

A STUDY ON GROUND WATER POLLUTION LEVELS IN AURANGABAD CITY OF MAHARASHTRA, INDIA

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Abstract: Water is the one of the important component of the environment, which is also called as Hydrosphere. It includes sea, rivers, oceans, lakes, ponds, streams etc. Hydrosphere covers over 75% of the earth's surface either as oceans or as fresh water. In India all 14 rivers and their tributaries are have been polluted. Nearly 70% of water is polluted due to the rapid Industrialization and domestic sewage etc. Water is an essential ingredient of animal and plant life. Human culture and civilization are vitally linked with water resources.

The causes of water pollution could be Municipal, Agricultural and Industrial. This has resulted in the decreases in the quality of drinking water available. Monitoring of water quality levels is thus important to assess the potential risk to the environment.

Introduction:

Water is liquid of life and very important requirement of industrial as well as daily life. It is used directly or indirectly by Industrial plants. But due to some physical impurities like odour, colour and taste water is suitable for one industry may not be so for other industry. There are two sources of water i.e. Surface water and Underground water. The domestic and industrial wastes not only affect water body but also exert an impact on Physico chemistry of ground water, there fore continuous monitoring of water is necessary particularly in Industrial areas (Saluja, 2008)

The aim of present study is to analyze the Physico-chemical characteristics of underground waters of industrial area of Aurangabad city (M.S.)

Locations of sampling points:

Aurangabad is one of the metropolitan cities of India. The location co-ordinates for Aurangabad are N 19° 53' 47" - E 75° 23' 54". It is located 512 meters above sea level. The city is surrounded by hills on all sides. Annual temperature in Aurangabad range from 9 to 40 °C. The highest maximum temperature ever recorded at Aurangabad was 46 °C (114 °F) on 25 May 1905. The lowest record temperature was 2 °C (36 °F) on 2 February 1911. Most of the rainfall occurs in the monsoons season (June to September). Rainfall in Aurangabad varies from 9.0 to 693 mm/month. Average annual rainfall is 725 mm. The area consists of various industries like Chemicals, Pharmaceutical drug and Distilleries, Oil refineries, Fertilizer plants, Pulp and paper, steel etc.

Four sampling stations were selected to monitor the ground water pollution levels in the region. Sampling station 'S1' is at Salim Ali Lake (Sarover) in Aurangabad north region where domestic waste directly discharged which shows Water pollution. Sampling station 'S2' is at Aurangpura in central region of Aurangabad. Which has crowded area, where domestic waste and sewage directly released in sewer from which polluted water get percolated in soil and ground water get polluted, Sampling station 'S3' is at CIDCO in East region of Aurangabad city which has well developed and arranged area of Aurangabad city, 'S4' is at Railway station south region of Aurangpura city. Where small scale industries are regulating in MIDC area so industrial waste water shows ground water pollution.

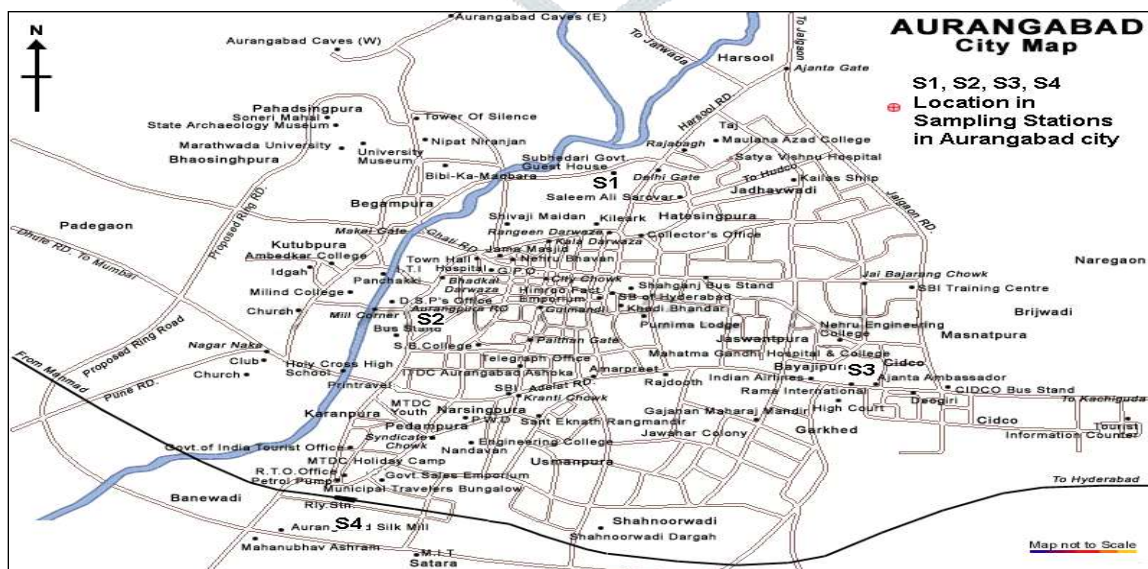


Figure 01:- Water sample collection and Analysis

Water samples were collected at monthly intervals from all the four sampling stations between March-2017 to February-2018. The samples were collected three times during each collection. Each of the samples was brought to the analytical lab and was analyzed for various parameters by standard methods. The result obtained were statistically analyzed using statistical package for social sciences.

Water samples are collected from 15 numbers of selected Bore wells as well as of open well in sterilized bottles (Kudesia, 1985) of one liter capacity during March-2017 to February-2018. Water samples were collected in morning at 8.00 A.M. to 11.00 A.M. Sampling has been carried out without adding any preservative in rinsed bottles directly for avoiding any contamination and brought to the laboratory. Only high pure chemicals and double distilled water used for preparing solutions for analysis. Bacteriological examination was done using standard procedure suggested by Trivedy and Goel (1984) and manual of APHA (1989)

Materials and Methods:

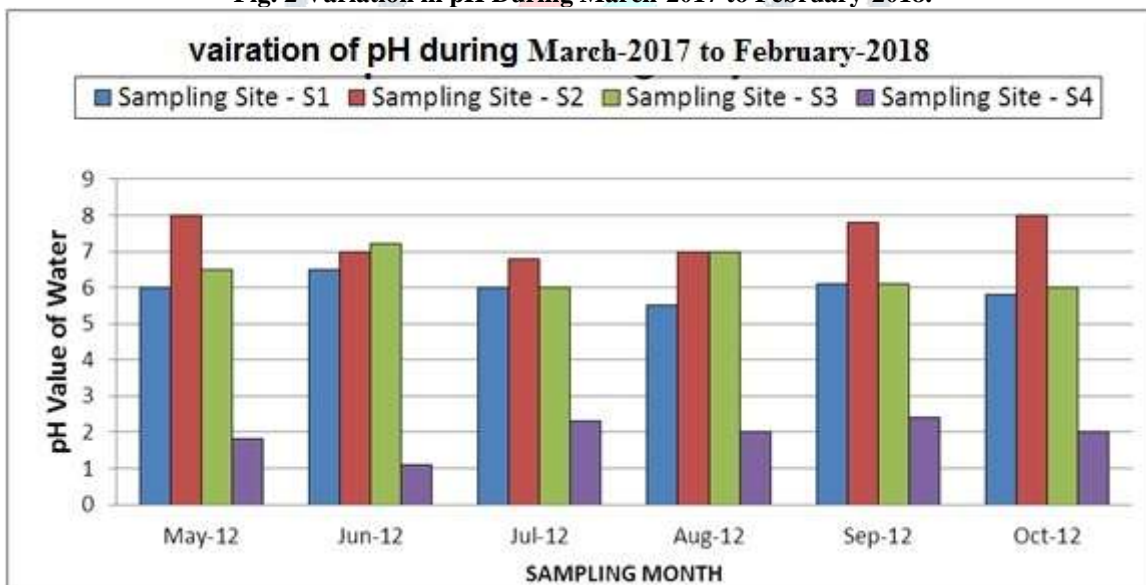
Water samples were collected in two liter plastic cans. Before sampling, the plastic cans were cleaned thoroughly to remove all surface contamination and to reduce many evaporation loss during storage. Water samples were collected from tube wells at four different sites during March-2017 the samples were named as S1, S2, S3 and S4. The measurement pH, Colour, Odour, Taste and Temperature were made at the sampling stations immediately after collecting sample. However for Physico-chemical analysis standard methods of APHA (1985) were followed.

Result and Discussions:

The results of the analysis carried on water samples from the four sampling stations are summarized in Table 1. Minimum, Mean and Maximum values of water quality parameters measured for sampling stations S1 to S4 are given in the Table 1.

pH is a measure of acidity or alkalinity and measures the concentration H^+ ion in solution. The pH of water samples from station S1, S2, S3 have remained in the slightly alkaline range during summer season. These values however have moved to the slightly acidic range during monsoon months. This could be due to the increased SO_x and NO_x gases in the atmosphere and the associated acidic deposition during monsoon. The water samples from the S4 site exhibited pH values in the highly acidic range of 1.57 - 2.42. Untreated acidic effluents discharged from industrial effluents could be responsible for these values. These acidic pH values are of concern that effluents could cause serious damage to the vegetation in the vicinity of the sampling point.

Fig. 2 Variation in pH During March-2017 to February-2018.



The recommended value of D.O. in normal drinking water is 8 ppm while the saturated value of DO is 14 ppm (Mitra, 1982). The values of D.O. measured at all the four sampling station are much below the accepted limit which is again as an indicator of the high degree of pollution. Such observations supported the established reverse impact of high temperature and solubility of gases in water. (Thakare *et.al.* 2009)

High B.O.D. and C.O.D. values are observed for stations S2 and S3. The high B.O.D. value and C.O.D. value water samples from S3 is of serious concern as this point is being used as a source of drinking water. Though there is no fixed guideline for B.O.D., C.O.D. values for drinking water quality (W.H.O.2004)

References:

- [1] Charu, P., Savita, D. and Rajnish Shrivastava, 2006. "Seasonal Variation in the Physico-Chemical characteristics in upper lake of Bhopal" *Asian Journal Experiment Science*, 20(2) 297-302.
- [2] Chakrabarthy, R. D., Ray, P., and Singh, S. B. 1959 "A quantitative study of the plankton and the Physico-chemical condition of the river Jamuna at Allahabad in 1954-1955". *Indian Journal of Fish*, 6 (1):186-203

- [3] Rai, H. 1974a. "Limnological studies on the Yamuna at Delhi, India Part-I. Relation between the chemistry and the state of pollution in the river Yamuna" *Arch.Hydbiology*.73(3) :369-393.
- [4] Saluja D. S., 2008, "Physico-chemical cauterization and quality determination of underground water in Koshmi industrial area of Betul city, (M.P.), India
- [5] Singh, J. P., Yadav, P. K., Sakun, Prasad, S. C. (1991), "BOD contamination in kali at Sadhu Ashram in Aligrah", *Indian Journal Environ Prot.* 11 (5):325-326.
- [6] Thakare, B.G., Pawar V.B., Nitin Padwal (2009), "Physico Chemical characteristics of
- [7] Siddheshwar Reservoir, Dist. Hingoli (M.S.)", *Life Science Bulletin.* 6 (3):343-345.
- [8] Trivedy and Goel (1984) and manual of APHA (1989)

Table No.1 Physico-chemical parameters of underground waters in Industrial area Aurangabad city (M.S.)

Sr. No.	Parameters	Unit	WHO Standard Values		SAMPLING STATIONS			
			Maximum	Minimum	S1	S2	S3	S4
1	Colour	-	-	-	Colourless	Colourless	Colourless	Colourless
2	Odour	NA	NA	Odourless	Odourless	Odourless	Odourless	Odourless
3	Taste	-	NA	NA	Plesent	Plesent	Plesent	Plesent
4	Temperature	C	NA	NA	18.0	18.1	18.2	18.1
5	TDS	mg/L	500	NA	554	561	574	569
6	Total Alkalinity	mg/L	200	600	213	192	186	189
7	pH	-	7.0-8.5	6.5-9.2	7.8	7.5	6.9	7.2
8	Ca-Hardness	mg/L	75	200	170.38	179.31	190.1	187.74
9	Mg-Hardness	mg/L	50	150	71.12	71.84	72.15	71.76
10	Total Hardness	mg/L	200	600	241.50	251.15	262.25	265.50
11	Chlorides	mg/L	250	1000	261.1	265.4	268.2	265.3
12	DO	mg/L	-	-	3.3	3.6	3.1	3.7
13	BOD	mg/L	-	-	210.1	214.3	221.6	215.6
14	COD	mg/L	-	-	7.8	8.1	8.4	8.3

* World Health Organization (WHO) Standards, N.A. – Not Available