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Data Article

Dataset on the evaluation of hydrochemical properties and groundwater suitability for irrigation purposes: South-western part of Jashore, Bangladesh

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ABSTRACT

The data herein presented concerns the article entitled "Evaluation of hydrochemical properties and groundwater suitability for irrigation uses in southwestern zones of Jashore, Bangladesh". Data was collected during 2018-2019 in the southwestern zones of Jashore, Bangladesh. One hundred groundwater samples (boreholes and tube wells) were collected to evaluate groundwater quality, using the irrigation water quality index (IWQI) as an indicator. Fourteen hydrochemical parameters (pH, EC, TDS, NO_3N, pH, EC, Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, Cl^{-}, HCO_3^{-}, SO_4^{2-} and Fe^{2+}) were used to calculate irrigation water quality indices (KI, Na%, PI, SAR, SSP, MH, and TH). Statistical methods such as Viper diagrams, USSL, and Wilcox diagrams were used to visualize datasets. The attained data can be used to assess the hydrogeochemistry of the sampled sites and groundwater quality for irrigation

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purposes. The findings of this work can be used in the optimization of management and treatment procedures and in the implementation of sustainable water development.

Specification Table

Subject area	Environmental science
Main specific subject area	Groundwater quality on irrigation purposes
Types of data	Tables and Figures
How data were acquired	The technique of thermometric, Ion chromatography, HCl titration, Conductivity bridge method, Portable Multi-Meter, (Hach, sensION + MM150), HACH Germany) at 562 nm, (0.009–1.4 mg/L) using a spectrophotometer (DR 2800), Atomic absorption spectrophotometer (Varian AAS, 680FS), Ultraviolet spectrophotometer (UV) method, Arc GIS version 10.5, SPSS statistics tools version 17, Windows 10 (Exal).
Data Format	Raw, Analyzed
Parameters for data collection	A total number of 100 groundwater samples have been collected for the dataset analysis on groundwater quality of hydrochemical parameters, EC, TDS, NO_3N, pH, EC, Ca^{2+}, Mg^{2+}, Na^{+}, K^{1+}, Cl^{1-}, $SO_4{}^{2-}$, Hardness, Zn^{2+}, $NO_3{}^{1+}$ and Fe^{2+}, respectively.
Description of data collection	All the samples have been collected randomly based on APHA (2012) methods in the year 2018, July to 2019 June from tube wells, and location has been recorded of sampling spot. For the collection of groundwater samples, 500ml and 100 ml of high-density polyethylene bottles (HDPE) have been used. In the laboratory, it has storied at 4°C.
Data source location	Abhaynagar, Keshabpur, Chaugachha, Jhikargachha, Bagherpara, Manirampur, Jessore Sadar and Sharsha (Jashore, Bangladesh)
Data accessibility	Data are included in this article
Related research article	[1] M.T. Ahmed, M.Y. Hasan, M.U. Monir, M.A. Samad, M.M. Rahman, M.S. Islam Rifat, M.N. Islam, A.A.S. Khan, P.K. Biswas, A.H.M.N. Jamil, Evaluation of hydrochemical properties and groundwater suitability for irrigation use in southwestern zones of Jashore, Bangladesh, Groundwater for Sustainable Development 11 (2020) 100441. 10.1016/j.gsd.2020.100441

Value of the Data

- The dataset collected in this work provides an overview of groundwater quality and its relation to seasonal prevention processes, with particular focus on permissible levels of different substances in groundwater for drinking and irrigation purposes.
- The presented datasets are not only beneficial to local administrators and decision-makers in as far as the planning, managing, superintending, and field level implementation of drinking and irrigation water seasonal prevention measures, but can also be of value to researchers, urban planners, and hydrologists focused on sectorial development.
- This dataset will help in the development of more sophisticated management processes of groundwater meant for irrigation, including regular monitoring of groundwater, purification and water supply processes, identification of groundwater contamination, and implementation of aquifer systems.
- This data can be used to improve the agricultural productivity and thus the quality of life of the inhabitants of the studied area by revealing potential areas suitable for short- and long-term irrigation.
- The data can be additionally used in health risk assessments, risk assessments of groundwater's chloride ions concentrations, aquifer resistivity assessments, water supply distribution management, and monitoring of water networks.

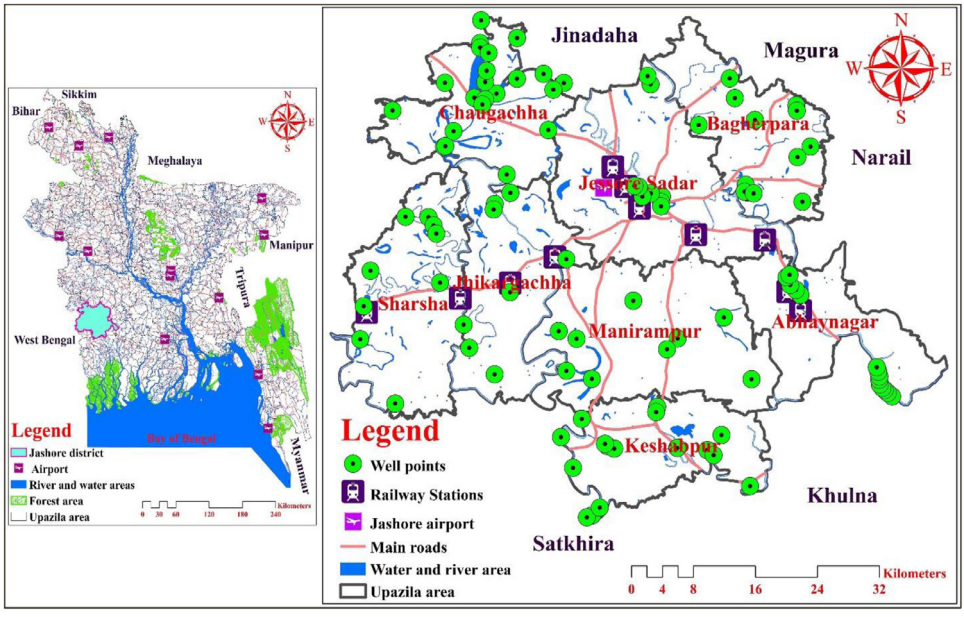

Fig. 1. The sampling points of Jashore district, Bangladesh (boreholes or tube wells).

Table 1
The total overview of water quality indices for irrigation [8–11].

S. No.	Water quality indexes	Acronym	Formula
1	Soluble sodium percentage	(SSP)	$\left[\frac{Na^+}{(Ca^{2+}+Mg^{2+}+Na^+)}\right]$
2	Kelley index	(KI)	$\left[\frac{Na^+}{(Mg^{2+}+Ca^{2+})}\right]$
3	Sodium percentage	(%Na)	$\left[\frac{(Na^++K^+)}{(Ca^{2+}+Mg^{2+}+Na^++K^+)}\right]$
4	Sodium absorption ratio	(SAR)	$\left[\frac{Na^+}{\left(\sqrt{\frac{Ca^{2+}+Mg^{2+}}{2}}\right)}\right]$
5	Permeability index	(PI)	$\left[\left(\frac{Na^++\sqrt{HCO_3}}{Ca^{2+}+Na^++Mg^{2+}}\right)\times 100\right]$
6	Magnesium hazard	(MH)	$\left[\left(\frac{Mg^{2+}}{(Mg^{2+}+Ca^{2+})}\right)\times 100\right]$
7	Total hardness	(TH)	$[2.497Ca^{2+}+4.11Mg^{2+}]$

1. Data Description

The dataset is presented in 5 Figures and 4 Tables that describe the groundwater quality indices for the purpose of irrigation in the Jashore district, Bangladesh. Fig. 1 displays the studied area and the sampling points. Tables 1 and 2 present water quality indices for irrigation purposes and the calculative values of the total parameter indices, respectively. These values were used to calculate the irrigation water quality index (IWQI). An overview of physical and hydrochemical parameters is shown in Table 3. Calculations of irrigation water quality indices (IWQI) based on the WHO [2, 3] standard are shown in Table 4, while the sample percentages for irrigation of the different sampled areas are shown in Fig. 2. The hydrochemical facies as an indicator of cations and anions is displayed with the use of a Piper diagram (Fig. 3). For easy identifi-

Table 2
The resultant values of water quality indices on the purpose of irrigation.

Well Id	SSP	SAR	KI	PI	Na (%)	MH
S1	55.41	21.83	1.55	0.41	70.88	44.31
S2	53.64	23.61	0.5	0.36	68.53	39.38
S3	34.71	30.24	0.67	0.43	78.9	54.51
S4	52.58	21.43	1.39	0.31	78.66	46.83
S5	32.98	29.06	0.54	0.39	70.63	69.62
S6	33.68	18.6	0.38	0.31	82.64	54.21
S7	48.68	27.15	2.55	0.38	63.76	53.27
S8	49.93	35.97	0.73	0.44	74.49	54.21
S9	33.74	19.9	0.5	0.37	82.53	29.16
S10	44.55	14.3	0.32	0.3	80.9	56.21
S11	63.68	63.72	1.75	0.67	73.94	32.59
S12	42.72	39.88	0.74	0.45	69.21	53.49
S13	31.53	18.54	1.46	0.37	82.55	44.06
S14	23.36	11.94	0.3	0.29	63.86	55.05
S15	53.71	37.6	1.16	0.58	64.05	55.42
S16	35.25	19.32	0.54	0.39	84.75	67.57
S17	40.51	30.32	0.68	0.44	87.55	55.92
S18	29.75	19.01	0.42	0.34	70.93	55.51
S19	32.81	18.11	0.48	0.38	80.95	61.02
S20	27.09	16.08	0.37	0.32	74.35	62.71
S21	27.16	14.47	0.37	0.33	68.61	57.86
S22	44.06	32.11	0.78	0.47	66.01	45.84
S23	35.44	22.39	0.54	0.4	83.71	76.72
S24	19.23	13.92	0.23	0.23	78.31	72.52
S25	52.38	46.45	1.1	0.55	86.58	81.82
S26	53.43	40.16	1.14	0.58	85.46	83.24
S27	29.59	16.06	0.42	0.36	67.63	60.63
S28	41.41	30.47	0.7	0.45	50.83	43.71
S29	42.16	31.69	2.82	0.45	80.23	76.03
S30	19.74	10.81	1.03	0.24	76.64	68.06
S31	18.46	12.51	1.11	0.23	80.84	63.04
S32	40.11	31.86	2.32	0.44	75.02	61.98
S33	55.69	48.47	3.26	0.58	79.56	71.93
S34	45.3	17.88	0.96	0.32	89.36	82.34
S35	36.61	12.97	1.7	0.28	80.66	79.77
S36	60.35	16.67	1.1	0.3	72.77	67.09
S37	73.85	17.32	1.24	0.38	71.24	50.43
S38	50.85	8.347	1.15	0.2	75.69	73.84
S39	52.77	22.8	0.94	0.34	84.85	83.21
S40	69.88	22.6	0.99	0.39	74.54	74.54
S41	76.57	23.61	0.96	0.46	82.49	82.22
S42	49.12	14.68	2	0.29	67.56	57.28
S43	63.03	15.14	1.56	0.29	74.49	35.75
S44	40.64	24.07	0.94	0.39	80.99	23.62
S45	32.04	24.81	0.73	0.43	72.38	64.55
S46	39.68	14.06	0.71	0.42	77.49	41.75
S47	52.25	24.82	1.19	0.51	74.49	64.73
S48	46.45	18.42	1.56	0.42	80.99	62.63
S49	59.54	8.762	1.47	0.25	72.38	64.93
S50	42.05	15.22	1.09	0.33	79.48	67.16
S51	28.37	38.81	0.82	0.48	67.26	65.46
S52	23.23	19.05	1.57	0.44	73.94	52.83
S53	26.31	48.35	1.52	0.64	57.88	59.2
S54	31.72	61.36	0.82	0.77	62.19	58.96
S55	14.78	22.85	0.03	0.6	74.94	41.12
S56	31.43	33.65	0.11	0.55	62.78	26.63
S57	34.54	30.98	0.32	0.81	57.65	43.67
S58	40.85	51.39	0.26	0.81	59.82	37.96
S59	44.35	15.41	0.96	0.62	62.73	29.62
S60	25.49	24.49	0.7	0.77	61	30.8

(*continued on next page*)

Table 2 (*continued*)

Well Id	SSP	SAR	KI	PI	Na (%)	MH
S61	35.48	16.46	0.68	0.49	62.35	41.66
S62	38.63	10.63	0.47	0.4	74.04	24.18
S63	32.03	16.9	0.65	0.46	62.39	59.65
S64	43.32	16.67	0.09	0.66	50.65	38.69
S65	36.28	14.42	0.86	0.57	63.24	31.02
S66	17.66	23.46	0.47	0.69	69.69	17.47
S67	27.67	11.42	0.72	0.59	52.66	16.91
S68	32.57	9.168	0.48	0.49	56.86	27.11
S69	22.34	4.975	0.28	0.41	58.44	23.16
S70	40.5	12.99	0.68	0.5	51.18	20.81
S71	38.16	13	0.61	0.47	36.37	28.06
S72	60.97	22.07	0.56	0.73	32.1	23.04
S73	48.68	17.8	0.94	0.6	70.93	21.98
S74	42.33	16.16	0.73	0.51	48.64	31.93
S75	24.41	21.18	0.19	0.64	35.06	22.34
S76	32.44	10.23	0.48	0.43	37.31	40.77
S77	32.13	10.11	0.47	0.44	47.39	27.09
S78	28.17	18.19	0.92	0.58	33.01	30.43
S79	28.8	6.61	0.4	0.45	44.64	33.84
S80	22.46	7.536	0.28	0.29	50.97	33.21
S81	17.85	5.747	0.21	0.31	51.59	34.54
S82	31.59	7.062	0.46	0.56	63.11	22.22
S83	40.91	9.488	0.69	0.59	63.82	37.28
S84	24.68	5.724	0.32	0.39	59.44	35.75
S85	41.62	15.43	0.71	0.5	53.7	23.62
S86	26.9	4.853	0.36	0.54	61.15	44.55
S87	31.61	7.632	0.46	0.51	54.89	44.31
S88	29.1	12.88	0.66	0.66	47.61	39.38
S89	26.69	27.36	0	0.76	53.7	54.51
S90	41.59	9.622	0.71	0.6	61.15	46.83
S91	32.47	6.431	0.48	0.52	54.89	39.62
S92	26.2	4.841	0.35	0.53	58.11	23.21
S93	35.55	18.98	0.24	0.66	60.83	23.27
S94	33.51	16.8	0.15	0.65	51.59	44.21
S95	40.39	7.786	0.53	0.57	54.76	29.16
S96	28.55	14.59	0.1	0.71	34.98	44.21
S97	35.27	7.424	0.49	0.51	33.9	32.59
S98	27.63	8.901	0.5	0.48	27.09	23.49
S99	35.59	12.84	0.14	0.66	45.09	24.06
S100	39.93	13.39	0.19	0.63	24.09	34.4

cation of water sample class, the salinity indicator is demonstrated through an USSL diagram whereas the sodium hazard indicator is displayed as a Wilcox diagram, as seen in Figs. 4 and 5, respectively.

2. Experimental Design, Materials, and Methods

2.1. Description of the study area

The covered district encompasses a total area of 2570.42 sq km (approximately) located at 23.1778°N and 89.1801°E in Bangladesh, in the south-western part of the coastal region [4]. The seasonal periods of this area as well as of Bangladesh are mostly influenced by the Bay of Bengal, which stands in the south of Bangladesh. The annual average temperature in Jashore ranges between 15.4 and 34.6°C, while the annual average rainfall is 1537 mm (approx.). One hundred sites were randomly selected for sampling within the studied area (Fig. 1). One sample was

Table 3
The analytical value on the total hydrochemical parameters in the study area.

Well Id	pH	EC (µs/cm)	TDS (mg/L)	Hardness (mg/L)	Fe^{2+} (mg/L)	Zn^{2+} (mg/L)	Cl^{1-} (mg/L)	NO_3N (mg/L)	$SO^{2+}{}_4$ (mg/L)	$NO^{1+}{}_3$ (mg/L)	K^{1+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	Ca^{2+} (mg/L)
S1	7.53	1480	1036	0	0.4	0.001	406.54	1	4.6	0.74	71	347	432	436
S2	7.45	2415	1690.5	450	0.03	0.05	1518.9	6.3	1	4.69	45	432	553	665
S3	7.59	3472	2430.4	575	0.03	0.23	1217.8	4.1	7	3.05	33	543	675	453
S4	7.5	4772	3340.4	100	0.04	0.39	900	1	1	0.74	39	674	575	765
S5	6.93	16598	11619	1400	0.4	0.23	4700	7	200	5.21	110	990	775	432
S6	7.17	2020	1414	0	0.4	0.021	1110.3	3.2	4.2	0	53	643	453	543
S7	6.92	3620	2534	0	0.3	0.013	563.35	3	4.5	2.23	45	643	667	564
S8	8.02	1593	1115.1	175	0.07	0.27	686.54	1.2	2	0.89	23	643	876	543
S9	7.75	1888	1321.6	475	1.3	0.42	425.35	1.3	1	0.96	33	222.75	389	541
S10	8.02	7684	5378.8	625	0.32	0.39	1310.5	6	100	4.47	78	543	314.43	423
S11	7.61	2036	1425.2	500	0.09	0.31	1082	0.9	2	0.67	90	215.21	1157.8	445
S12	6.82	7732	5412.4	825	0.13	0.42	1557.8	2	150	1.49	75	765	1066.5	665
S13	7.74	2600	1820	0	0.01	0.009	413.44	2.7	5.2	2.01	78	356.86	373.09	453
S14	6.94	1721	1204.7	540	0.01	0.01	1200	1.9	5.4	1.41	54	422.55	234	345
S15	6.8	1610	1127	700	0.01	0.02	1160	2.1	19.7	1.56	67	290.9	609.23	234
S16	7.19	1010	707	380	1.4	0	0	0	0	0	32	287.84	343	342
S17	7.57	1928	1349.6	420	2.1	0	120	3.5	8.5	2.6	52.88	316.1	675	675
S18	7.53	6081	4256.7	675	0.34	0.06	1040	6	125	4.47	56	465.04	426.9	543
S19	7.38	1774	1241.8	660	0.17	0.081	920	1	25	0.74	63	345.83	335.89	342
S20	7.07	2802	1961.4	325	2.76	0.48	624	4.7	5	3.5	78	482.88	347.9	453
S21	7.11	8096	5667.2	500	0.07	0.3	3200	12	150	8.94	71	408.11	280.89	345
S22	7.2	1860	1302	350	0.48	0.31	388	13	50	9.69	52	483.61	654.45	347
S23	7.27	1860	1302	350	0.48	0	388	11	50	8.2	73	392.7	456.67	439
S24	7.08	10074	7051.8	1100	0.52	0.31	2320	15	80	11.1	75	703.14	407.23	1007
S25	6.97	2920	2044	700	5.6	0	0	2	0	1.49	54	237.4	980.81	654
S26	7.03	2260	1582	640	4.6	0	0	2	0	1.49	77	267.54	702.89	345
S27	7.47	3150	2205	900	2.78	0.187	960	3	40	2.23	72	277.24	306.9	453
S28	7.75	3040	2128	880	0.81	0.03	880	3	40	2.23	53	275.26	656.9	654
S29	7.57	3330	2331	950	0.34	0.23	2320	15	80	11.1	43	291.14	689.03	654
S30	7.38	1717	1201.9	420	0.43	0.116	560	2	43	1.49	47	402.83	237.81	564
S31	7.11	6209	4346.3	750	0.09	0.06	2320	3.7	150	2.75	93	369.31	345.9	1158
S32	6.88	9907	6934.9	400	0.73	0.05	1840	5	200	3.72	98	675.09	758.07	456.6
S33	7.38	1560	1092	340	0	0	1314.4	0	0	0	45	287.84	934.89	456
S34	6.83	1230	861	0	7	0.035	307.81	2	0.4	1.49	57	316.1	403.65	702.9
S35	8.3	1120	784	0	3.3	0.041	436.54	0.1	0.9	0.07	54	160.56	278.01	758.1

(*continued on next page*)

Table 3 (*continued*)

Well Id	pH	EC (µs/cm)	TDS (mg/L)	Hardness (mg/L)	Fe^{2+} (mg/L)	Zn^{2+} (mg/L)	Cl^{1-} (mg/L)	NO_3N (mg/L)	$SO^{2+}{}_4$ (mg/L)	$NO^{1+}{}_3$ (mg/L)	K^{1+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	Ca^{2+} (mg/L)
S36	7.1	1192	834.4	482	5	0	265.35	4	8.8	1.49	58	184.23	389.01	904.9
S37	7.1	1192	834.4	482	5	0	467.77	4	8.8	1.49	61	188.55	323.09	506.8
S38	7.85	1090	763	0	0.35	0.266	624.43	0.2	3.9	1.49	62	267.95	200.78	889
S39	7.13	1240	868	0	2.83	0.042	211.81	7.2	12.7	1.86	43	257.5	567.04	979.4
S40	7.18	1190	833	0	0.6	0.049	848.35	2.6	4.6	2.01	64	262.8	484.09	654.5
S41	7.73	1165	815.5	248	2.5	0.012	1186.9	2.5	7	1.64	65	350.45	403.65	234
S42	8.11	1165	815.5	220	0.2	0.032	177.88	2	2.5	2.23	53	695.17	334.89	345
S43	8.21	1193	835.1	260	0.3	0.021	784.43	1.4	8	1.49	30	522.55	334.9	456
S44	7.89	1260	882	328	3.5	0.024	1757.8	3	1.2	1.86	59	390.9	526.78	567
S45	7.08	1000	700	480	0.2	0	666.54	0	0	3.28	60	387.84	489.02	389
S46	7.27	960	672	360	1.6	0	1657.8	1	0	1.49	55	416.1	209.78	29.01
S47	7.51	1145	801.5	500	0.6	0.038	1246.8	2.5	13.8	0	75	287.84	403.09	239.4
S48	7.28	1410	987	460	0.02	0.046	614.43	0.5	7.8	1.64	53	316.1	298.01	207.1
S49	7.3	1378	964.6	420	0.4	0.085	157.81	0.2	11.8	0.89	75	460.56	178.9	373.1
S50	7.27	1164	814.8	560	0.3	0.032	1566.5	2	5.8	2.98	61	384.23	302.82	407
S51	7.3	1380	966	660	0.02	0.05	1890.6	3	3.9	2.16	71	488.55	909.37	609.2
S52	7.14	1560	1092	920	0.01	0.062	199.8	5	16.7	0.03	64	367.95	314.43	176.5
S53	7.18	1263	884.1	420	0.5	0	80	2.5	8	1.19	66	158.45	767.81	345.9
S54	7.4	1020	714	460	3.6	0	0	3.75	0	2.79	37	109.08	666.54	126.9
S55	7.4	1090	763	440	0.6	0	0	3	0	2.23	68	107.94	252.35	135.9
S56	8.54	767	536.9	360	0.46	0.005	33	3.2	18	2.38	16.09	118.53	506.8	334.9
S57	8.46	698	488.6	140	1.5	0.005	32	2.3	7	1.71	19.15	60.213	206.8	28.89
S58	6.99	1000	700	400	4	0	0	1	0	0.74	12.77	69.088	403.9	54.45
S59	8.41	929	650.3	188	1.4	0.024	37	3.6	17	2.68	22.71	70.707	123	56.67
S60	6.41	1321	924.7	164	0.32	0.128	44	2.1	5	1.56	16	62.983	176	40.23
S61	7.05	1190	833	0	6	0.113	0	4.7	28.4	3.5	23	181.35	198	107.8
S62	7.04	800	560	400	4.2	0	0	0	50	0	15	147.26	120	107.2
S63	6.41	1321	924.7	164	0.32	0.128	44	2.1	5	1.56	11	151.18	217	178.6
S64	6.77	1170	819	560	7	0	0	0	0	0	15	89.026	127	27.01
S65	7.02	1020	714	480	5.4	0	0	0	0	0	23	100.32	120	38.01
S66	6.77	1170	819	560	7	0	0	0	0	0	22	103.96	187	23.09
S67	7.25	900	630	0	0	0.061	0	1	5.8	0.74	12.09	103.22	90	20.78
S68	7.38	1200	840	0	0.06	0.137	0	2.7	4.6	2.01	22.98	109.17	87	70.89
S69	7.38	1420	994	580	9	0	0	0	0	0	20.67	65.308	43	84.09
S70	6.99	660	462	300	0.8	0.002	25	0.54	28	0.4	21.02	138.49	124	43.65

(*continued on next page*)

Table 3 (*continued*)

Well Id	pH	EC (µs/cm)	TDS (mg/L)	Hardness (mg/L)	Fe^{2+} (mg/L)	Zn^{2+} (mg/L)	Cl^{1-} (mg/L)	NO_3N (mg/L)	$SO^{2+}{}_4$ (mg/L)	$NO^{1+}{}_3$ (mg/L)	K^{1+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	Ca^{2+} (mg/L)
S71	6.62	513	359.1	288	3.2	0.026	20	1.3	5	0.96	16.9	151.06	137	70.89
S72	6.58	435	304.5	280	2.8	0.012	18	0.85	22	0.63	14.99	62.947	156	36.9
S73	7.45	520	364	244	0.8	0.014	22	1.3	12	0.96	25.02	109.08	167	66.9
S74	7.27	980	686	420	3.2	0	0	0	0	0	22.5	174.39	178	68.03
S75	7.57	852	596.4	208	1.8	0	40	3.2	15	2.38	10	129.68	188	27.81
S76	7.19	1010	707	380	1.4	0	0	0	0	0	23.65	181.08	109	45.9
S77	7.9	496	347.2	0	2	0.099	0	1.6	1.5	1.19	22.6	153.04	108	75.07
S78	7.19	570	399	0	1	0.062	0	2.1	1	1.56	15.9	96.562	178	94.89
S79	7.02	858	600.6	380	0.12	0.047	25	5.6	12	4.17	14.09	98.552	54	34.9
S80	6.95	394	275.8	188	1.2	0.002	12	2.8	15	2.08	10.94	281.42	98	56.78
S81	7.27	822	575.4	300	0.14	0.073	25	2.1	13	1.56	25.98	260.69	76	89.02
S82	7.68	566	396.2	240	0.2	0.074	20	1.8	9	1.34	11.08	96.133	54	20.78
S83	3.7	722	505.4	260	0.11	0.069	25	0.9	0.2	0.67	16.92	53.761	65	40.09
S84	7.51	733	513.1	188	0.1	0	32	2.5	7	1.86	17	54.547	50	98.01
S85	7.4	815	570.5	180	3.4	0	35	1.4	21	1.04	12.75	55.334	167	178.9
S86	7.7	955	668.5	180	0.4	0	45	3.2	14	2.38	25.16	56.121	32	30.82
S87	7.05	727	508.9	300	0.06	0.046	25	1.7	25	1.26	19.15	56.908	63	79.37
S88	9.08	536	375.2	224	0.2	0.012	20	1.6	9	1.19	17.77	57.694	86	31.44
S89	10.01	550	385	364	0.2	0.012	22	1.2	5	0.89	22.71	58.481	187	34.89
S90	7	795	556.5	460	8.3	0.046	45	1.7	61	1.26	15.42	59.268	65	32
S91	7.62	659	461.3	264	1.6	0.023	24	1.3	7	0.96	12.98	60.055	43	29.36
S92	7.63	617	431.9	316	2.1	0.012	23	1.9	2	1.41	11	60.841	33	32.09
S93	8.34	765	535.5	368	0.4	0.002	28	2.1	3	1.56	8,.09	61.628	145	55.01
S94	7.61	688	481.6	364	0.2	0.002	24	1.5	2	1.11	7	62.415	122	43.01
S95	8.1	679	475.3	320	2.6	0.02	28	2	9	1.49	6	63.201	57	43.98
S96	8.22	799	559.3	340	2.8	0.001	30	1.2	7	0.89	11.03	63.988	96	22.56
S97	8.41	709	496.3	324	3.8	0.08	29	2.6	5	1.93	19.63	64.775	56	49.01
S98	8.09	612	428.4	288	3.8	0.03	23	2.4	7	1.78	9	65.562	78	88
S99	8.44	809	566.3	364	0.6	0.04	31	1.4	9	1.04	7.09	66.348	87	25.36
S100	8.22	799	559.3	340	2.8	0.001	30	1.2	7	0.89	14	67.135	90	23.09

Table 4
Total overview of ranges and classification on IWQI and percentages of the samples [1, 2].

Index	Ranges	Classes on water quality	% of samples
IWQI	85-100	Excellent	36%
	70-85	Good	18%
	50-70	Permissible	15%
	40-55	Doubtful	14%
	0-40	Severe	17%

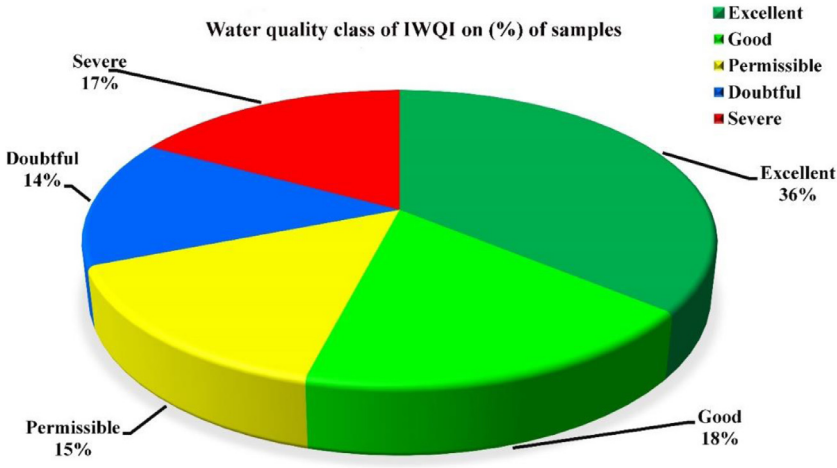

Fig. 2. The ratio of water quality index for irrigation purposes.

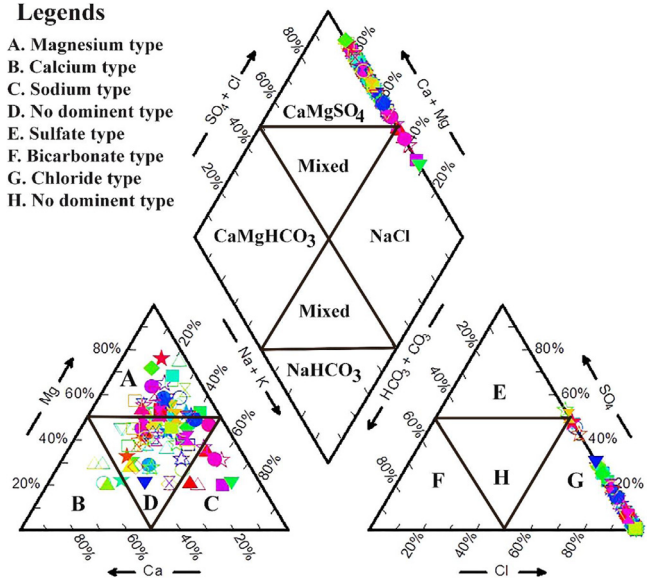

Fig. 3. Piper's Trilinear plot diagram on hydrochemical facies for the major ion's of groundwater samples.

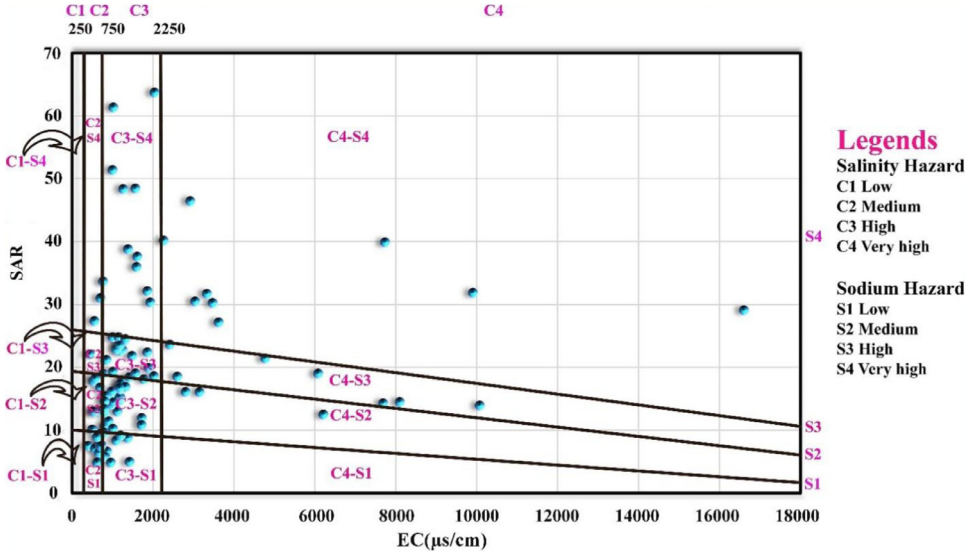

Fig. 4. USSL diagram, Salinity hazard (EC) vs Sodium absorbption hazard (SAR).

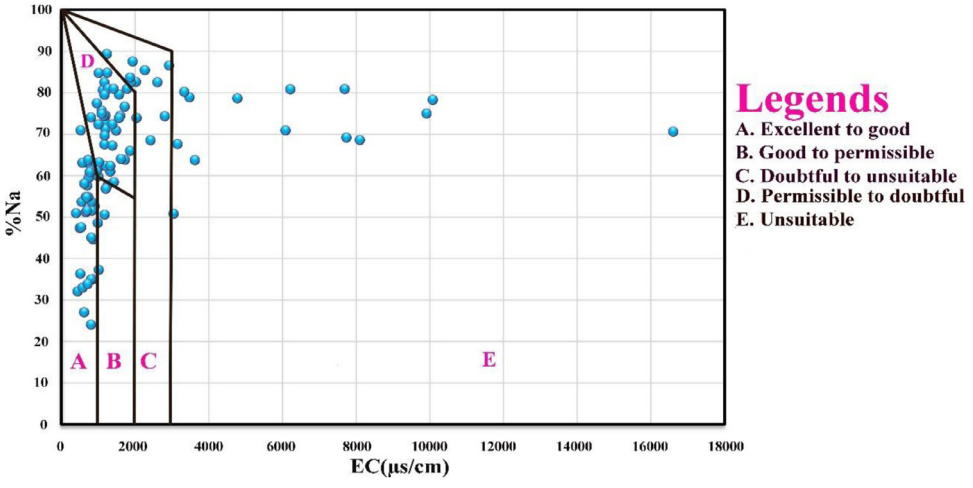

Fig. 5. Wilcox diagram, EC vs % Na.

collected from each of the sites and thus 100 groundwater samples were gathered for hydro-chemical analysis.

2.2. Groundwater sample collection and laboratory analysis

The investigation was performed with the cooperation of the Environmental Laboratory of Asia Arsenic Network, Bangladesh, and the Bangladesh Agricultural Development Corporation (BADC). The field survey covered both the arid and rainy seasons. Groundwater samples were collected from randomly assigned boreholes and tube wells. The sampling spots of the well were measured by a Garmin's handheld GPS recorder 6. Plastic bottles (500ml and 100ml) were used

to collect the water samples submitted to hydrochemical analysis [5]. Prior to collection, plastic bottles were washed with ethanol or fresh groundwater then subsequently cleaned with DI (deionized) water. Plastic bottles were prepared in such a way so that the sample water did not mix with other samples. Bottles were labeled with a serial number with the use of a permanent marker, then kept in a cooler for transportation. Following transportation, groundwater samples were submitted to appropriate sample preparation protocols for instrumental analysis [1, 6, 7]. Ultraviolet spectrophotometry (UV) and atomic absorption spectrophotometry (Varian AAS, 680FS were carried out on prepared samples for identification of major anions [(SO_4^{2-}), (NO_3^-), NO_3N] and major cations [(Na), (K^{1+}), (Mg^{2+}), (Ca^{2+})], respectively. Thermometric analysis was carried out for identification of temperature and pH. Carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-) were measured by HCl titration. Total dissolved solids, Chloride (Cl^-), Iron (Fe^{2+}), and Electrical conductivity (EC) were analyzed by the Conductivity bridge method, Ion chromatography, FerroZine iron reagent method, and Portable Multi-Meter, respectively.

3. Statistical Data Analysis of Groundwater Samples

3.1. Evaluation of water quality indices

Irrigational water quality indices were applied to selected hydrochemical parameters (Table 4) to measure the irrigational condition of the sampled groundwater. Permeability index (PI), Soluble sodium percentage (SSP), Sodium absorption ratio (SAR), Sodium percentage (%Na), Kelley's index (KI) Magnesium hazard (MH) and Total hardness (TH) were calculated through the following formula.

3.2. Irrigation water quality index

Irrigation water quality index (IWQI) [1, 12, 13] and single index were determined by Eqs. (1)–(3) (Fig. 2). Calculations of irrigation water quality index were based on irrigation indices (Table 2) and standard values established by WHO (Table 4).

$$Qrv = \left[\frac{(Cv) \times 100}{(RSv)}\right] \tag{1}$$

$$Wcv = \left[\frac{1}{RSv}\right] \tag{2}$$

$$IWQI = \left[\frac{\left(\sum_{1=0}^{n} Wcv \times Qrv\right)}{\left(\sum_{1=0}^{n} Wcv\right)}\right] \tag{3}$$

Where, Qrv indicates the characterization for groundwater quality rating value, Cv signifies the concentration of water quality parameters, RSv defines groundwater standard level, Wcv represents the relative coefficient weight of water quality parameters, and n denotes the number of irrigation water quality parameters, while IWQI indicates irrigation water quality index. IWQI is given as a single number, with dimensionless parameters that range from 0 to 100 (Table 4 and Fig. 2).

3.3. Piper diagram,USSL diagram and Wilcox diagram

The Piper's Trilinear plot diagram [14] (Fig. 3) indicates the hydrochemical facies on the cation and anions of groundwater. The USSL diagram [15] (Fig. 4) and Wilcox diagram [8] (Fig. 5) have been used to indicate salinity and sodium hazard values, respectively.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary Materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2020.106315.

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