

Ground water Quality of Maharashtra

Introduction:

I wanted to work with data connected to my roots, focusing on the place where I grew up—Maharashtra, India. This topic is personal because I’ve seen the challenges caused by groundwater contamination in my community. Maharashtra relies heavily on its rivers and reservoirs for domestic and agricultural needs, but rapid urbanization, industrialization, and farming have impacted groundwater quality. Poor sewage treatment and unplanned industrial waste disposal have worsened the problem, leading to issues like salinity and high fluoride levels in some areas. While searching for data, I came across an official 2023 groundwater quality report for Maharashtra, which inspired me to explore this issue further.

Dataset:

unconfined aquifers:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
S.No.	District	Location	Latitude	Longitude	pH	EC µS/cm	TDS mg/l	TH	Ca	Mg	Na	K	CO	HCO	Cl	SO	NO	F	U µg/l	SAR	RSC
1	Ahmednag	Kokangaon	19.592	74.3	7.9	1315	842	465	80	64	88	1.6	0	519	121	62	18	0.53	2.02	1.78	-0.8
2	Ahmednag	Vadala Bh	19.433	74.9	7.55	1513	968	510	116	53	96	7.2	0	293	191	187	64	0.18	2.33	1.86	-5.4
3	Ahmednag	Ghotan	19.4	75.3	7.36	6611	4231	1900	349	250	380	450	0	757	1202	824	200	0.11	9.3	3.79	-25.6
4	Ahmednag	Bote	19.278	74.228	7.97	1276	817	425	76	57	88	2.1	0	305	103	80	200	0.31	1.12	1.85	-3.5
5	Ahmednag	Rajur	19.525	73.925	7.85	638	409	290	50	40	16	0.3	0	323	25	18	11	0.2	0.56	0.4	-0.5
6	Ahmednag	Sangamne	19.567	74.221	8.14	1810	1158	460	80	63	203	5	0	445	199	125	197	0.69	3.62	4.11	-1.9
7	Ahmednag	Ambikhal	19.35	74.175	8.02	951	609	250	50	30	105	0.8	0	378	60	53	39	0.54	1.57	2.87	1.2
8	Ahmednag	Rahata	19.717	74.483	7.63	3930	2515	1025	210	122	440	1.6	0	439	904	160	200	0.45	7.46	5.98	-13.3
9	Ahmednag	Dehre	19.233	74.667	8.08	517	331	190	60	10	28	1.1	0	207	50	16	3	0.24	0	0.87	-0.4
10	Ahmednag	Jakhanga	19.106	74.631	7.76	3735	2390	1230	210	171	297	6.1	0	360	397	890	80	0.59	7.96	3.68	-18.7
11	Ahmednag	Babhul	19.6	74.508	8.11	869	556	280	60	32	73	0.4	0	366	53	47	13	0.6	2.06	1.89	0.4
12	Ahmednag	Supe	18.96	74.539	7.78	2007	1284	470	80	66	223	9.6	0	421	245	141	198	1.25	3.5	4.47	-2.5
13	Ahmednag	Dahigaon	18.963	74.807	7.56	4286	2743	1000	200	122	336	330.3	0	366	525	924	200	0.45	9.87	4.61	-14
14	Ahmednag	Rakshi	19.356	75.317	8.12	784	502	280	60	32	44	6.4	0	293	57	63	17	0.56	0.16	1.15	-0.8
15	Ahmednag	Devlali	19.475	74.621	7.91	1940	1242	455	56	77	220	11.4	0	482	238	160	80	0.52	2.97	4.47	-1.2
16	Ahmednag	Malharva	19.383	74.582	7.82	740	474	240	40	34	59	2.4	0	244	78	46	14	0.69	0	1.65	-0.8
17	Ahmednag	Bambori	19.289	74.738	8.02	493	315	190	34	26	28	0.6	0	183	39	38	9	0.32	0	0.89	-0.8
18	Ahmednag	Sonai	19.396	74.821	7.89	675	432	245	50	29	37	1.1	0	287	43	31	10	0.29	0.26	1.02	-0.2
19	Ahmednag	Shirasgaon	19.55	75.101	7.99	924	591	280	60	32	79	4	0	244	110	106	9	0.26	0.07	2.06	-1.6
20	Ahmednag	Jamkhed	18.733	75.317	7.96	2296	1469	860	136	126	117	8.2	0	622	316	160	46	0.49	4.56	1.73	-7
21	Ahmednag	Chandana	19.483	74.2	7.77	1049	671	335	64	43	78	1.1	0	275	128	54	67	0.31	0.47	1.85	-2.2
22	Ahmednag	Bhitkewad	18.644	74.897	7.78	707	452	240	50	28	58	0.7	0	232	60	46	68	0.47	0	1.62	-1
23	Ahmednag	Pategaon	18.633	75.1	7.63	1438	920	345	40	60	149	25.4	0	366	216	95	18	0.59	0.09	3.5	-0.9
24	Ahmednag	Kolwadi	18.517	74.983	7.97	2742	1755	465	80	64	316	126.3	0	696	475	79	65	0.23	4.38	6.36	2.1
25	Ahmednag	Tambhol	19.517	74.253	8.25	273	175	125	26	15	6	0.6	0	73	46	9	4	0.1	0	0.23	-1.3
26	Ahmednag	Vadegaon	18.617	74.617	7.51	2068	1324	740	102	118	110	0.9	0	207	355	299	60	0.26	3.15	1.76	-11.4
27	Ahmednag	Takli-Dho	19.139	74.387	8.03	757	485	225	40	30	67	1.8	0	366	43	20	5	0.75	0	1.95	1.5
28	Ahmednag	Kokona-1	19.418	75.088	7.53	1965	1258	760	146	96	89	0.9	0	299	301	160	195	0.39	2.11	1.4	-10.3
29	Ahmednag	Chichondi	19.001	74.917	7.77	1298	831	405	70	56	96	1.8	0	281	188	120	20	0.37	0.55	2.08	-3.5
30	Ahmednag	Ghodegaon	19.355	74.873	8.18	839	537	225	40	30	86	0.8	0	305	60	75	7	0.44	0.56	2.48	0.5
31	Ahmednag	Loni-Prav	19.592	74.482	7.83	1386	887	460	82	62	99	0.6	0	354	195	109	35	0.35	2.15	2.01	-3.4

Confined/semiconfined aquifers

S.N	DISTRICT	Village	Well	Lat	Long	pH	EC	TDS mg/L	TH	Ca	Mg	Na	K	CO3	HCO	Cl	NO	SO	F	U	SAR	RSC	
1	Amravati	Chikhili	EW	21.51	77.126	7.2	508	325	195	34	27	38	1	0	323	14	20	0	0.62	0	1.18	1.37	
2	Amravati	Chikhili	EW	21.51	77.126	7.26	508	325	200	26	33	39	1	0	330	18	19	0	0.57	0	1.2	1.39	
3	Amravati	Chikhili	EW	21.51	77.126	7.26	507	324	195	20	35	39	1	0	323	21	15	0.6	0.64	0	1.22	1.41	
4	Amravati	Chikhili	EW	21.51	77.126	7.65	468	299	210	28	34	35	1	0	311	21	18	0.04	0.57	0	1.05	0.9	
5	Amravati	Bod	EW	21.531	76.992	7.56	662	424	250	96	2	34	0	0	330	32	23	14	1.03	0	0.94	0.39	
6	Bhandara	Station To	EW	21.344	80.405	7.46	898	575	185	48	16	118	10	0	244	25	116	119	0.35	ND	1.33	0.3	
7	Bhandara	Pawanar	Zone-1	21.534	79.709	7.68	769	492	250	52	29	49	7	0	165	113	20	71	1.15	ND	0.48	-2.3	
8	Buldhana	Shekapur	Pz-1	20.46	75.46	7.43	706	452	210	34	30	60	8	0	262	46	41	46	2.27	0.06	1.81	0.1	
9	Buldhana	Shekapur	Pz-2	20.46	75.46	7.63	733	469	145	36	13	97	4	0	189	85	19	71	5.35	BDL	3.52	0.2	
10	Buldhana	Warwand	Pz-3	20.51	76.279	7.14	1227	785	200	62	11	184	13	0	214	195	45	98	1.23	1.75	5.67	-0.5	
11	Buldhana	Chikhala	Pz	20.454	76.094	7.91	814	521	295	56	38	47	1	0	177	74	128	52	0.46	BDL	1.19	-3	
12	Buldhana	Chikhala	Pz	20.454	76.094	8.12	686	439	255	44	35	40	2	0	140	71	119	45	0.39	BDL	1.08	-2.8	
13	Buldhana	Mandapga	Pz	20.097	76.207	7.75	795	509	250	40	36	66	2	0	275	74	20	50	0.55	BDL	1.82	-0.5	
14	Buldhana	Chinchol	Pz	20.004	76.142	7.21	2405	1539	940	270	64	103	15	0	470	464	20	155	0.28	2.55	1.46	-11.1	
15	Buldhana	Daregaon	Pz	20.16	76.353	7.4	1154	739	410	82	50	69	2	0	439	89	45	62	0.29	1.82	1.48	-1	
16	Buldhana	Shindi	Pz	20.204	76.369	7.58	745	477	180	30	26	88	2	0	299	46	37	33	0.54	0.29	2.84	1.3	
17	Buldhana	Dhorve	Pz	20.083	76.318	7.49	618	396	190	40	22	49	3	0	256	25	45	29	0.22	2.16	1.54	0.4	
18	Buldhana	Rajpur	Pz	20.387	76.147	7.14	989	633	310	40	51	65	1	0	299	67	108	62	0.37	0.24	1.61	-1.3	
19	Buldhana	Chandol	Pz	20.333	76.011	7.27	997	638	190	20	34	109	10	0	268	121	35	52	1.8	0.2	3.44	0.6	
20	Buldhana	Jamb	Pz	20.316	75.948	7.25	1137	728	310	36	53	88	10	0	323	103	92	69	0.94	0.74	2.18	-0.87	
21	Buldhana	Rajpur	Pz	20.387	76.147	6.92	933	597	290	36	49	66	8	0	342	57	67	67.7	0.54	1.37	1.68	-0.23	
22	Buldhana	Baigaon B	Pz	20.147	76.282	7.39	658	421	135	14	24	84	2	0	360	18	3	20	0.83	0.4	3.16	3.2	
23	Buldhana	Wardhadi	Pz	19.888	76.263	7.46	1000	640	325	34	58	62	13	0	330	71	100	62	0.57	0.37	1.48	-1.1	
24	Buldhana	Jambora	Pz	19.955	76.276	7.34	1167	747	310	24	61	96	21	0	403	85	61	86	0.47	0.81	2.38	0.4	
25	Buldhana	Bhosa	Pz	19.866	76.162	7.47	2161	1383	645	76	111	102	28	0	305	206	354	138	0.68	2.17	1.74	-7.9	
26	Buldhana	Hiwarkhet	Pz	20.022	76.261	7.18	711	455	130	24	17	92	8	0	226	82	9	57	1.52	0.46	3.51	1.1	
27	Buldhana	Digras Kh	Pz	20.043	20.043	7.26	1584	1014	380	54	60	128	30	0	293	191	142	121	0.54	1.59	2.85	-2.8	
28	Buldhana	Kinggaon	Pz	20.022	76.261	7.11	637	407	140	34	13	78	2	0	232	57	28	43	0.43	0.66	2.87	1	
29	Buldhana	Chincholi	Pz	19.873	76.209	7.78	1060	678	270	34	45	96	17	0	311	99	81	80	0.75	1.96	2.54	-0.3	

Features :

Confined/semi- confined aquifers: 137 instancces

Unconfined aquifers : 1346 instances

- Electrical Conductivity (EC)
- Longitude
- Latitude
- Chloride (Cl)
- Fluoride (F)
- Nitrate (NO₃)
- Iron (Fe)
- Arsenic (As)
- Uranium (U)
- Total Hardness (as CaCO₃)
- TDS - Total Dissolved Solids and many more

Approach to the Project:

1. I have scraped the data from report. As it was pdf file, I have used Camelot library to extract the tabular data from PDF.
2. Combine both unconfined and confined datasets.
3. Add one more column for the types of aquifers – confined or unconfined
4. Analysis and insights of this using Power BI.

As of now thinking of including these trends and insights and analysis in dashboard.

I might change them or include more.

- Compare Aquifer Types
- spatial and temporal trends in groundwater quality
- Which aquifer type (confined or unconfined) has better groundwater quality?
- Which regions in Maharashtra face the most significant water quality challenges (e.g., high nitrate or fluoride)?
- Hotspot Identification

I would really appreciate your suggestions/comments.