Water Resource Management and Water Quality Analysis in Udgir: A Semiarid Region Perspective

Narkhede R. K.[1], Patwari J. M[2]

[1, 2]Department of Environmental Science, Maharashtra Udayagiri, MahavidyalayaUdgir
rajunarkhede[at]gmail.com, patwarijay[at]gmail.com

Abstract: *This article focuses on the water resource dynamics and quality assessment in Udgir, a region characterized by a semiarid climate with an annual precipitation of 700 mm. Groundwater and surface water bodies play a vital role in catering to domestic, irrigation, and drinking needs due to the absence of perennial rivers. The study highlights the significance of underground and surface water sources, particularly lake Banshelki, situated 7 km from Udgir. With agriculture as the primary income source in the area, concerns regarding atmospheric runoff leading to sediment deposition and agricultural residue runoff into the lake are explored. The research identifies four sampling sites and conducts a year - long monthly analysis of iron levels using Atomic Absorption Spectrophotometry, shedding light on water quality trends.*

Keywords: Water resource management, semiarid climate, groundwater, surface water, water quality analysis

1. Introduction

According to the statistics of WHO reports, In India about 36% of Urban and 65% of rural area are without access to safe drinking water[1]. Fresh water is becoming most important resource for the survival of the living system on the Earth. It is even more important for the human being as they depend upon it for food production, industrial and waste disposal, as well as cultural requirements[2] Water quality is influenced by natural and anthropogenic effects including local climate, geology, and irrigation practices.

The quality of water is of uttermost important to quantity in any water supply planning. The chemical character of any groundwater determines its quality and utilization. The quality is a function of the physical, chemical, and biological parameters and could be subjective, since it depends on a particular intended use[3]

Prolonged discharge of industrial effluents, domestic sewage and solid waste dump causes the ground water to become polluted and created health problems. Contamination of ground water can result in poor drinking water quality, loss of water supply, high clean - up costs, high costs for alternative water supplies, and/or potential health problems[4] Ground water monitoring of dug wells and bore wells is one of the most important tools for evaluating the quality of ground water. Hence the present study has been undertaken to know about the status of ground water quality in Udgir.

2. Study Area

Udgir is one of the important taluka in the Latur district as it is situated in the boundaries of Telangana and Karnataka state. Udgir has the population of 3.10 lakhs. The main source of drinking water in this region is only ground water. Just now the pipeline has been done from Manyad river to Udgir. Then also the demand of water is increasing. Udgir is home to the historical Udgir Fort. The town and nearby villages rely mainly on agriculture, which serves as a major source of income for the population[5].
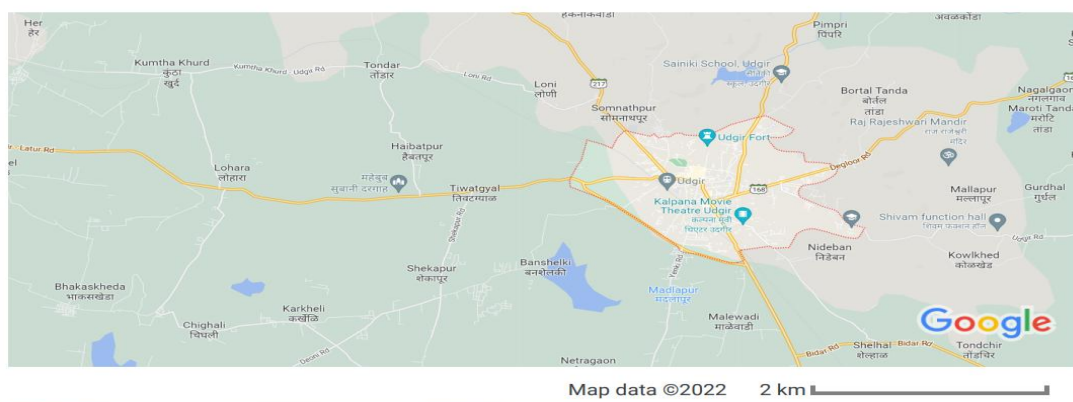
Sampling Stations: - S1 - Renuka Nagar, S2 NagsenBudhVihar S3 - Uday Petrol Pump S4 - Sanjay Gandhi Urdu Primary School, S5 - DabirPura S6 - Indai Colony S7 - Chaubara, S7 Khadkali, S8 Yerme Nagar S9 - Uppar Bowdi Nagar, S - 10 - Vikas nagar S11 - Vikas Nagar, S12 - Kher Nagar S13 - Venkatesh Nagar, S14 - Samta Nagar, S15 - Yeshwant Colony S16 - Santoshi Mata Nagar.

3. Methodology

Water samples were collected in cleaned borosilicate bottle washed with acetone during January 2021 to December 2021 at selected sampling sites (Hand pump) between 10.00 to 11.30 a. m. at different depths. All the parameters were assessed by using the standard methods provided by American Public Health Association (APHA) [6].

Tables and Graphs

Table 1: Pre - Monsoon (February March April May 2021 - 22)

Parameter	Sampling Points															
	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	S_{16}
pH	7.3	7.4	7.3	7.4	7.3	7.2	7.2	7.3	7.2	7.3	7.1	7.3	7.3	7.3	7.3	7.3
TDS	200	220	300	321	257	258	261	267	269	264	263	251	220	230	213	224
Hardness	310	321	314	320	311	310	295	298	291	290	296	331	341	356	352	310
Calcium	34	33	35	37	41	36	34	38	32	34	36	46	47	59	61	57
Magnesium	10	12	11	16	14	17	13	16	23	24	25	25	26	25	27	24
Chloride	140	141	132	128	152	163	154	132	143	125	132	164	156	154	149	159
Sulphate	105	108	110	159	140	120	110	150	140	120	127	132	135	156	167	140
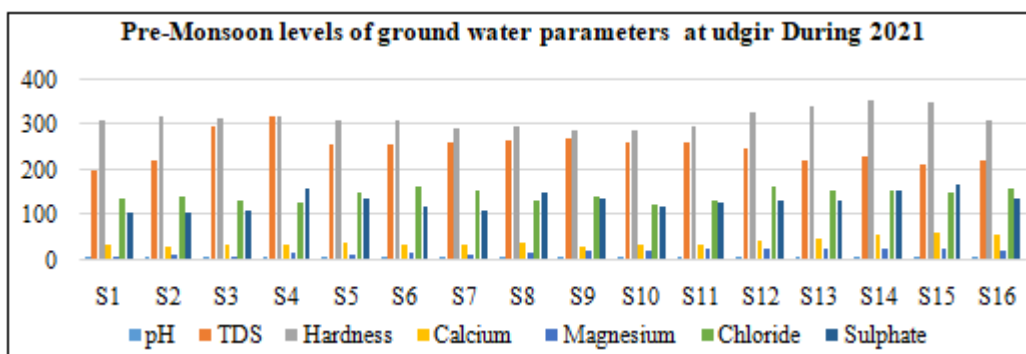
Figure 1

Post Monsoon (October November December January 2021 - 22)

Table 2

| Parameter	Sampling Points															
	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	S_{16}
pH	7.2	7.3	7.4	7.3	7.3	7.2	7.2	7.2	7.3	7.2	7.2	7.1	7.3	7.2	7.3	7.3
TDS	150	152	143	146	142	142	120	153	154	161	167	162	159	157	158	161
Hardness	210	211	214	195	196	146	189	195	196	197	206	214	216	217	210	211
Calcium	21	24	29	24	27	23	21	23	24	26	27	29	24	25	24	23
Magnesium	13	17	16	18	19	11	12	16	15	17	19	12	14	13	16	15
Chloride	109	111	105	108	109	108	125	135	145	164	167	158	159	167	162	169
Sulphate	79	77	78	73	81	82	85	86	87	89	91	92	93	90	91	90
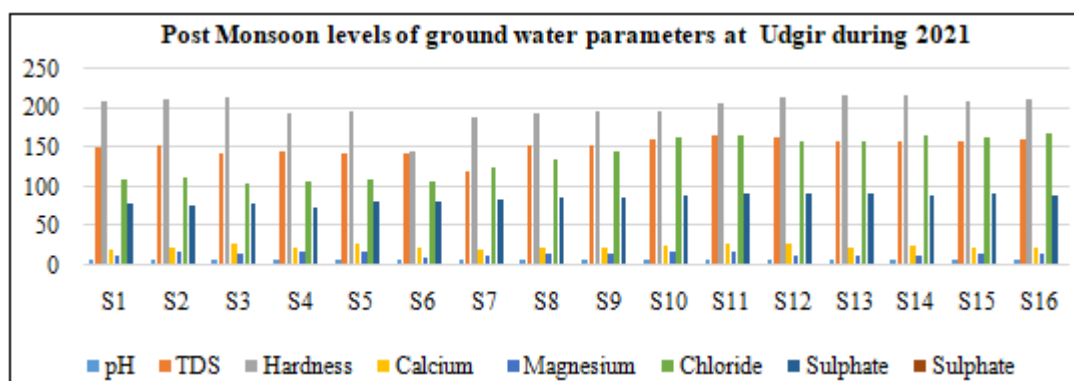
Figure 2

4. Results and Discussion

In the present study the levels of pHwere observed maximum at sampling station S_2 it was 7.4 and minimum was observed at S_{11} it was 7.1. TDS was observed highest in the sampling station S_4 it was 321mg/l and lowest at S_1 it was 200mg/l. The hardness was found highest at S_{14} it was 356 mg/L and lowest at S_{10} it was 290 mg/l. the amount of calcium was found maximum at S_{15} it was 61 mg/l and minimum was at S_9 32mg/l. The levels of magnesium were

Volume 12 Issue 8, August 2023

observed highest at S_{15} it was 27 mg/L and lowest at S_1 10mg/l. The levels of Chloride were maximum at S_{12} it was 164 mg/l and minimum at S_4 128mg/l. Levels of Sulphate was found highest at S_{15} it was 167 mg/l and lowest at $S_1$105mg/l. in pre monsoon season.

In Post monsoon the levels of pH were observed maximum at sampling station S_3 it was 7.4 and minimum at S_{13} it was 7.1. The amount of TDS was found highest at S_{11} it was 167 mg/l and lowest at S_6 it was 142mg/L. the levels of hardness was observed at S_{14} it was 217mg/l and at S_6 146mg/l. The calcium was observed maximum of 29 to minimum of 21 mg/l at S_{12} and S_1. The Magnesium range was highest as 18 to lowest as 11mg/l at S_4 and S_6. The levels of chlorides was found maximum at S 16 it was 169 mg/L and minimum at $S_1$109mg/L. The amount of Sulphate was observed as highest at S_{12} as 92 mg/l and lowest at S_4 73 mg/L. Simillar results were found by the Umesh and Swati Saxena[7] AparnaBoravake et. al [8]PawarVijaykumar B., KshamaKhobragade[9]Absar Siddiqui et al [10]

5. Conclusion

In Present study it was concluded that the levels of hardness were more than permissible limits in all sampling stations. From that point of view, the water is not suitable for drinking without treatment for the hardness.

References

[1] N. Sexenal and S. N. Mishra, J. Chem. Pharma. Res., 3 (2), 162 - 167 (2011).

[2] Agarwal and C. Sharma, State India Freshwater, A Citizen Report Centre for Science and Environment, New Delhi (1982).

[3] Anita Joshi and Gita Seth, Environ Monit Assess, 2011, 174, 547 - 554.

[4] B Nas and A Berktay, Journal of Environmental Management, 2006, 79, 30 - 37.

[5] http: //censusindia. gov. in/2011 - prov - results/paper2/data_files/India2/Table_2_PR_Cities_1 Lakh_and_Above.

[6] Standard Methods for Examination of Water and Waste Water 20 th Edition by American Public Health Association Washington USA

[7] UmeshSaxena and Swati Saxena, Suresh Co rrelation study on Physico chemical parameters and quality assessment of Ground water of BassiTahasil of Dist. Jaipur Rajasthan. India, GyanVihar University International Journal of Environment, Science and Technology Volume 1, Issue 1, 2015, pp.78 - 91 ISSN: 2394 - 9570

[8] AparnaBorawake, V. B. Gaikwad, SuchetaPatil, KamraAnjana Assessment of Ground Water Quality of Pathardi Region of Nashik, Maharashtra, India International Journal of Science and Research (IJSR) ISSN (Online): 2319 - 7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

[9] PawarVijaykumar B., KshamaKhobragade A Study on Ground water Pollution Levels in Aurangabad City of Maharashtra India.2018 JETIR February 2018, Volume 5, Issue

[10] Absar Siddiqui, Deepali Kulkarni, V. S. Sohoni and S. S Thorat

[11] Analysis of Groundwater quality in Pune City.