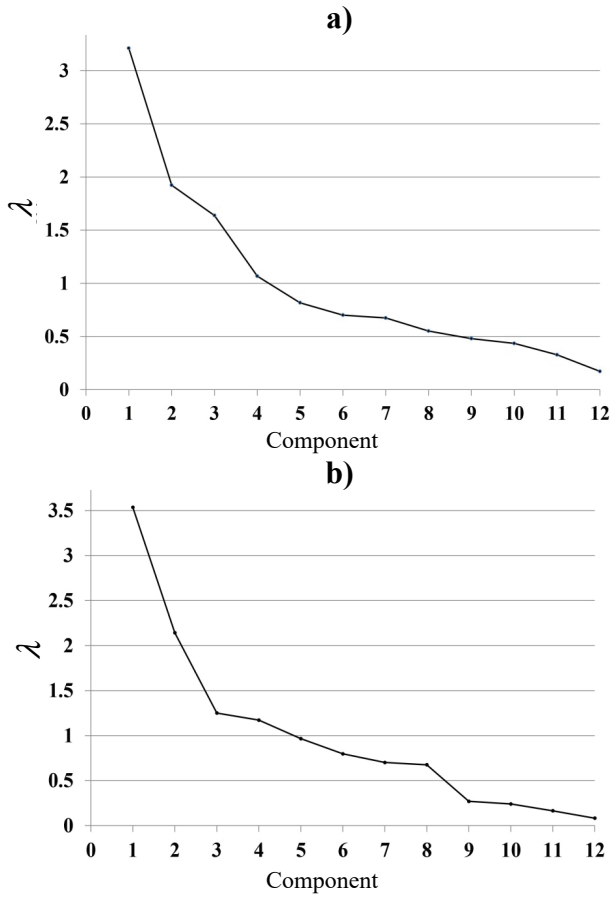

Fig. S-2. Scree plot of eigenvalues (λ) for generated Components for a) Zobnatica Lake and b) Wetlands Tompojevci.

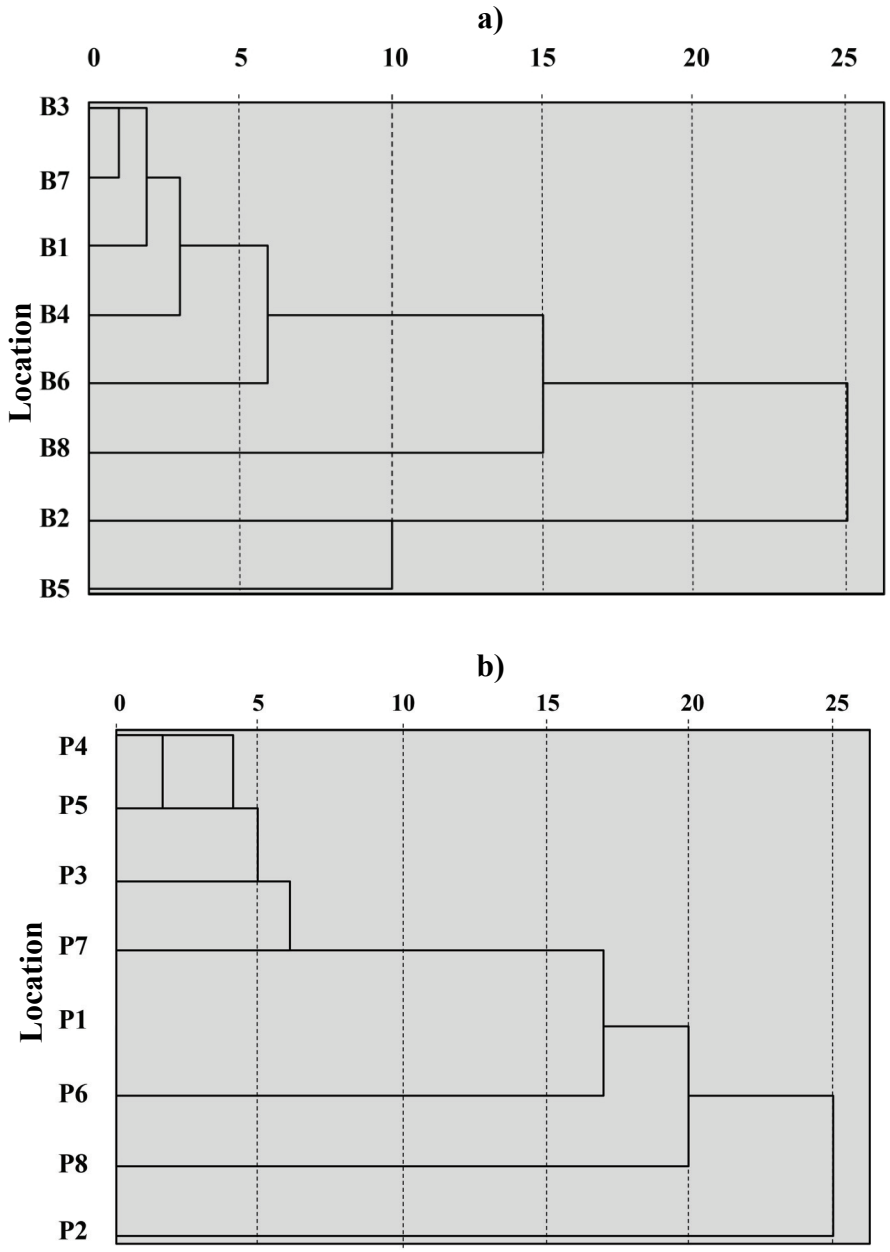

Fig S-3. Dendograms of Rescaled Distance Cluster Combined for sampling locations of a) Zobnatica Lake and b) Wetlands Tompojevci.