

HYDRO-CHEMICAL MONITORING OF DRINKING WATER IN KADI RIVER AT NIMGAON CHOBA PROJECT IN BEED DIST.(M.S) INDIA

S M Dhonde¹ and G B Kulkarni

¹Shriram Jr.College, Kada, Tal-Ashti, Dist. Beed (M.S)
Dept.Of Chemistry'Madhu Malancha Govt. Degree College Bodhan (Nizamabad)

ABSTRACT

The water quality of Nimgaon-choba project at Ashti Taluka in Beed District was analyzed to assess their suitability for drinking and domestic. The sampling was done seasonally and the study was divided into four seasons i.e. winter, summer, pre-monsoon, and post-monsoon. The physico-chemical parameters were compared with standard values, recommended by Indian Council of Medical Research, the Bureau of Indian Standard and the World Health Organization. With few exceptions all the parameters were within the permissible limit as per the WHO and ISI. The parameters like Dissolved Oxygen and pH observed in summer were objectionable regarding quality criteria..

Keywords: Hydrochemical Monitoring, fluorides, Nitrated, Phosphates, parameters, WHO, ISI, ICMR Criteria

INTRODUCTION

Global Literature survey reveals that 70% of earth surface is covered by the water. Although it is surprising but in spite of such abundance of water, there is shortage of pure fresh water in the world because more than 97.3% of water is marine, which is unsuitable for human use. Only 2.7% of the total waters in the rivers, lakes swamps, damp, and tanks are fresh and soft water which is suitable for human consumption and other uses. It has been also estimated that out of total fresh water 77.6% is in the form of 'cold storage' frozen in ice caps and glaciers. Most of the remaining supplies of fresh water 22.4% are ground water and soil moisture. Near about 0.35% of fresh water is contained in lakes and swamps and less than 0.01% in rivers and streams.

It has been also estimated that only 0.00192% of the total water on the earth is useful for human consumption (Trivedy, 1998). Hence for highlighting the issue UNGA (United Nations General Assembly) celebrated the decade 1981-1990 as "International Drinking Water Supply and Sanitation Decade".

MATERIALS AND METHODS

The paper work carried out with sample collected from Kadi River at Nimgaon choba project at Kada early in the morning between 8:30 to 10:00 am in each season from October 2009 to September 2010. The samples were collected .One spot was selected site for sampling. The samples were analysed with respect to parameteric variation by analyzing method.

With the help of mercury thermometer of 0°C least count, the temperature was recorded in

degree Celsius (°C). Trivedy and Goel (1984) pH values were measured in the field with the help of portable digital pH meter (Hanna made). Standard buffer solutions were used for calibration. Conductivity of water is generally measured with the help of a conductivity meter which contains conductivity cell containing electrodes of coated with platinum black or carbon.The total dissolved solids were estimated by gravimetric method in mg/lit.Trivedy and Goel 1984.Dissolved oxygen was determined by modified Winkler's method (Trivedy and Goel 1984). It was determined by titrometrically by using 0.05 N NaOH (Sodium Hydroxide) titrant and phenolphthalein as a indicator Trivedy and Goel 1984).Total alkalinity was calculated by formula,given by (Trivedy and Goel 1984). Phosphate was estimated by spectrophotometrically, readings were taken on spectrophotometer at 690 nm after five minutes (Trivedy and Goel). Chlorides were calculated by using method and formula, (Trivedy and Goel 1984).The values of nitrate were estimated by spectrophotometrically at 410 nm methods. The values of nitrate were calculated with calibration curve. Results were expressed as mg / lit (Trivedy and Goel).

RESULTS AND DISCUSSION

The physico-chemical properties of water play an important role in the circulation of material and growth of microorganisms. Therefore, the physico chemical analysis of water is most important aspect to determine the quality of lentic water ecosystems for its best uses to human and animal consumption, agricultural purpose and plants.

Properties of water body related with physico-chemical nature reveals much about the metabolic and physical characteristics of the aquatic ecosystems. These also explore the hydro – biological and ecological inter relationship.

The temperature was varied in different season as in winter minimum temperature was recorded i.e. 18.9 °C and maximum 21.5°C. But in summer they were increased the maximum temperature was 28°C and minimum was 21.8°C. In pre–monsoon temperature was minimum 23.4°C and maximum 26.5°C. In post–monsoon it was maximum 24.3°C and minimum 23.2°C. Hence the average temperature of seasonal variation in drinking water is minimum in winter season (20.2°C) and there was increased in summer season average value was 24.9°C. But it was slightly change in pre– monsoon average value was 24.95°C. But in post–monsoon it shows average temperature 23.75°C. The drinking water supplies from the Kadi project at Neemgaonchobha dam Dist- Beed.

The seasonal variation in Hydrogen ion concentration pH of drinking water sampling from Kadi project at Neemgaonchobha was recorded in winter. It was minimum 8.0 and maximum 8.4. In summer season due to evaporation rate is highest

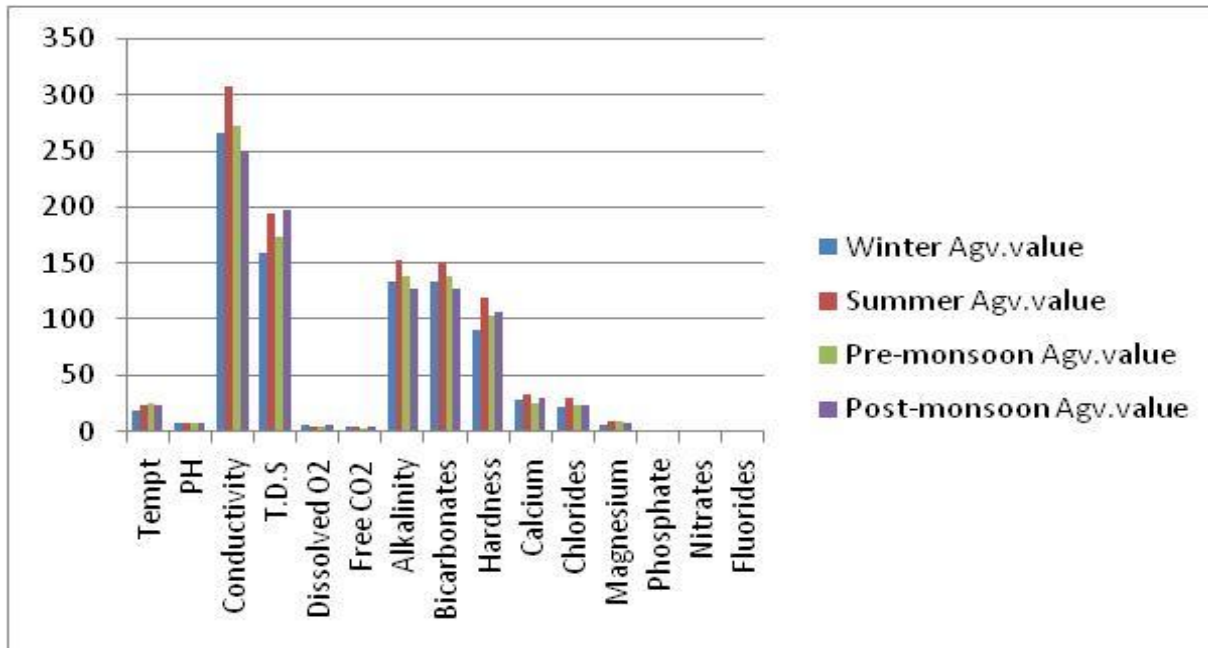
so the pH was slightly increased at maximum level up to 8.6 and minimum 8. But in pre-monsoon it was mini-7.4 and maxi-8.2. In post-monsoon it was minimum at 8.1 and maximum it was 8.2. The average value of seasonal variation in pH in different season as in winter average pH was 8.20, while in summer it was 8.40. In pre-monsoon pH were 8.0, while in post–monsoon it was 8.15. So the average pH values of various seasons were recorded and determine. They doesn't show maximum fluctuation in pH values which was recorded during the experiential period.

The specific conductivity of water from Kadi project at Neemgaonchobha was studied and recorded in different season as it was in winter season minimum specific conductivity was 255 and maximum 280 maximum 258 while in summer it was increased minimum 283 and maximum 323 maximum 258. But in the pre–monsoon they were decreased i.e. minimum 278 and maximum 288. But in post- monsoon it shows specific conductivity of drinking water was minimum 255 and maximum 270. The average value of seasonal variation in specific conductivity of water was in winter it shows 267.5 in summer it was 303. In pre-monsoon it was 283 and post –monsoon it was 262.5 as recorded during the study period.

Table 1: Agv.value in different season at Nimgaon Chobha project, Kada Taq.Ashti Dist-Beed.(M.S) India.

Sr.No	Containts	Winter	Summer	Pre-monsoon	Post-monsoon
	Parameters	Agv.value	Agv.value	Agv.value	Agv.value
1	Tempt	20.2	24.9	24.95	23.75
2	PH	8.2	8.4	8	8.15
3	Conductivity	266.5	308	273.5	251.50
4	T.D.S	160.5	195	175	198.50
5	Dissolved O2	6.5	4.9	5.3	5.90
6	Free CO2	4.775	4.4	4.02	4.80
7	Alkalinity	134.5	153.5	139	127.50
8	Bicarbonates	134.5	152.5	139	127.50
9	Hardness	91.5	120.5	104.5	107.00
10	Calcium	28.815	33.64	26.2	30.48
11	Chlorides	22.6	30.82	24.61	24.85
12	Magnesium	6.33	9.27	9.545	8.53
13	Phosphate	0.38	0.23	0.36	0.30
14	Nitrates	0.25	0.15	0.18	0.26
15	Fluorides	0.6	0.75	0.65	0.7

Fig.1: parametric variation in different season at Nimgaon Chobha project, Kada Taq.Ashti Dist-Beed (MS) India



The dissolved oxygen contained at minimum level it was 5.6 and maximum level 7.6. In summer the dissolved oxygen at minimum 3.2 and maximum was 6.6 while in pre-monsoon it was minimum 3.5 and maximum 7.1 and in post monsoon it was minimum 4.5 and maximum 7.3. The average of an dissolved oxygen in different season was varied like in winter it shows 6.5 And in summer it was 4.9 while dissolved oxygen in pre-monsoon was recorded as 5.3 And in post-monsoon 5.9 was recorded in present investigation.

Shows seasonal changes i.e. in winter free CO₂ was minimum 3.85 and maximum 5.7. But in summer it was minimum 2.9 and maximum 5.8. And in pre-monsoon season free CO₂ as minimum 3.7 and maximum 4.3. It was reduced the free CO₂ in post-monsoon, the minimum 4.1 and maximum 5.5. The average values of free CO₂ in different season like in winter 4.77, the summer 4.4 and in pre-monsoon 4.02. While in post-monsoon season 4.80 was recorded during the study period.

The alkaline nature of drinking water was recorded in study period in the form of total alkalinity in different season from Kadi project at Neemgaonchobha. In winter season it was minimum 119 and maximum 150. In summer season it was minimum 147 and maximum 160. While in pre-monsoon it was 133 and maximum 145. The total alkalinity was decreased in post-monsoon that was minimum 127 and maximum 128. The average values of total alkalinity from

different season varied, like in winter 134.5, in summer 153.5, pre-monsoon 145, and post-monsoon it was 127.5 recorded during the experimental work.

The bicarbonates were recorded from different seasons like in winter minimum 199 and maximum 150. In summer season minimum 145 and maximum 160. During pre-monsoon bicarbonates was minimum 133 and maximum 145. While in post-monsoon it was recorded minimum 127 and maximum 127. The average values of bicarbonates in different season during winter it shows 134.5, in summer 152.5, in pre-monsoon 139 and in post-monsoon it was 127.5 recorded during study period

In winter the total hardness of water was minimum 74 and maximum 109. In summer season the hardness of water was minimum 119 and maximum 122 while the hardness of drinking water in pre-monsoon season it was decreased and shows 97 and maximum 112. In the post-monsoon the hardness of drinking water was minimum 99 and maximum 115 was observed. The average value of total hardness at different season shows 91.5, in summer season it was 120.5, in pre-monsoon water hardness was 104.5. During the post monsoon it was increased and riches up to 107 during the study period.

The calcium the seasonal changes like in winter season it was minimum 23.20 and maximum 34.44. In summer season it was minimum 28.05 and maximum 39.22.

Pre-monsoon season it was minimum 26.00 and maximum was recorded up to 26.40. During post-monsoon season it was recorded at minimum i.e. 27.25 and maximum 33.7. The average value of calcium content in different season from drinking water, in winter it shows 28.81 and in summer season it shows 33.64, in pre-monsoon it was recorded 26.2 and in post-monsoon season it was 30.85 was recorded during the study period.

The chloride content indicates the chlorinity of drinking water was minimum 17.8 and maximum 27.4. In summer season it was minimum 27.98 and maximum 33.66, while in pre-monsoon it was minimum 23.56 and maximum 25.66. And in post monsoon the chloride content was observed 22.72 and maximum 26.98. The average value of chloride content in drinking water show seasonal changes in chlorinity that is in winter 22.6, in summer 30.82, it was highest in pre monsoon i.e. 26.2. The average of chloride in post-monsoon season was 24.85 was recorded in study period.

The magnesium hardness shows minimum 5.30 and maximum 7.36. In summer season it was minimum up to 6.33 and maximum up to 12.20. During the period of pre-monsoon it was minimum 9.25 and maximum 9.84. It shows significant variations in post monsoon minimum 8.28 and maximum 8.77. The average value of magnesium hardness was recorded in different season like in winter 6.33, in summer 9.27, pre-monsoon 9.54, and it was recorded in post-monsoon up to 8.53.

The phosphate is one of the vital constituent found in drinking water shows minimum up to 0.34 and maximum 0.42. In summer season it was minimum 0.12 and maximum 0.34. While in pre-monsoon it was minimum 0.30 and maximum 0.42 the content in post monsoon was minimum 0.22 and maximum 0.38. The average phosphate content in drinking water shows seasonal changes. The average phosphate content in winter season was 0.38, in summer season it was 0.23, in pre-monsoon 0.36 and in post-monsoon the average phosphate

content was 0.30 was recorded during the study period.

The nitrates indicate the acidic nature of drinking water as in winter season it was minimum 0.15 and maximum 0.35. In summer it was minimum as 0.08 and maximum 0.22. During the period of pre-monsoon the content was minimum as 0.14 and maximum was 0.22 while in post-monsoon it was minimum 0.30 and maximum 0.22. The average content of nitrates from different seasons like in winter season it was 0.25 and summer season 0.15 but in pre monsoon it was 0.18 and in the post season it was 0.26 are these average value of nitrate content was recorded during the study period.

The fluoride shows seasonal variation like in winter it was minimum 0.3 and maximum 0.9. In summer season the fluoride was minimum 0.3 and maximum 1.2. It was also shows in pre monsoon minimum 0.2 and maximum 1.1 and in the post monsoon season fluoride content in drinking water was minimum 0.4 and maximum 1.0. The average fluoride content in the drinking water shows seasonal changes like in winter 0.6, in summer season it was 0.75 and pre-monsoon 0.65 and in post-monsoon 0.7 was recorded in experimental investigation.

The present paper helps to understand the effect of different physico-chemical parameters and their integrations among themselves in deciding the final biotic and abiotic environment of the water bodies.

In the present work water temperature, pH, Conductivity, TDS, Dissolved oxygen, Free CO₂, Total alkalinity, Carbonates, Bicarbonates, Total hardness, Calcium, Magnesium, Chlorides, Nitrates, Phosphates and Fluoride were studied for one year data. Beside these diversity and density level studied for one year from sampling sites decided for physico-chemical parameters studies. In the following discussion all the parameters are expressed in mg/lit, except the pH, temperature (°C) and conductivity (micro Mhos/cm) during the study period.

LITERATURE CITED

- Ahmed ALM, Sulaiman WN, Osman MM, Sayeed EM and Mohamed YA, 2000.** Groundwater quality in Khartoum state, Sudan. *J. Env. Hydrology*, **8**:67-73
- Ansari MA, 1993.** *Hydrological studies of Godavari water at Nanded*. Ph. D. thesis, Marathwada, Indian End. And Cons., **5**(2): 141-193.
- APHA, 1985.** American Public Health Association, Standards Methods for Examination of Water and Waste Water.
- Bharat Mani and SA Gaikwad, 1998.** Physico-chemical characteristics of Lake Pokharan. *Indian J. Environ. And Toxicology.*, **8**(2):56-58

Chavan RJ, AD Mohekar, RJ Savant and MB Tat, 2005. Seasonal variations of biotic factors of Manjara project water reservoir in district Beed, Maharashtra, India. *J. Poll Res.* **24**(23): 705 -708.

Goel PK, Trivedy RK and Bhave, 1985. Studies on the Limnology of few freshwater bodies in Southern Maharashtra. *Indian Jr. of Env. Port.* **5**(1): 19-25.

ICMR, 1975. Indian Council for Medical research manual of standard of quality of drinking water supplies. 2nd ed. Special reported series no 44, N. Delhi.

ISI, 1992. Indian standards drinking water specification (First Ed.) is 10500:1991 Bureau of Indian standard, New Delhi.

Kodarkar MS. 1998. Methodology for water analysis (physico-chemical, Biological and Microbial). IAAB Publication Hyderabad.

Trivedy RK and PK Goel, 1984. *Practical Methods in Ecology and Environmental Science.* By – Environ-media publications Karad. P-69- 85).

Ubale MB and SR Dhuley, 2000. Analytical Studies a Ground water Quality in Aurangabad Industrial Area Part-1, Environ. Issues Sust.Development. P.95-96

WHO. 1984. Guide-lines for drinking water quality Vol. I Recommondations 6th World Health Organization Geneva.