



Research Article

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Assessment of physico chemical parameters of well water from Waluj area near Aurangabad city of Maharashtra

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ABSTRACT

The water quality assessment of water from Waluj Well Water has been reported. In this paper atmospheric temperature, water temperature, humidity, rainfall, pH, acidity, alkalinity D. O, total nitrogen, sulphate, phosphates, chlorides total solids etc is monitored for two years 2010-2011, & 2011-2012 The seasonal variation in these physico-chemical parameters has been discussed.

INTRODUCTION

Monitoring the water ponds is essential, in order to find out the pollution status of the water bodies, The water from Waluj Well Water is used for domestic purpose by the rural people. The physico chemical parameters are also important because different aquatic species relates with the physicochemical parameters of the water bodies. Some parameters are required for the healthy growth, whereas some of the parameters adversely affect the growth of the aquatic species.

There are various papers appeared which monitored physico-chemical parameters from marathwada region[1-7] but very less or almost no work has been reported regarding water quality of Waluj Well Water surface water.

It is perennial source of water situated in a farm at Waluj near Aurangabad.

EXPERIMENTAL SECTION

Water samples were collected from about 15 Cm, below the surface of water in wide mouthed screw capped, air tight and opaque polythene containers. The samples were collected fortnightly from June 2010 to May 2012. The samples were collected on 1st and 15th of every month around 9.00 a.m. The atmospheric and water temperature was recorded with the help of digital portable kit. The digital portable kit is an excellent, instrument for field operations. It has got automatic decimal, positioning polarity indication as well as low battery indication which eliminates manual errors. The data of humidity and rainfall was collected from Metereological department, Chikalhana, Aurangabad. The pH of the sample was recorded with "Systronic portable pH Meter".

Dissolved Oxygen, Acidity, Total alkalinity, Hardness nitrogen, Sulphate ion, phosphates, Total solids etc has been determined as per the procedures given in the literature[8-9]

There are three seasons during a year in this region namely summer (February to May), Monsoon (June to September) and Winter (October to January). The summer season is characterized by clear sky, with relatively longer duration of the day and more intensity of light. During monsoon the sky is cloudy, humidity is relatively more and the temperature is moderate to high. The winter has relatively brighter days with clear sky, and the lesser duration of the day. As all ecological factors are influenced by the duration and intensity of sunlight, humidity, atmospheric and water temperature, various physico-chemical variables were studied season wise and at the selected sampling stations, during the present study over a period of two years.

RESULTS AND DISCUSSION

Water Temperature :-The water temperature was consistently lower than the atmospheric temperature by 1 - 3°C throughout

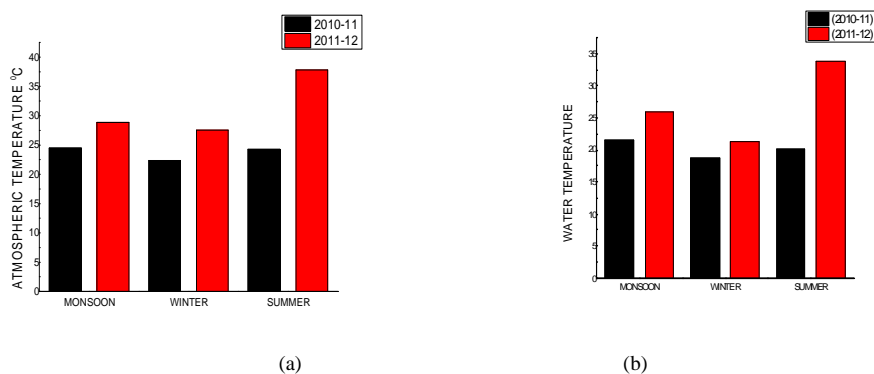


Fig 1a and 1b : Seasonal variation In atmospheric temperature and Water temperature

Atmospheric Temperature : The effect of temperature as an environment factor is evident, however its influence is not direct. The range was 15.0 – 32.2°C and 14.6 – 31.8°C during the two years respectively (Figs.). During 2010-2011 the range of temperature in monsoon was 22.6 – 27.0°C, in winter 16.2 – 26.0°C and in summer 17.2 – 31.2°C while during 2011-2012 the range of temperature was 23.4 – 27.0°C, 15.2 – 23.2°C and 17 - 32°C in monsoon, winter and summer respectively. The range of temperature was narrow in monsoon (4.4°C), wide in winter (9.8°C) and wider in summer (14°C) during 2010-11. During 2011-2012 the range of temperature was 3.6°, 8°C and 15.8°C in monsoon, winter and summer respectively.

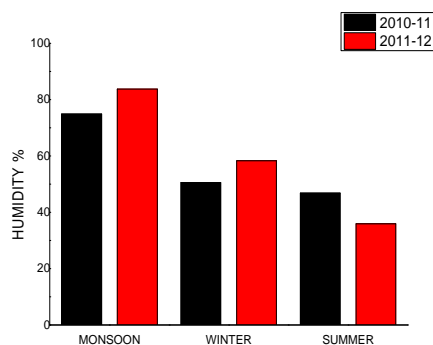


Fig. 2 : Seasonal variation in humidity

Humidity :- The range of percentage of humidity during 2010 – 11 was 15 – 85%, during 2011-12 it was 20 – 92%. Further the range of percentage of humidity during 2010-11 was 41 - 62%, 61 - 84% and 15 – 65% in winter, monsoon and summer respectively. Thus, the range of humidity was narrow in winter, wide in monsoon and much wider in summer being 21%, 23% and 50%. During 2011-12 the range in winter and 35 – 83%, in monsoon 66 –

92% and in summer 20 – 69%. Thus, the range was narrow in monsoon, wide in winter and more wider in summer being 26%, 48% and 49% respectively.

Rainfall :- The total rainfall recorded during 2010-11 was 394.6 mm and during 2011-12 584.4 mm. The season wise analysis of the rainfall showed that it was at its peak during monsoons and least during summers of both the years. The range of rainfall recorded was 0.1 – 6.1 mm and 2.1 – 5.2 mm in monsoon and winter respectively during 2010-11. During 2011-12 in monsoon the range was 3.89 – 30.7 mm and in winter it was recorded in I & II fortnight of October, November and December. It was not recorded during summers of both the years.

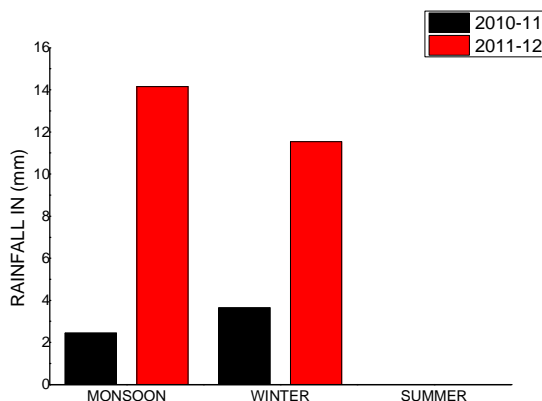


Fig. 3 : Seasonal Variation in Rainfall

pH :- The acid or the base character of any aqueous solution can well be defined by means of a single variable the hydrogen ion activity. The annual range was 6.7 – 7.6 during both the years. It was maximum in winter and minimum in monsoon during both the years. The range during 2010-11 was 6.7 – 7.1, 7.4 – 7.6 and 6.8 – 7.3 in monsoon, winter and summer respectively. The range was narrow in winter (0.2), wide in monsoon (0.4) and wider in summer (0.5). During 2011-2012 in monsoon the range was 6.9 – 7.4, in winter 7.2 – 7.4 and in summer 7.0 – 7.5. The range was wide and identical in monsoon and summer (0.5) and narrow in winter (0.2).

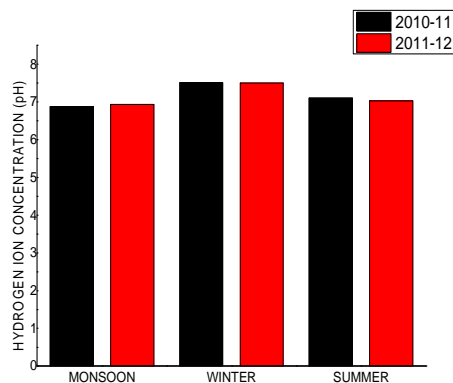


Fig.4 : Seasonal Variation in pH

Acidity:- The acidity in natural water is primarily due to dissolved carbondioxide. However, in water polluted by industrial water it is because of mineral acids. During the present study an amount of CO_2 was recorded occasionally and that too in very low quantities. it was recorded in 1st fortnight of April, May and June and 2nd fortnight of April during 2010-11 and during 2011-12 it was recorded in 1st fortnight of June, July and May and 2nd fortnight of Marh, April, May and June.

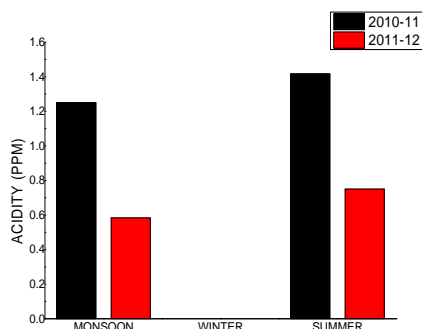


Fig.5 : Seasonal Variation in Acidity

Total Alkalinity :-Alkalinity is the contribution of hydroxide, carbonate and bicarbonate. Numerically it is an equivalent concentration of titerable base and is determined by titration with a standard solution of strong acid, to certain equivalence points as given by the indicator solution. The season wise analysis of total alkalinity showed that it was maximum in monsoons and minimum in winters of both of the years. The range was 40.16 – 45.56 ppm, 28.24 – 38.19 ppm and 31.93 – 43.09 ppm in monsoon, winter and summer during 2010-11. The range was narrow in monsoon (5.4 ppm), wide in winter (9.95 ppm) and wider in summer (11.16 ppm). During 2011-12 the range was 28.14 – 40.32 ppm, 21.20 – 30.91 ppm and 25.09 – 37.16 in monsoon, winter and summer respectively. The range was narrow in winter (9.71 ppm) wide and almost same in monsoon and summer (12.18 and 12.07 ppm).

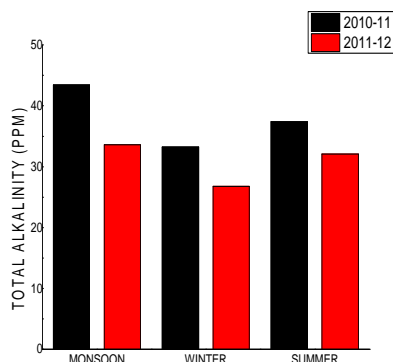


Fig. 6 : Seasonal Variations in Total Alkalinity (PPM)

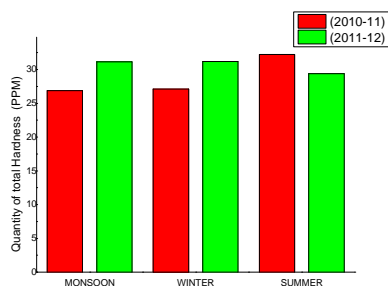


Fig. 7 : Seasonal Variations in Quantity of total Hardness (PPM)

Total Hardness :- Hardness of water is caused by the bivalent metallic ions as cation Ca, mg, Sr, Fe, Mn and anions HCO_3 , SO_4 , Cl, NO_3 and SiO_3 . Temporary hardness is caused by the presence of HCO_3 of Ca and mg. Permanent hardness is mostly due to SO_4 . The range of Hardness was 16.6 – 39.6 ppm and 22.6 – 33.6 ppm during 2010-11 and 2011-12 respectively. Seasonal analysis showed that the hardness recorded during present study was maximum

during summer and minimum during winter of both the years. It showed a range of hardness in monsoon as 22.4 – 29.9 ppm, in winter 21.6 – 31.6 ppm and 20.2 – 39.6 ppm in summer during 2010-11. While during 2011-12 the range was 29.4 – 32.8 ppm, 27.6 – 34.3 ppm and 24.1 – 33.6 ppm in monsoon, winter and summer respectively. During both the year the range was narrow in monsoon (7.5 and 3.4 ppm), wide in winter (10.0 and 6.7 ppm) and much wider in summer (19.4 and 9.5 ppm).

Dissolved Oxygen :- The annual range of dissolved oxygen the range of 3.90 – 5.60 ppm during 2010 – 2011 and 2.40 – 6.80 ppm during 2011-12. Seasonwise analysis showed that the dissolved oxygen was at its peak in winter, less in summer and least in monsoon during both the years.

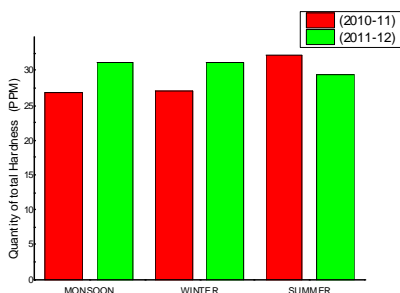


Fig. 8 : Seasonal Variations in Quantity of total Hardness (PPM)

Total Nitrogen :- The range during 2010-11 was 1.92 – 2.11 ppm, 2.20 – 2.49 ppm and 2.18 – 2.39 ppm in monsoon, winter and summer respectively. The range during monsoon was narrow (0.19 ppm) wide in summer (0.21 ppm) and wider in winter (0.29 ppm). During 2011-12 in monsoon the range was 1.87 – 2.14 ppm, in winter 2.18 – 2.45 ppm and in summer 2.10 – 2.36 ppm. The range was narrow in summer (0.26 ppm) and wide and identical in monsoon and winter (0.27 and 0.27 ppm).

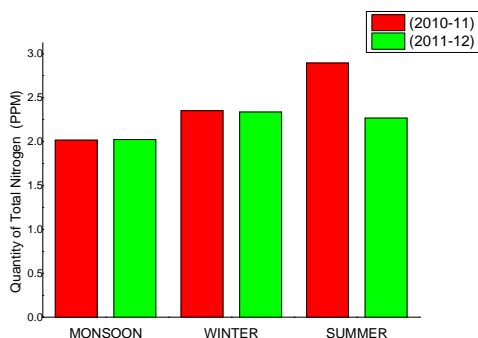


Fig. 9 : Variations in Quantity of Total Nitrogen (PPM)

Sulphates :- The annual range of the quantities of sulphates was during 2010-11 it was 2.50 – 3.08 ppm and 2.58 – 3.18 ppm in 2011-12. Further variations of sulphates contents showed the maximum in summers and minimum in winters of both the years. The range was 2.59 – 2.72 ppm, 2.50 – 2.71 ppm and 2.62 – 3.00 ppm in monsoon, winter and summer respectively during 2010-11. The range was narrow in monsoon (0.13 ppm), wide in winter (0.21 ppm) and much wider in summer (0.44 ppm). During 2011-12 the range was 2.80 – 2.96 ppm in monsoon, 2.56 – 2.89 in winter and 2.78 – 3.14 ppm in summer. The range was narrow in monsoon (0.16 ppm), wide in winter (0.33 ppm) and wider in summer (0.36 ppm).

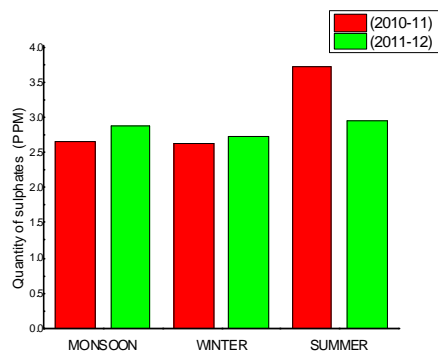


Fig. 9 : Variations in Quantity of Sulphates (PPM)

Phosphates :- The quantities of phosphates recorded as 0.03 – 0.10 ppm and 0.02 – 0.10 ppm during 2010-11 and 2011-12 respectively. Seasonal analysis of phosphate content during both the years was maximum in winter and minimum in monsoon. It was 0.04 – 0.09 ppm, 0.08 – 0.11 ppm and 0.06 – 0.08 ppm in monsoon, winter and summer respectively during 2010-11. The range was narrow in summer (0.02 ppm) wide in winter (0.03 ppm) and wider in monsoon (0.05 ppm). During 2011-12 the range was 0.03 – 0.09 ppm, 0.07 – 0.09 ppm and 0.04 – 0.09 ppm in monsoon, winter and summer respectively. The range was narrow in winter (0.02 ppm) wide in summer (0.05 ppm) and wider in monsoon (0.06 ppm).

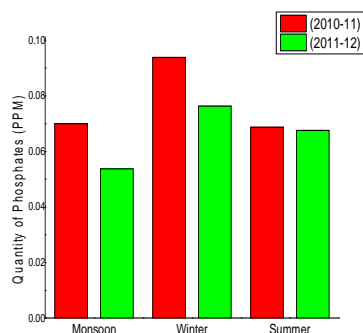


Fig. 10 : Variations in Quantity of Phosphates (PPM)

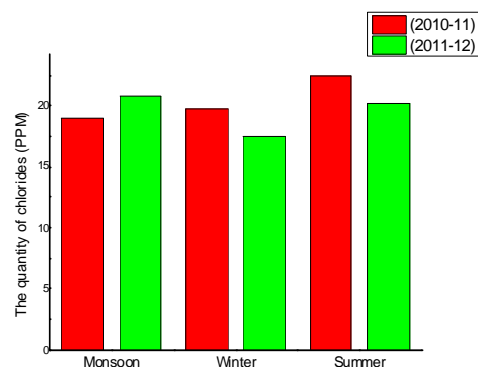


Fig. 11 : Variations in quantity of chlorides (PPM)

Chlorides :- The range of chlorides recorded was 12.85 – 28.01 ppm and 11.66 – 26.13 ppm during 2010-11 and 2011-12 respectively. The seasonal variation in chloride content showed the maximum in summer and minimum in winter of both the years. The chlorides ranged between 18.40 – 27.67 ppm in monsoon, 16.41 – 24.14 ppm in winter and 14.40 – 29.86 ppm in summer during 2010-11. The range was narrow and almost identical in monsoon

and winter (9.27 and 7.73 ppm) and wide in summer (15.46 ppm). The range of chlorides recorded during 2011-12 was 18.96 – 22.86 ppm, 13.02 – 21.16 ppm and 14.32 – 24.11 ppm respectively in monsoon, winter and summer respectively. The range was narrow in monsoon (3.9 ppm) wide in winter (8.14 ppm) and still wider in summer (9.79 ppm).

Total Solids :-The annual range of quantities of the total solids recorded was 246.1 – 304.5 ppm and 235.1 – 301.2 ppm during 2010-11 and 2011-12 respectively. The season wise analysis of the total solids showed that it was maximum in summers and minimum in winters of both the years. It showed the range between 270.6 – 296.6 ppm, 244.1 – 266.5 ppm and 290.4 - 304.6 ppm in monsoon, winter and summer respectively during 2010-11. The range was narrow in summer (14.2 ppm) wide in winter (22.4 ppm), much wider in monsoon (26.0 ppm). During 2011-12 the range was 256.1 – 288.4 ppm in monsoon, 234.1-241.2 ppm in winter and 288.3 – 300.4 ppm in summer the range was narrow in winter (7.1 ppm), wide in summer (12.1 ppm) and much wider in monsoon (32.3 ppm).

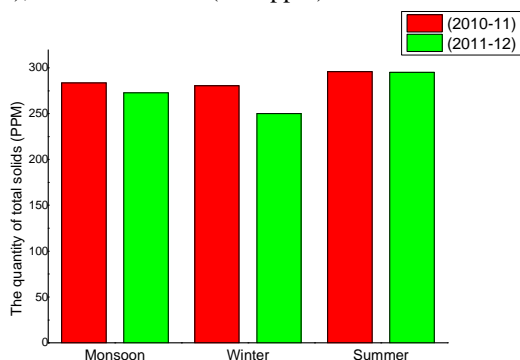


Fig. 12 : Variations in quantity of total solids (PPM)

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