

Table S1. Borehole lithologic log of Satkhira Assasuni upazila, southwest Bangladesh, Latitude-N 22.6477, Longitude-E 89.17452, sampling method: rotary drilling method (Data source: Directorate of Groundwater Hydrology, BWDB 2022)

Borehole ID	From depth (m)	To depth(m)	Sediment color	Lithology (gross type)	Hydrostratigraphy
SABH-2	0.0	9.2	Gray	Clay	Aquiclude
	9.2	18.3	Gray	Sandy Clay	Aquitard
	18.3	30.5	Gray	Clay	Aquiclude
	30.5	36.6	Gray	Very Fine Sand	Aquitard
	36.6	39.6	Gray	Fine Sand	Fine Sand Aquifer
	39.6	61.0	Gray	Very Fine Sand	Aquitard
	61.0	73.2	Gray	Fine Sand	Fine Sand Aquifer
	73.2	79.3	Gray	Very Fine Sand	Aquitard
	79.3	97.6	Light Gray	Medium Sand	Medium Sand Aquifer
	97.6	103.7	Gray	Very Fine Sand	Aquitard
	103.7	109.8	Light Gray	Medium Sand	Medium Sand Aquifer
	109.8	115.9	Light Gray	Fine Sand	Fine Sand Aquifer
	115.9	118.9	Gray	Very Fine Sand	Aquitard
	118.9	125.0	Gray	Fine Sand	Fine Sand Aquifer
	125.0	131.1	Gray	Very Fine Sand	Aquitard
	131.1	134.2	Gray	Fine Sand	Fine Sand Aquifer
	134.2	143.3	Gray	Very Fine Sand	Aquitard
	143.3	152.4	Gray	Fine Sand	Fine Sand Aquifer
	152.4	161.6	Gray	Very Fine Sand	Aquitard
	161.6	167.7	Gray	Fine Sand	Fine Sand Aquifer
	167.7	170.7	Gray	Very Fine Sand	Aquitard
	170.7	182.9	Gray	Medium Sand	Medium Sand Aquifer
	182.9	204.3	Gray	Clay	Aquiclude
	204.3	207.3	Gray	Medium Sand	Medium Sand Aquifer
	207.3	213.4	Gray	Fine Sand	Fine Sand Aquifer
	213.4	219.5	Gray	Medium Sand	Medium Sand Aquifer
	219.5	237.8	Gray	Very Fine Sand	Aquitard
	237.8	243.9	Gray	Clay	Aquiclude
	243.9	280.5	Gray	Very Fine Sand	Aquitard
	280.5	283.5	Gray	Fine Sand	Fine Sand Aquifer
	283.5	286.6	Gray	Clay	Aquiclude

Table S2a. Levels of physical parameters, major ions from the groundwater samples during dry season 2020 among 12 monitoring wells of Satkhira district, Bangladesh (Data source: major ions from ICP-MS and IC analysis; physical parameters from BWDB).

Sample ID	Latitude	Longitude	Depth (m)	pH	EC (μS/cm)	DO	Temp (°C)	ORP (mv)	As (μg/l)	Fe2+ (mg/l)	Ca2+ (mg/l)	Mg2+ (mg/l)	Na+ (mg/l)	K+ (mg/l)	Mn2+ (mg/l)	HCO3- (mg/l)	SO42- (mg/l)	Cl- (mg/l)
SKASPZ-1	22.5477	89.1745	45.5	8.17	1875.0	2.87	27.08	-124.70	121.92	6.40	182.81	112.26	758.07	14.55	0.19	1170.77	1.13	2474.91
SKASPZ-2	22.5477	89.1745	111.5	8.25	1560.0	3.00	27.10	-149.50	2.02	0.42	322.85	167.53	1415.67	16.83	0.27	1903.90	64.21	4302.84
SKASPZ-3	22.5477	89.1745	205.0	8.26	3841.0	1.03	27.30	-147.70	5.60	0.26	270.21	124.13	1014.07	11.56	0.16	1062.83	100.22	2942.26
SKSKPZ-1	22.7075	89.1261	25.0	8.26	4942.0	1.44	26.40	-114.40	10.44	3.82	169.56	49.97	202.23	10.23	0.21	476.51	1.44	484.49
SKSKPZ-1/1	22.7055	89.0694	22.3	8.24	980.0	1.72	27.05	-110.60	187.68	10.51	151.37	40.13	60.25	4.31	0.11	439.31	0.22	219.08
SKSKPZ-2	22.7078	89.1262	100.0	8.25	9072.0	1.91	27.20	-115.70	2.55	5.88	175.34	47.44	144.03	11.25	0.49	410.01	3.19	432.62
SKSKPZ-3	22.7078	89.1262	155.0	8.25	7025.0	2.71	26.60	-95.40	4.57	1.08	114.65	51.98	624.01	9.00	0.21	290.20	9.36	1480.97
SKSKPZ-4	22.7078	89.1262	237.0	8.20	674.0	0.86	26.58	-130.70	10.00	6.10	105.97	30.43	15.85	6.73	0.09	347.36	0.36	98.15
SKSN2PZ-1	22.2789	89.3113	67.0	8.30	11110.0	1.94	28.20	-53.00	16.90	23.60	684.92	223.00	1222.42	9.15	1.19	2277.86	0.98	5049.07
SKSN2PZ-1/1	22.2788	89.3112	30.0	8.30	4710.0	0.40	27.60	50.40	10.29	5.27	59.77	71.55	704.94	41.98	0.62	682.05	91.97	1754.05
SKSN2PZ-2	22.2791	89.3113	116.0	8.26	9071.0	1.32	27.75	-83.00	0.96	14.55	403.53	205.05	1267.49	5.14	3.67	293.89	52.52	3054.89
SKSN2PZ-3	22.2793	89.3113	212.0	8.28	3017.0	1.40	27.80	-137.50	0.94	2.79	172.84	83.74	357.20	10.36	0.15	453.14	1.62	1362.90
	Maximum		=	8.30	11110.0	3.00	28.20	50.40	187.68	23.60	684.92	223.00	1415.67	41.98	3.67	2277.86	100.22	5049.07
	Minimum		=	8.17	674.0	0.40	26.40	-149.50	0.94	0.26	59.77	30.43	15.85	4.31	0.09	290.20	0.22	98.15
	Average		=	8.25	4823.08	1.72	27.22	-100.98	45.12	6.72	234.49	100.60	648.85	12.59	0.61	817.32	27.27	1971.35
	Standard Deviation		=	0.04	3516.82	0.82	0.54	55.09	72.46	6.75	171.37	66.42	498.66	9.92	1.01	663.84	38.81	1626.32

Table S2b. Levels of physical parameters, major ions from the groundwater samples during wet season 2021 among 12 monitoring wells of Satkhira district, Bangladesh (Data source: major ions from ICP-MS and IC analysis; physical parameters from BWDB)

Sample ID	Latitude	Longitude	Depth (m)	pH	EC (μS/cm)	DO	Temp (°C)	ORP (mv)	As (μg/l)	Fe2+ (mg/l)	Ca2+ (mg/l)	Mg2+ (mg/l)	Na+ (mg/l)	K+ (mg/l)	Mn2+ (mg/l)	HCO3- (mg/l)	SO42- (mg/l)	Cl- (mg/l)
SKASPZ-1	22.5477	89.1745	45.50	7.85	30080.0	0.61	27.45	-115.70	92.42	4.27	155.28	58.78	373.19	6.07	0.05	3093.81	0.91	2272.54
SKASPZ-2	22.5477	89.1745	111.50	7.88	17690.0	0.58	28.10	-203.30	7.93	0.22	127.30	57.09	468.36	5.78	0.06	3663.85	121.60	2586.04
SKASPZ-3	22.5477	89.1745	205.00	8.10	8090.0	0.52	27.29	-179.70	0.68	0.15	147.23	79.75	672.71	7.94	0.12	6311.54	67.14	4371.54
SKSKPZ-1	22.7075	89.1261	25.00	7.85	3150.0	0.49	27.63	-139.60	62.35	3.44	53.66	14.50	26.35	1.61	0.05	131.08	0.61	149.22
SKSKPZ-1/1	22.7055	89.0694	22.30	8.20	1850.0	0.52	27.80	-118.60	48.71	2.78	52.92	14.38	25.30	1.53	0.05	7591.52	72.60	4431.99
SKSKPZ-2	22.7078	89.1262	100.00	7.02	5867.0	0.56	26.00	-135.90	5.22	0.36	45.14	20.91	84.62	4.60	0.00	760.10	1.47	571.61
SKSKPZ-3	22.7078	89.1262	155.00	7.80	4549.0	0.47	26.98	-128.10	8.12	2.19	74.41	21.02	83.81	4.48	0.09	7485.68	57.01	4454.99
SKSKPZ-4	22.7078	89.1262	237.00	8.10	5996.0	0.51	27.01	-120.90	18.03	0.01	34.73	14.81	30.85	1.90	0.00	7431.63	68.98	4324.64
SKSN2PZ-1	22.2789	89.3113	67.00	7.80	46450.0	0.42	28.10	-9.20	3.68	5.29	176.33	189.99	1457.15	54.03	0.75	917.67	1.72	1024.69
SKSN2PZ-1/1	22.2788	89.3112	30.00	7.20	54650.0	0.47	28.40	-1.70	0.16	0.73	79.07	39.03	159.40	5.14	0.04	12160.66	553.45	6892.28
SKSN2PZ-2	22.2791	89.3113	116.00	7.82	8646.0	0.51	27.53	-11.20	0.17	0.78	83.89	40.41	162.42	5.23	0.05	994.71	0.56	828.54
SKSN2PZ-3	22.2793	89.3113	212.00	7.90	8026.0	0.49	27.50	-19.20	0.28	0.76	76.35	36.83	147.42	4.80	0.05	1193.77	0.00	923.49
		Maximum	=	8.20	54650.0	0.61	28.40	-1.70	92.42	5.29	176.33	189.99	1457.15	54.03	0.75	12160.66	553.45	6892.28
		Minimum	=	7.02	1850.0	0.42	26.00	-203.30	0.16	0.01	34.73	14.38	25.30	1.53	0.00	131.08	0.00	149.22
		Average	=	7.79	16253.7	0.51	27.48	-98.59	20.65	1.75	92.19	48.96	307.63	8.59	0.11	4311.33	78.84	2735.96
		Standard Deviation	=	0.35	17839.7	0.05	0.64	70.06	30.42	1.80	47.36	49.02	414.38	14.44	0.20	3818.72	155.01	2127.10

Table S3. Primary data from 40 monitoring well groundwater sample analysis (Data Source: BWDB 2022 and ICP MS, IC Analysis)

Well Number	Sample ID	District	Upazila	Latitude	Longitude	Well Depth (Meter)	Dry season	Wet season	Dy Season	Wet Season
							2020 Salinity (mg/l)	2021 Salinity (mg/l)	2020 Arsenic (µg/l)	2021 Arsenic (µg/l)
01	BABAPZ-1/1	Bagerhat	Bagerhat Sadar	22.710000	89.690000	30.00	734.72	985.6	50	0
02	BABAPZ-2	Bagerhat	Bagerhat Sadar	22.705380	89.691700	175.00	828.16	807.68	0	0
03	BABAPZ-3	Bagerhat	Bagerhat Sadar	22.705340	89.691800	240.00	823.04	3683.2	0	0
04	BABAPZ-4	Bagerhat	Bagerhat Sadar	22.705280	89.691800	278.00	787.84	1128.96	0	0
05	BARAPZ-1	Bagerhat	Raeyenda	22.315565	89.849672	58.00	12170.88	8249.6	10	0
06	BARAPZ-2	Bagerhat	Raeyenda	22.315562	89.849668	116.00	705.28	11200	25	10
07	BARAPZ-3	Bagerhat	Raeyenda	22.315560	89.849664	180.00	2141.44	21312	25	0
08	BARAPZ-4	Bagerhat	Raeyenda	22.315554	89.849660	211.00	21797.12	2341.12	25	0
09	KHDUPZ-1	Khulna	Dumuria	22.809274	89.414577	55.00	1792.00	1058.56	10	10
10	KHDUPZ-2	Khulna	Dumuria	22.809261	89.414556	96.73	321.28	2010.24	10	0
11	KHDUPZ-3	Khulna	Dumuria	22.809261	89.414556	254.00	335.36	1014.4	0	0
12	KHDUPZ-4	Khulna	Dumuria	22.809390	89.414550	0.00	3891.20	3948.8	0	0
13	KHKHPZ-1	Khulna	Noornagar	22.839710	89.650090	61.00	2108.16	423.68	25	50
14	KHKHPZ-2	Khulna	Noornagar	22.839730	89.650130	165.00	752.64	1563.52	25	50
15	KHKHPZ-3	Khulna	Noornagar	22.839760	89.650170	323.00	712.96	2280.96	0	0
16	KHKHPZ-4	Khulna	Noornagar	22.832920	89.546230	0.00	7161.60	839.04	0	0
17	KHPKPZ-1	Khulna	Paikgacha	22.585084	89.318046	44.00	3214.08	852.48	50	25
18	KHPKPZ-2	Khulna	Paikgacha	22.585124	89.317974	106.00	5768.96	3520	0	10
19	KHPKPZ-3	Khulna	Paikgacha	22.585077	89.317970	190.00	9002.24	5755.52	0	10
20	KHPKPZ-4	Khulna	Paikgacha	22.585031	89.317943	245.50	12192.64	9734.4	0	0
21	KHRSPZ-1	Khulna	Rupsha	22.839710	89.650090	27.00	1528.96	12096	100	0
22	KHRSPZ-2	Khulna	Rupsha	22.839730	89.650130	107.00	2413.44	2085.76	250	0
23	KHRSPZ-3	Khulna	Rupsha	22.839760	89.650170	195.00	1934.72	2830.08	0	0
24	KHRSPZ-4	Khulna	Rupsha	22.839650	89.650060	264.00	1287.68	1179.52	25	50
25	KHTEPZ-1	Khulna	Terokhada	22.855990	89.801201	24.00	336.64	1817.6	25	25

Well Number	Sample ID	District	Upazila	Latitude	Longitude	Well Depth (Meter)	Dry	Wet	Dy	Wet
							season	season	Season	Season
							2020	2021	2020	2021
							Salinity (mg/l)	Salinity (mg/l)	Arsenic (µg/l)	Arsenic (µg/l)
26	KHTEPZ-2	Khulna	Terokhada	22.8560	89.8012	61.00	330.24	578.56	10	50
27	KHTEPZ-3	Khulna	Terokhada	22.8560	89.8012	201.00	2699.52	2256.64	10	10
28	KHTEPZ-4	Khulna	Terokhada	22.8560	89.8012	235.00	362.88	3064.96	100	0
29	SKASPZ-1	Satkhira	Asasuni	22.5477	89.1745	45.50	1200.00	1066.24	121.92	92.42
30	SKASPZ-2	Satkhira	Asasuni	22.5477	89.1745	111.50	998.40	19251.2	2.02	7.93
31	SKASPZ-3	Satkhira	Asasuni	22.5477	89.1745	205.00	2458.24	11321.6	5.60	0.68
32	SKSKPZ-1	Satkhira	Satkhira Sadar	22.7075	89.1261	25.00	3162.88	2016	10.44	62.35
33	SKSKPZ-1/1	Satkhira	Satkhira Sadar	22.7055	89.0694	22.30	627.20	1184	187.68	48.71
34	SKSKPZ-2	Satkhira	Satkhira Sadar	22.7078	89.1262	100.00	5806.08	3754.88	2.55	5.22
35	SKSKPZ-3	Satkhira	Satkhira Sadar	22.7078	89.1262	155.00	4496.00	2911.36	4.57	8.12
36	SKSKPZ-4	Satkhira	Satkhira Sadar	22.7078	89.1262	237.00	431.36	3837.44	10	18.03
37	SKSN2PZ-1	Satkhira	Shyamnagar	22.2789	89.3113	67.00	7110.40	29728	16.90	3.68
38	SKSN2PZ-1/1	Satkhira	Shyamnagar	22.2788	89.3112	30.00	3014.40	34976	10.29	0.16
39	SKSN2PZ-2	Satkhira	Shyamnagar	22.2791	89.3113	116.00	5805.44	5533.44	0.96	0.17
40	SKSN2PZ-3	Satkhira	Shyamnagar	22.2793	89.3113	212.00	1930.88	5136.64	0.94	0.28

Table S4a. Ranks of Interpolation models and cross validation data from geostatistical wizard for salinity during dry season 2020 and wet season 2021 in the extended study area boundary as shown in [Figure 2](#).

Description of Interpolation Model	Rank	Salinity		Description of Interpolation Model	Rank	Salinity	
		Dry Season 2020				Wet Season 2021	
		RMSE	CV Mean			RMSE	CV Mean
Radial Basis Functions - Completely regularized spline	1	3436.52	-651.23	Ordinary Kriging – Optimized	1	5691.81	-473.51
Ordinary Kriging – Default	2	4262.11	44.39	Radial Basis Functions - Multiquadric	2	7006.44	16.08
Empirical Bayesian Kriging - Advanced	3	4361.03	-243.81	Empirical Bayesian Kriging - Advanced	3	7343.96	-238.14

Input Dataset example of Table S4a:

C:\RAZ\First Paper 2024_Comments\Interpolation2024\Interpolation2024.gdb\Dryseason 2020 Salinity (mg/l)

Type: Feature Class

Data field: Dry 2020 Salinity (mg/l)

Coincident Point Method: Use Mean

Records: 34

Method: Radial Basis Functions

Kernel function: Completely Regularized Spline

Parameter: 1.695576391695

Searching neighborhood: Standard

Neighbors to include:15

Include at least: 10

Sector type: Full

Major semiaxis: 25,935.0416860125

Minor semiaxis: 25,935.0416860125

Angle: 0

Table S4b. Ranks of Interpolation models and cross validation data from geostatistical wizard for arsenic during dry season 2020 and wet season 2021 in the extended study area boundary as shown in [Figure 2](#).

Description of Interpolation Model	Rank	Arsenic		Description of Interpolation Model	Rank	Arsenic	
		Dry Season 2020				Wet Season 2021	
		RMSE	CV Mean			RMSE	CV Mean
Ordinary Kriging – Default	1	44.930	-1.09	Empirical Bayesian Kriging - Advanced	1	21.51	-0.89
Empirical Bayesian Kriging - Default	2	46.550	-3.58	Ordinary Kriging – Optimized	2	21.61	-1.07
Radial Basis Functions - Inverse multiquadric	3	50.39	-2.17	Radial Basis Functions - Inverse multiquadric	3	24.32	0.22

Table S5a. Pearson Correlation matrix among field parameters and major ions found in the 12 groundwater samples at Satkhira district during dry season 2020

	pH	EC	ORP	As	Fe	Ca	Mg	Al	Na	K	Mn	Cu	Zn	Ba	Pb	HCO ₃	Cl	NO ₃	SO ₄	PO ₄
pH	1																			
EC	0.536	1																		
ORP	0.530	0.380	1																	
As	-0.671	-0.606	-0.185	1																
Fe	0.238	0.560	0.365	0.135	1															
Ca	0.353	0.579	0.014	-0.291	0.733	1														
Mg	0.299	0.450	0.080	-0.400	0.546	0.889	1													
Al	0.389	0.535	0.582	-0.282	0.561	0.392	0.554	1												
Na	0.279	0.322	0.128	-0.507	0.226	0.679	0.906	0.465	1											
K	0.331	-0.075	0.718	-0.274	-0.232	-0.292	-0.063	0.153	0.169	1										
Mn	0.248	0.585	0.284	-0.292	0.569	0.509	0.639	0.934	0.498	-0.140	1									
Cu	0.486	0.501	0.851	-0.292	0.383	0.065	0.187	0.749	0.182	0.583	0.569	1								
Zn	0.406	-0.032	0.853	-0.161	-0.087	-0.310	-0.110	0.322	0.080	0.946	-0.006	0.713	1							
Ba	-0.335	0.187	-0.153	0.114	0.448	0.554	0.483	-0.042	0.342	-0.195	0.066	-0.190	-0.340	1						
Pb	0.032	0.218	0.104	-0.177	-0.240	-0.236	-0.242	-0.065	-0.020	-0.067	-0.081	-0.039	-0.005	-0.317	1					
HCO₃	0.178	0.127	0.015	-0.174	0.341	0.722	0.695	-0.065	0.677	0.136	-0.052	-0.107	-0.022	0.619	-0.273	1				
Cl	0.303	0.346	0.100	-0.433	0.372	0.813	0.934	0.335	0.949	0.107	0.374	0.088	0.000	0.486	-0.116	0.847	1			
NO₃	-0.261	0.032	0.067	0.137	0.360	0.422	0.457	-0.072	0.394	0.143	-0.078	-0.075	-0.006	0.839	-0.289	0.685	0.556	1		
SO₄	0.352	-0.042	0.298	-0.412	-0.286	0.012	0.312	0.329	0.568	0.574	0.203	0.339	0.544	-0.245	-0.113	0.172	0.394	-0.094	1	
PO₄	-0.068	-0.004	-0.138	0.080	-0.141	-0.190	-0.374	-0.285	-0.323	-0.355	-0.281	-0.421	-0.294	-0.149	0.703	-0.251	-0.305	-0.305	-0.510	1

Table S5b. Pearson Correlation matrix among field parameters and major ions found in the 12 groundwater samples at Satkhira district during wet season 2021

	pH	EC	As	ORP	Fe	Ca	Mg	Al	Na	K	Mn	Cu	Zn	Ba	Pb	HCO ₃	Cl	NO ₃	SO ₄	PO ₄
pH	1																			
EC	-0.396	1																		
As	0.266	-0.076	1																	
ORP	-0.260	0.521	-0.275	1																
Fe	0.157	0.336	0.585	0.208	1															
Ca	0.168	0.545	0.045	0.027	0.430	1														
Mg	0.059	0.609	-0.202	0.295	0.498	0.835	1													
Al	0.028	0.559	-0.027	0.381	0.734	0.632	0.899	1												
Na	0.101	0.555	-0.199	0.168	0.460	0.855	0.991	0.864	1											
K	-0.018	0.570	-0.216	0.393	0.582	0.645	0.949	0.972	0.921	1										
Mn	0.069	0.520	-0.192	0.360	0.622	0.632	0.933	0.970	0.910	0.990	1									
Cu	0.011	0.538	-0.083	0.480	0.704	0.545	0.872	0.973	0.824	0.965	0.966	1								
Zn	0.024	0.659	-0.084	0.427	0.678	0.715	0.947	0.979	0.911	0.976	0.970	0.960	1							
Ba	0.077	0.158	0.622	-0.424	0.397	0.575	0.164	0.140	0.204	0.012	-0.009	-0.032	0.130	1						
Pb	0.178	0.235	0.071	0.182	0.790	0.342	0.626	0.826	0.611	0.769	0.838	0.833	0.768	-0.023	1					
HCO₃	-0.003	0.376	-0.172	0.106	-0.129	-0.115	-0.072	-0.052	-0.073	-0.051	-0.015	-0.113	-0.007	-0.188	0.015	1				
Cl	0.056	0.270	-0.136	-0.063	-0.280	-0.077	-0.184	-0.252	-0.162	-0.241	-0.207	-0.333	-0.185	-0.059	-0.197	0.955	1			
NO₃	0.119	0.339	0.630	-0.176	0.298	0.401	0.000	-0.013	0.010	-0.150	-0.160	-0.174	0.010	0.801	-0.178	0.297	0.413	1		
SO₄	-0.417	0.608	-0.252	0.258	-0.283	-0.087	-0.104	-0.198	-0.126	-0.140	-0.152	-0.181	-0.077	-0.223	-0.243	0.757	0.748	0.197	1	
PO₄	0.153	0.317	0.240	0.241	0.668	0.312	0.593	0.760	0.560	0.701	0.699	0.803	0.688	0.036	0.654	-0.211	-0.404	-0.069	-0.314	1

Table S6a. Depthwise heavy mineral distribution

Heavy Mineral Wt %											
Sample ID	Latitude	Longitude	HA-03 Depth (m)	Strongly Magnetic	Moderately	Weakly magnetic	Poorly magnetic	Dry	Wet	Dry sea-	Wet Season
				(Magnetite,	magnetic	(Rutile,	(Apatite,	season	season	son 2020,	2021,
				Goethite,	(Biotite,	(Rutile,	Kyanite,	2020,	2021,	Salinity	Salinity
				Siderite,	Garnet)	Pyrite)	Zircon,	As	As	(mg/l)	(mg/l)
				Fe-Oxides)		Silimanite)	(µg/l)	(µg/l)			
SKASPZ-1	22.5477	89.1745	30.48	20.13	11.04	5.19	22.08	121.92	92.42	1200.00	1066.24
SKASPZ-2	22.54774	89.17451	111.5					2.02	7.93	998.40	19251.20
SKASPZ-3	22.5477	89.17448	205					5.60	0.68	2458.24	11321.60
SKSKPZ-1	22.7075	89.12613	25					10.44	62.35	3162.88	2016.00
SKSKPZ-1/1	22.70546	89.0694	22.3					187.68	48.71	627.20	1184.00
SKSKPZ-2	22.7078	89.12622	121.92	20.63	5.56	7.14	22.22	2.55	5.22	5806.08	3754.88
SKSKPZ-3	22.7078	89.12622	155					4.57	8.12	4496.00	2911.36
SKSKPZ-4	22.7078	89.12622	237					10.00	18.03	431.36	3837.44
KHPKPZ-1	22.58508	89.31805	44					16.90	165.38	7110.40	29728.00
KHPKPZ-2	22.58512	89.31797	106					10.29	65.70	3014.40	34976.00
KHPKPZ-3	22.58508	89.31797	190					0.96	19.04	5805.44	5533.44
KHPKPZ-4	22.58503	89.31794	245.5	10.93	15.75	5.73	9.14	0.94	0.84	1930.88	5136.64

Table S6b. Depthwise heavy minerals wt% among deep, intermideate and shallow aquifers

Heavy mineral Wt%			
Well ID	HA-03	HT-06	HT-11
Well Aquifer Depth (m)	30.48 m	121.92 m	245.5 m
Tourmaline	3.90	1.59	1.24
Goethite	3.25	7.14	4.32
Siderite	5.19	5.56	2.25
Magnetite	7.79	6.35	3.12
Garnet	3.25	2.38	5.62
Biotite	7.79	3.17	10.13
Rutile	3.25	2.38	2.3
Pyrite	1.95	4.76	3.43
Apatite	6.49	4.76	2.45
Zircon	5.19	4.76	2.11
Kyanite	4.55	4.76	1.4
Silimanite	5.84	7.94	3.18
Chlorite/ Chloritoid	8.11	3.97	5.25
Opaques	33.45	40.48	53.2
Total =	100.00	100.00	100.00

Table S7. Data retrieved in Defrac.EVA from XRD analysis of the sample A-12 in Satkhira district















Index	Color Icon	Pattern #	Mineral Name	Formula	S-Q (%)	Conc. Level	System
1		COD 9000468	Biotite	Al1.999 K0.5 Mg2.001 O12 Si3	16.5	Major	Monoclinic
2		COD 1010928	Calcite	Ca C O3	21.7	Major	Rhombo.R.axes
3		COD 9010163	Chlorite	Al0.865 Fe0.255 H4 Mg2.292 O9 Si1.588	3.8	Minor	Monoclinic
4		COD 9000083	Dolomite	C2 Ca Mg O6	0.6	Trace	Hexagonal
5		COD 1008766	Goethite	Fe H O2	1.1	Minor	Orthorhombic
6		COD 9008569	Graphite	C	3.3	Minor	Hexagonal
7		COD 9013732	Illite	Al2 H2 K O12 Si4	9.9	Major	Monoclinic
8		COD 9009230	Kaolinite	Al2 H4 O9 Si2	1.6	Minor	Triclinic
9		COD 9002514	Olivine	Fe0.15 Mg1.85 O4 Si	1.9	Minor	Orthorhombic
10		COD 9006563	Pyroxene	Al1.388 Ca0.742 Fe0.162 Mg0.016 O6 Si1.5	1.3	Minor	Monoclinic
11		COD 5000035	Quartz	O2 Si	8.2	Major	Hexagonal
12		COD 1011176	Quartz low	O2 Si	25.2	Major	Hexagonal
13		COD 9016599	Siderite	C Fe O3	0.7	Trace	Hexagonal
14		COD 9011362	Sulfur	S8	4.2	Minor	Orthorhombic
					Total S-Q (%) = 100		

Table S8. SEM Data showing elemental weight percentage with respective sample ID among nine sediment samples in Satkhira district.

Auburn University Research Instrumentation Facility (AURIF)

SEM Analysis Date Time: 06/05/2023 6:46:41 PM

Spectrum processing: No peaks omitted

Processing option: All elements analyzed (Normalized)

Number of iterations: 4

Instrument: Zeiss EVO 50

Software: Oxford INCA Microanalysis

Element (Wt %)	Sample ID									Mean Wt %	Standard 1-Jun-1999 12:00 AM
	P8-1	P8-2	P8-3	A12-1	A12-2	A12-3	HA03-1	HA03-2	HA03-3		
O	59.78	62.35	61.41	47.84	47.74	47.55	49.19	46.3	46.19	52.04	SiO2
Na	1.45	0.63	2.08	2.19	1.42	1.36			0.77	1.41	Albite
Mg				0.64		0.52	2.01	1.49	2.2	1.37	MgO
Al	5.17	2.77	5.29	6	5.64	6.07	8.06	6.59	9.51	6.12	Al2O3
Si	29.88	32.84	28.05	35.9	35	33.23	15.49	11.37	15.3	26.34	SiO2
Cl	0.57		0.49	1.04	2	0.98	0.9	0.43	0.62	0.88	KCl
K	1.89	1.41	1.44	2.34	2.06	1.97			0.44	1.65	MAD-10 Feldspar
Ca	0.45		0.6	2.01	1.69	4.14	4.64	3.06	3.42	2.50	Wollastonite
Fe	0.81		0.65	2.05	4.45	4.18	17.1	21.11	19.01	8.67	Fe
Ti							2.61	7.56	1.69	3.95	Ti
Mn								0.61	0.85	0.73	Mn
Zr								1.48		1.48	Zr
Total (Wt %)	100	100	100	100	100	100	100	100	100		

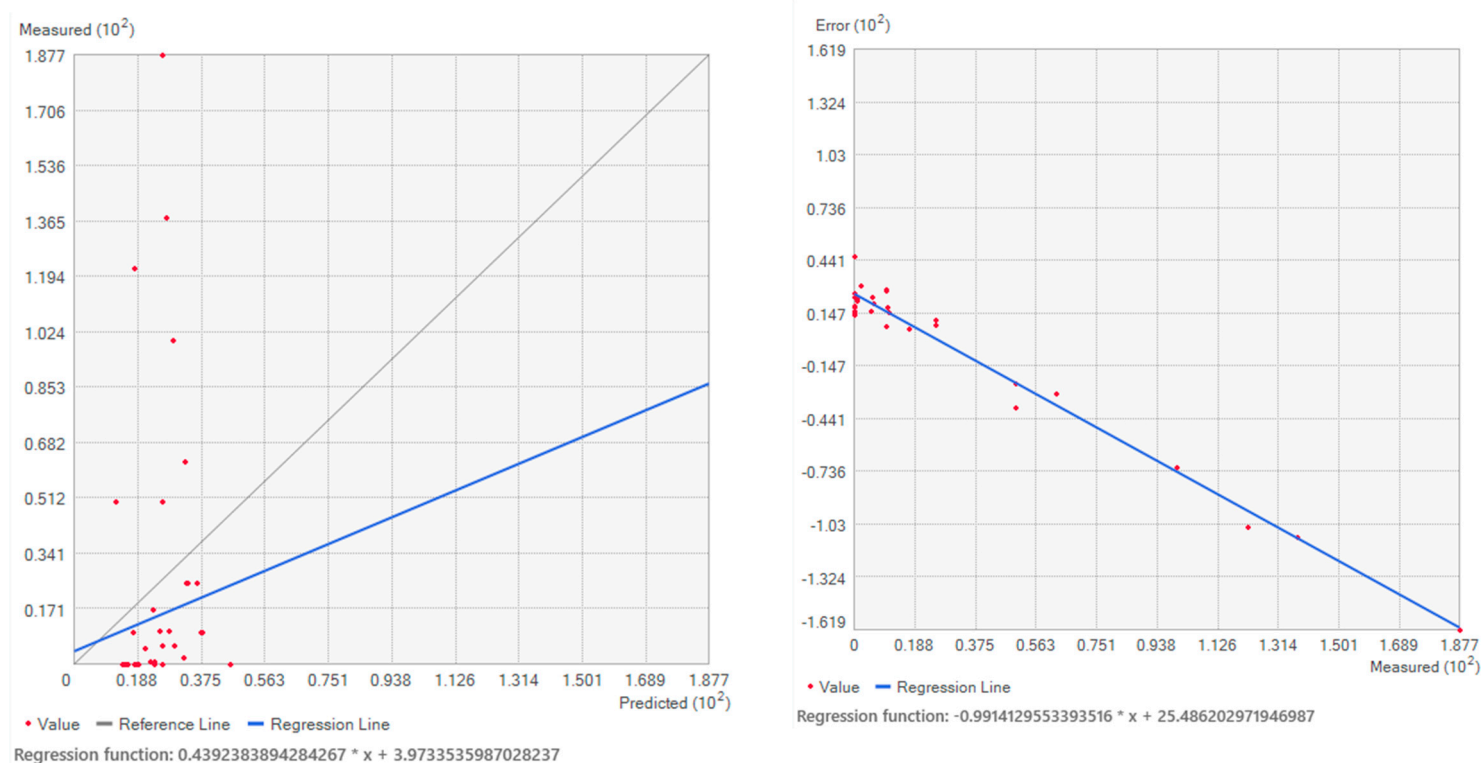


Figure S1. Ordinary Kriging interpolation methods showing measured As vs Predicted As and measured As vs Error during Dry season 2020

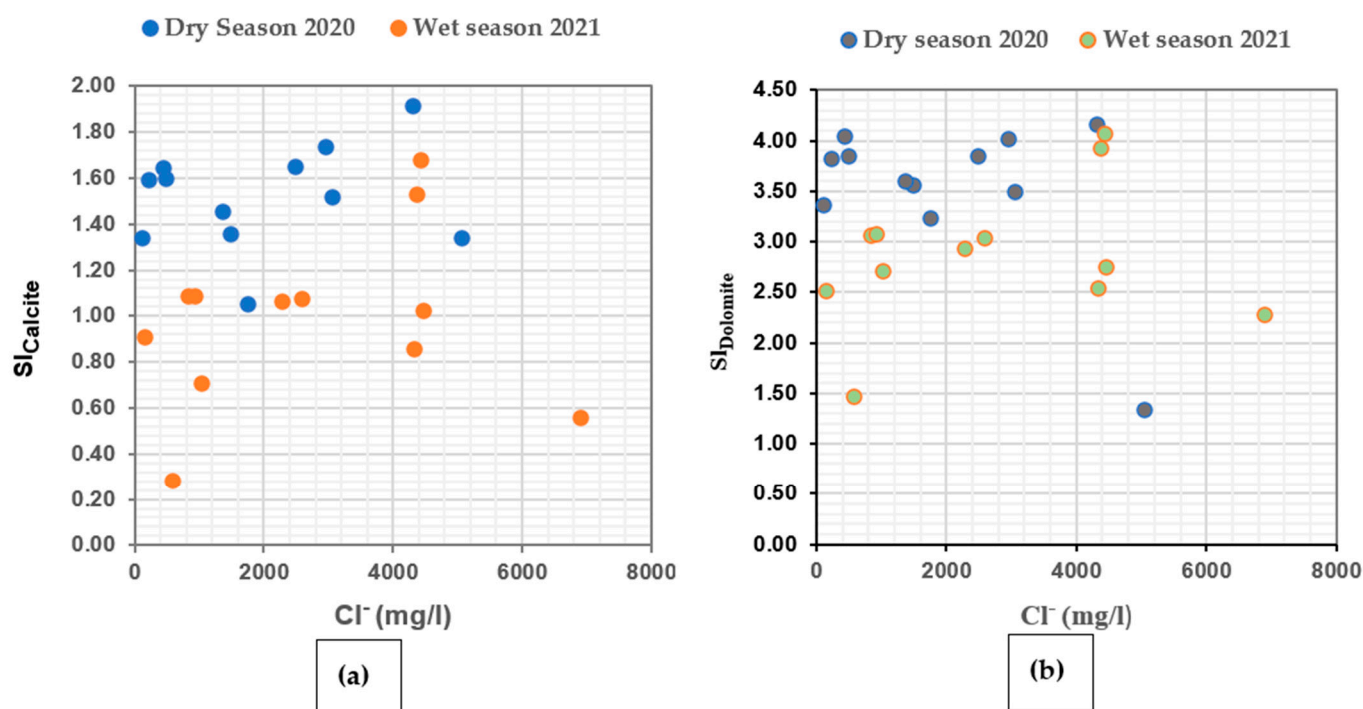


Figure S2: Distribution plots of Saturation Index of (a) calcite versus salinity and (b) dolomite versus salinity during wet season 2021 and dry season 2020 in Satkhira district.

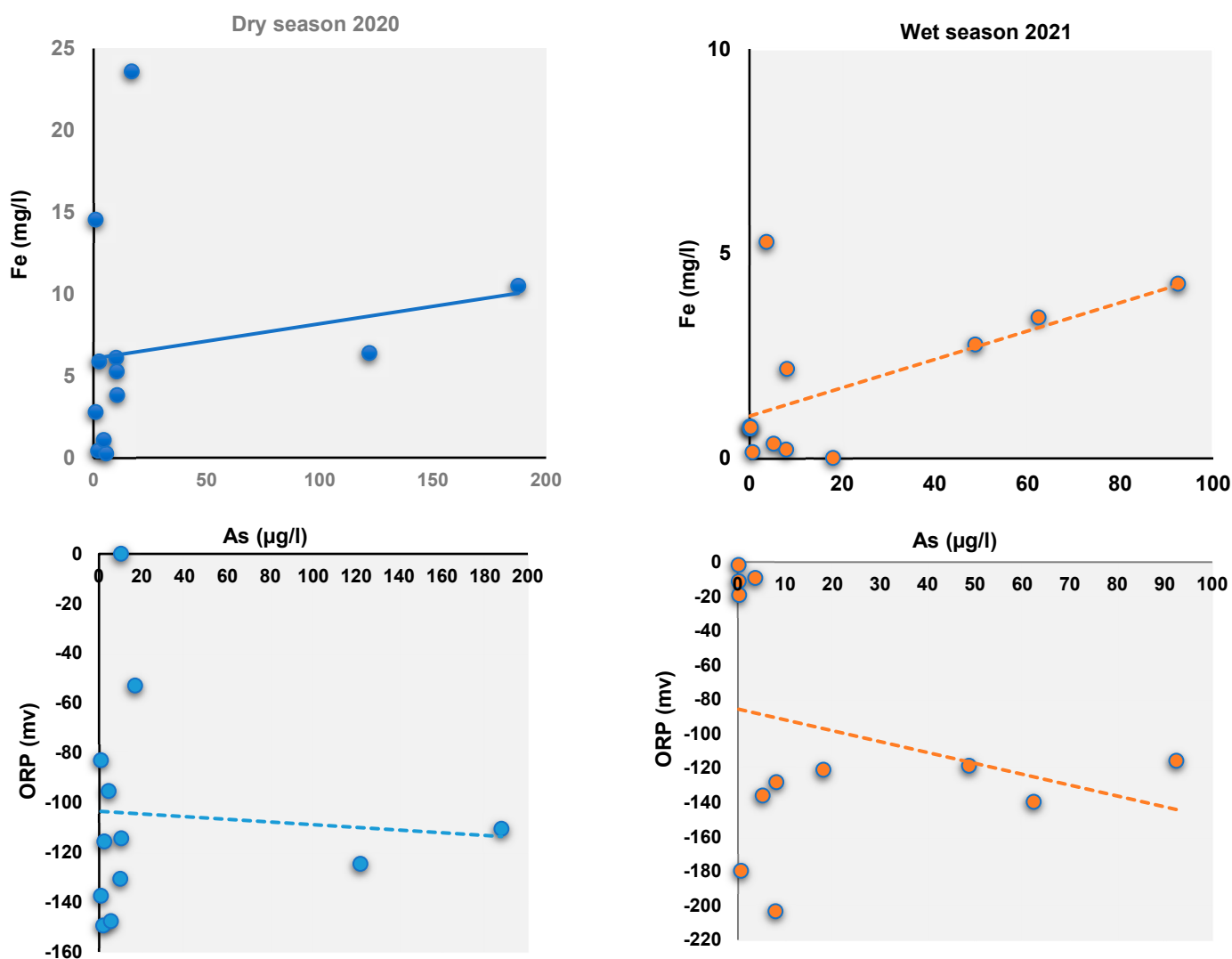


Figure S3: Scatter plots showing correlation between As vs Fe , and As vs ORP during dry 2020 and wet season 2021