Spatial and temporal evaluation of the physicochemical quality of domestic/industrial water in the Kırklareli Reservoir (Turkish Thrace)

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STUDY AREA

The study area is located in Kırklareli Province in the Turkish Thrace region approximately 5 km east of the city center (Fig. S-1). Kırklareli reservoir lake that provides drinking and industrial freshwater supplies to the province of Kırklareli is located between 41°44.12′21.1236″ N and 27°16′45.8400″ E coordinates. It was built on the Şeytandere stream between 1985-1995 for irrigation and flood control.
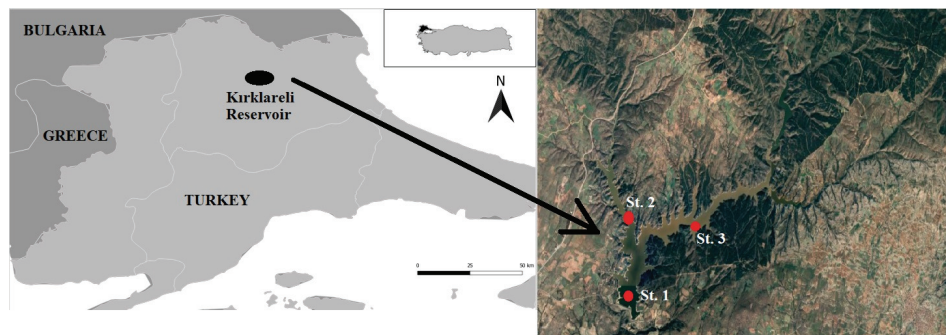

Fig. S-1. Location of Kırklareli Reservoir and the sampling stations.

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Table S-I. Monthly average values of the data obtained from the stations

Ele-ment	Content, ppb												
	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Ave	SD
B	5.87	8.56	13.06	52.88	50.78	40	57.83	0.96	18.8	20.8	30.26	27.25	±20.32
Na	134	7692	5742	5768	5964	5913	6644	8378	1432	1252	1873	4727.09	±2709.18
Mg	2191	10994	8848	9715	11034	9722	12296	12270	2350	1901	8791	8192	±4056.7
Al	6.68	6.17	15.04	5.28	10.4	7.2	9.7	15.41	5.94	72.9	120.07	24.98	±37.05
Ca	4618	21215	14875	14577	17163	12116	19670	22313	4092	3038	16594	13661	±6926.65
Cr	0.345	3.642	11.519	4.68	3.6	0.827	1.355	2.46	0.912	0.379	1.112	2.8	±3.25
Mn	0.354	1.623	2.944	1.471	2.869	1.8	24.21	6.114	0.475	0.797	2.277	4,08	±6.86
Fe	33	82.67	83.2	104.84	100.21	51.91	83.97	108.66	32.61	66.58	29.46	70.65	±29.83
Co	0.023	0.083	0.128	0.181	0.185	0.11	0.145	0.121	0.032	0.039	0.13	0,11	±0.06
Ni	0.262	0.482	1.717	0.952	0.98	0.577	1.061	0.962	0.69	0.44	1.589	0.88	±0.46
Cu	0.129	0.816	2.55	0.276	0.561	0.933	0.583	0.615	0.207	0.19	0.756	0.69	±0.67
Zn	0.664	2.631	0.531	2.183	2.609	3.017	6.622	5.577	0.785	0.928	3.636	2.65	±2.01
As	0.15	0.623	0.498	0.463	0.585	0.907	1.191	1.182	0.023	0.209	1.077	0.63	±0.41
Se	2.564	9.754	7.273	9.08	11.536	0.3	7.937	16.731	3.013	2.901	0.055	6.47	±5.2
Cd	0.006	0.027	0.041	0.03	0.048	0.057	0.157	0.049	0.009	0.01	0.042	0.04	±0.04
Ba	3.929	21.5	19.639	17.942	19.448	23.31	34.392	32.038	5.951	4.798	29.095	19.28	±10.65
Pb	0.069	0.874	0.685	0.443	0.566	0.51	2.039	0.807	0.069	0.132	0.161	0.58	±0.57
Parameter	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Ave	SD
$c_{fluoride}$ / mg L^{-1}	0.114	0.12	0.099	0.099	0.099	0.108	0.115	0.106	0.112	0.1	0.102	0.11	±0.01
$c_{chloride}$ / mg L^{-1}	8.18	6.18	11.81	28.71	19.94	15.7	18.54	8.9	9.12	8.16	8.26	13.05	±6.94
$c_{nitrite}$ / mg L^{-1}	0.04	0.05	0	0.016	0.016	0.002	0.006	0.014	0.025	0.016	0.003	0.02	±0.02
$c_{nitrate}$ / mg L^{-1}	0.422	0.153	0.209	0.19	0.312	0.039	0.517	0.704	1.496	1.844	2.132	0.73	±0.74
$c_{phosphate}$ / mg L^{-1}	0	0.784	0	0	0.259	0	0	0.031	0.038	0.032	0.044	0.11	±0.24
$c_{sulfate}$ / mg L^{-1}	9.94	10.29	9.89	10.15	10.06	10.37	10.12	10.37	10.57	9.71	9.84	10.12	±0.26
Dissolved O$_2$, mg L^{-1}	13.7	12	8.5	8.2	8.7	7.4	8.2	9.3	10.1	11.4	11.1	9.87	±1.96
pH	9.447	9.38	9.113	8.86	8.927	8.243	8.227	8.167	8.147	8.203	8.32	8.64	±0.51
Salinity, ‰	0.166	0.1	0.1	0.186	0.170	0.173	0.204	0.163	0.162	0.146	0.148	0.16	±0.03
σ / μS cm^{-1}	249.8	250.5	217.5	280.1	245.5	254.3	322.3	241.7	239.9	214.6	213.3	248.14	±31.56
Tot. diss. solids, mg L^{-1}	122.9	120	120	137.7	120.7	125	158.7	118.9	118.1	105.6	105	122.96	±14.78
$c_{chlorophyll\text{-}a}$ / μg L^{-1}	4.5	3.33	4.33	9.18	11.55	13.08	5.74	4.62	4.44	2.44	2.3	5.96	±3.66
Light transp, cm	123	125	250	193	166	220	256	336	230	66	140	191.36	±76.76
T_{water} / °C	11	12	24	26.5	26.2	22	18	14	9	6	7	15.97	±7.7

TABLE S-II. The average values of the parameters according to the sampling stations

Element	Content, ppb				
	1.St.	2.St.	3.St.	Ave	Accepted limit
B	51.138	15.35	15.958	27.482	1472
Na	4678.35	4765.55	4443.59	4629.16	-
Mg	8165.22	8179.12	7956.86	8100.4	-
Al	22.566	25.94	28.477	25.661	27
Ca	13245.87	13566.14	12936.05	13249.35	-
Cr	2.663	2.941	2.897	2.834	142
Mn	4.193	4.836	3.384	4.138	100
Fe	69.215	69.573	72.212	70.333	101
Co	0.111	0.104	0.106	0.107	2.6
Ni	1.009	0.827	0.843	0.893	34
Cu	0.888	0.601	0.564	0.684	3.1
Zn	2.924	2.484	2.541	2.65	231
As	0.656	0.598	0.63	0.628	53
Se	6.562	6.381	6.129	6.357	10
Cd	0.064	0.029	0.036	0.043	1.5
Ba	19.51	18.553	19.591	19.218	680
Pb	0.722	0.504	0.468	0.565	14
PARAMETER					Water quality
$c_{Fluoride}$ / mg L^{-1}	0.108	0.105	0.104	0.106	I
$c_{Chloride}$ / mg L^{-1}	22.989	8.108	8.232	13.11	IV
$c_{Nitrite}$ / mg L^{-1}	0.024	0.013	0.01	0.015	II
$c_{Nitrate}$ / mg L^{-1}	0.725	0.716	0.803	0.748	I
$c_{Phosphate}$ / mg L^{-1}	0.088	0.152	0.012	0.084	II
$c_{Sulfate}$ / mg L^{-1}	10.189	10.109	10.049	10.116	I
Dissolved oxygen, mg L^{-1}	9.7	9.8	9.7	9.7	I
pH	8.6	8.6	8.5	8.6	III
Salinity, ‰	0.199	0.144	0.147	0.163	-
Conductivity, µS cm^{-1}	304.05	220.87	216.48	247.13	I
Total dissolved solids, mg L^{-1}	156.1	106.85	106.64	123.2	I
Content of chlorophyll-*a*, µg L^{-1}	6.05	6.23	5.88	6.05	II
Light transpatency, cm	192	197	194	194	-
T_{water} / °C	15.9	16.2	15.9	16	I
SAR	0.2	0.2	0.1	0.1	Excellent
KI	0.1	0.1	0.08	0.09	Suitable
MgR	50	50	50	50	Suitable

The data of pH, nitrite, chloride, chlorophyll-*a*, and selenium measured in Kırklareli reservoir lake and found to exceed the first class water quality and the data of chloride value and chlorophyll-*a* distributions of the approaching second class water quality were visualized with the distribution maps created in the spatial analysis results made in the Arc MAP were given in Figs. S-1–S-5.
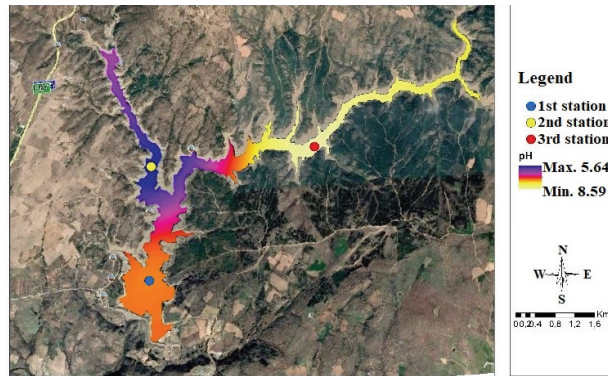
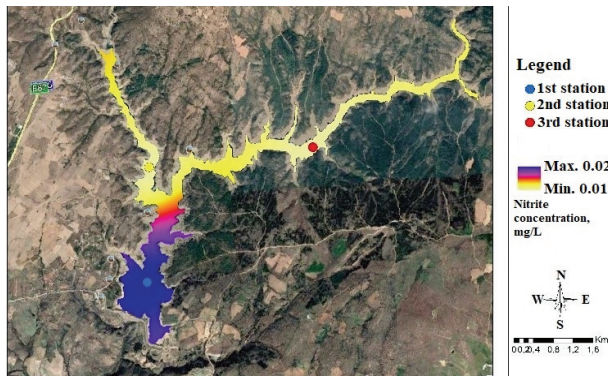Fig. S-2. Spatial distributions of pH values prepared in Arc MAP.

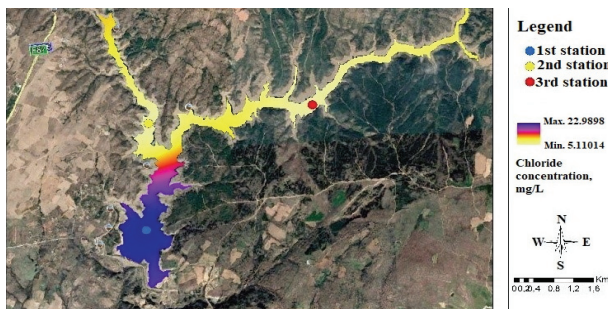Fig. S-3. Spatial distributions of nitrite values prepared in Arc MAP.

Fig. S-4. Spatial distributions of chloride values prepared in Arc MAP.
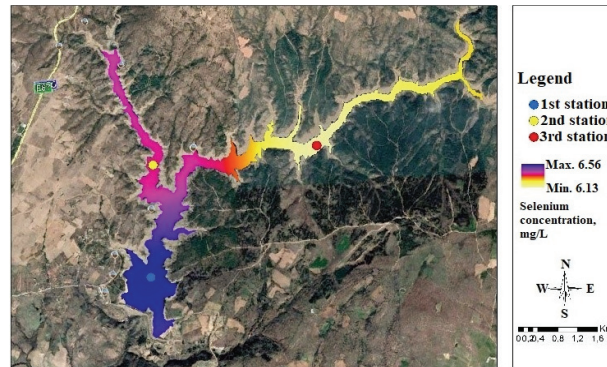
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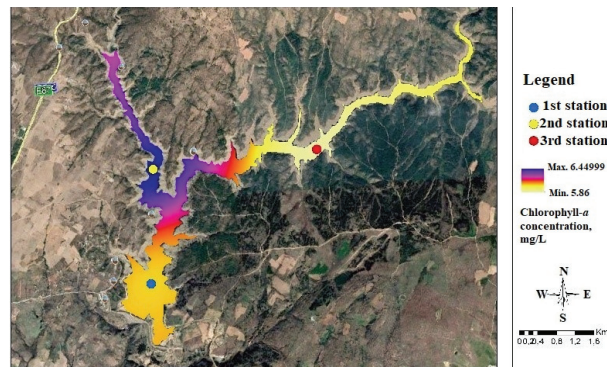Fig. S-5. Spatial distributions of selenium values prepared in Arc MAP.

Fig. S-6. Spatial distributions of chlorophyll-a values prepared in Arc MAP.