

Table S1. Physical and inorganic characteristics of the surface waters, bank filtrates and groundwater sources.

Parameter	Unit	MDL	Egypt standards	River Nile	Aswan Dam Lake	BF (site1)	BF (site2)	GW
pH			6.5–8.5	8.2 ± 0.6	7.9 ± 0.5	8.41 ± 0.3	8.3 ± 0.5	8.4 ± 0.3
Conductivity	µs/cm	2	-	234 ± 12	225 ± 8	288 ± 25	376 ± 38	438 ± 26
turbidity	NTU	0.1	1	1.5 ± 0.6	1.2 ± 0.7	0.23 ± 0.1	0.28 ± 0.1	0.75 ± 0.2
Ca⁺²	mg/L	2	-	24 ± 3	19 ± 5	36 ± 5	55 ± 8	70 ± 6
Mg⁺²	mg/L	1	-	5 ± 1	7 ± 1	9 ± 2	22 ± 5	19 ± 2
Na⁺	mg/L	2	200	11 ± 3	10 ± 1	11.4 ± 2	26 ± 3	32 ± 5
K⁺	mg/L	0	-	5.3 ± 0.8	4.8 ± 2	5.5 ± 1	7.4 ± 2	8.4 ± 4
NH₄⁺	mg/L	0.2	0.5	n.d.	n.d.	0.42 ± 0.2	0.61 ± 0.1	0.64 ± 0.2
NO₂⁻	mg/L	0.02	0.2	0.14 ± 0.1	0.1 ± 0.08	0.05 ± 0.02	0.28 ± 0.1	0.37 ± 0.1
NO₃⁻	mg/L	0.2	45	2.63 ± 0.4	2.22 ± 0.6	0.71 ± 0.1	5.8 ± 1.3	4.3 ± 0.8
SO₄⁻²	mg/L	0.5	250	12 ± 3	14 ± 4	19 ± 4	33 ± 9	25 ± 8
PO₄⁻³	mg/L	0.01	-	0.05 ± 0.02	0.03 ± 0.01	0.1 ± 0.04	0.14 ± 0.05	0.25 ± 0.08
Cl⁻	mg/L	0.5	250	6.9 ± 1.7	7 ± 2	16.5 ± 3	38 ± 9	56 ± 7

Table S2. The concentrations of heavy metals in the surface waters, bank filtrates and groundwater sources.

Parameter	Unit	MDL	Egypt standards	River Nile	Aswan Dam Lake	BF (site1)	BF (site2)	Ambient GW
Fe	µg/L	3	300	n.d.	n.d.	20 ± 3	145 ± 21	330 ± 37
Mn	µg/L	5	400	42 ± 9	n.d.	14 ± 5	211 ± 27	432 ± 41
As	µg/L	1	10	n.d.	n.d.	n.d.	n.d.	n.d.
Cd	µg/L	1	3	n.d.	n.d.	n.d.	n.d.	n.d.
Co	µg/L	1	-	n.d.	n.d.	n.d.	n.d.	n.d.
Cr	µg/L	2	50	n.d.	n.d.	n.d.	n.d.	n.d.
Cu	µg/L	5	2000	n.d.	n.d.	14 ± 7	24 ± 9	32 ± 7
Ni	µg/L	5	20	n.d.	n.d.	n.d.	n.d.	n.d.
Pb	µg/L	5	10	n.d.	n.d.	n.d.	n.d.	n.d.
Zn	µg/L	5	3000	n.d.	33±14	n.d.	n.d.	nd
Al	µg/L	50	200	n.d.	n.d.	837 ± 116	511 ± 32	487 ± 50

Table S3. Organic characteristics of the surface waters, bank filtrates and groundwater sources.

Parameter	Unit	MDL	River Nile	Aswan Dam Lake	BF (site1)	BF (site2)	Ambient GW
DOC	mg/L	0.5	3.90	3.60	4.30	4.90	5.50
SUVA	L /mg·m	---	1.56	1.33	2.16	2.04	2.73
HIX	---	---	0.56	0.55	0.84	0.84	0.86
FIX	---	---	1.67	1.36	1.09	1.07	1.54
BIX	---	---	0.71	0.83	0.59	0.53	0.68
P1	R.U.	---	0.32	0.20	0.41	0.74	1.10
P2	R.U.	---	0.12	0.09	0.14	0.25	0.46
P3	R.U.	---	0.23	0.22	0.11	0.14	0.19

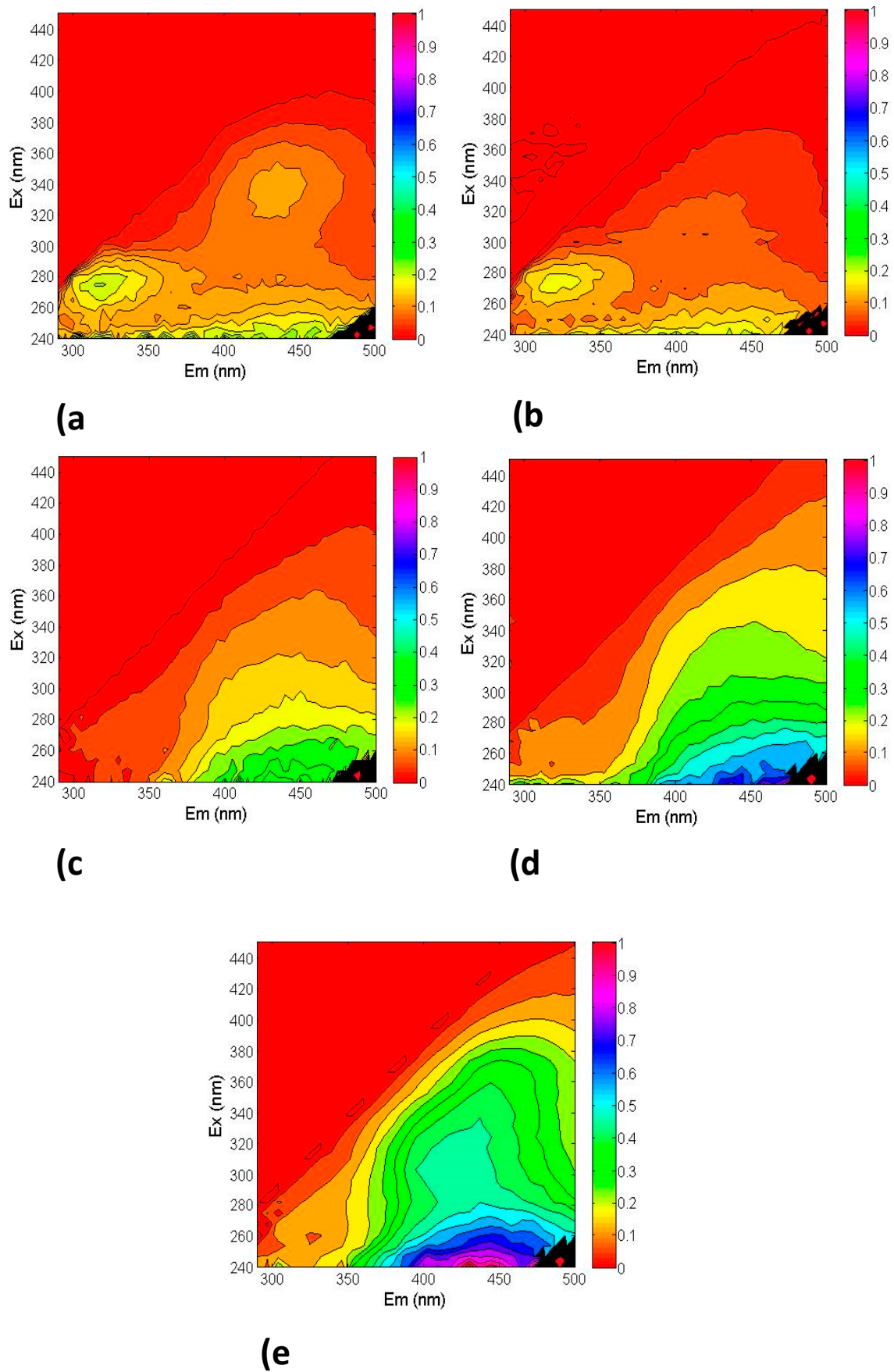


Figure S1. F-EEM spectra: (a) NR, (b) ADL, (c) BF1, (d) BF2 and (e)GW.