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Study of Seasonal variation in physical and chemical make-up of different water sources in Jind

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ABSTRACT

Human health may be jeopardised by contaminants in drinking water, such as radioactive materials, microorganisms, and high mineral content. Variation in chemical and physical and microbiological quality existed in the present investigation. In case of issues touching on water best, "It remains a hard challenge to discover the location climate natural or anthropogenic in nature. The satisfactory of water is especially related to nearby environmental and geological conditions. As evidenced by way of research ground water high-quality of distinctive regions varies due to numerous geological elements inclusive of formations, percolation of surface and rain water, complicated hydrogeology, manmade activities and numerous land use pattern of the area. An agricultural interest which include Irrigation is stated to steer the provision of minerals in each water supply i.e. Water and floor water.

The present undertaken was based on the sampling and analysis of water accrued from special sources (hand pump, bore well, faucet and canal water) at some stage in summer, monsoon and iciness seasons of 12 months 2013 and 2014 for their suitability for drinking purposes. This especially focuses on the physical and chemical make-up and microbiological assessment of water gathered from exclusive tehsils (Narwana, Jind, Safidon and Junala) of Jind district and outcomes were divided into following sections:

Seasonal version of chemical and physical traits of water sources from extraordinary tehsils of Jind district

Seasonal version of microbiological evaluation of water excellent from one-of-a-kind tehsils of Jind district.

Key Words : pH, electrical conductivity, normal dissolved solids (TDS), hardness (TH), calcium (Ca), magnesium (Mg), alkalinity (TA), carbonate (CO32), bicarbonate (HCO32), sodium (Na+), potassium (K+), chloride (Cl), sulphate (SO42), and fluoride (F)

INTRODUCTION

Seasonal variation in physical and chemical make-up of different water sources in Jind

Values of chemical and physical parameters of water samples collected from Jind from different sources (hand pump and Tube well) For the duration of summer time, monsoon and iciness seasons of 12 months 2013 and 2014 are exhibited in tables (4.1-4.6) and correlation coefficients amongst one of a kind water best parameters of water in Jind district are exhibited in tables (4.7-four.12). There is no color or odor in any of the water samples. Some sample locations had a taste that was mildly salty to fairly salty.

pH

In the summer of 2013, the pH in the Jind district ranged from 7.36 (B11) to 8.3. (B12). pH was shown to have a positive connection with TA (r = 0.581), HCO3- (r = 0.575), and SO42- (r = 0.698) at the P0.01 and P0.05 levels, respectively. Jind city's water samples obtained during the 2013 monsoon showed a pH range of 7 (B11) to 8.2 (Table 4.2). (B2). According to the correlation matrix, pH was favourably connected with TA (r = 0.634), HCO3- (r = 0.634), and SO42- (r = 0.659), and strongly correlated with turbidity (r = -0.570). Table 4.3 shows that the pH of water in Jind district city ranged from 7.3 (B11) to 8.3 throughout the 2013 winter season (B2 & B3). The correlation matrix demonstrated a positive and statistically significant relationship between pH and TDS (r = 0.742), EC (r = 0.742), TA (r = 0.704), and HCO3- (r = 0.704), at the P0.01 level, and with Ca2+ (r = 0.608), SO42- (r = 0.657), and F- (r = 0.593), at the P0.05 level. The pH of the water samples taken in the Jind area during the summer of 2014 ranged from 7.3 (B1) to 8.4 (Table) (B5).

TDS and EC were favourably connected with pH (r = 0.558 and 0.557, respectively) while pH was positively correlated with TDS and EC (P 0.05). Water samples from Jind district showed a pH range of 7.43 (B11) to 8.4 (C) during the 2014 monsoon (B3). According to the correlation matrix, the pH value was positively associated to the TDS value (r = 0.716), the EC value (r = 0.716), the TA value (r = 0.782), the HCO3- value (r = 0.782), and the SO42- value (r = 0.677) at the P0.01 level. The pH ranged from 7.44 (B9) to 8.6 (H+) in Jind district during the 2014 winter (Table) (B3). At the P0.01 level, the correlation matrix revealed a positive and statistically significant relationship between pH and both TDS and EC, while at the P0.05 level, pH was also favourably linked with TH (r = 0.565), TA (r = 0.620), Ca2+ (r = 0.577), SO42- (r = 0.662), and HCO3- (r = 0.618).

Turbidity

During summer 2013, turbidity varied from 0.08 NTU (B2) to 16 NTU (B11). During monsoon 2013, turbidity of the water samples varied from 1.15 NTU (B2) to 19 NTU (B11) and significantly and positively correlated with BOD (r = 0.930) and was significantly and negatively correlated with Na+ at P≤0.05 level. During winter 2013 turbidity varied from 0.07 NTU (B2) to 17.9 NTU (B11). During summer 2014, turbidity varied from 0.09 NTU (B8) to 20 NTU (B11). Turbidity was significantly and positively correlated with BOD (r = 0.989) at P≤0.01 level and PO43- (r = 0.591) at P≤0.05 level. During monsoon 2014, turbidity varied from 1.40 NTU (B13) to 44.2 NTU (B10). It was significantly and positively correlated with BOD (r = 0.962) at P≤0.01 level and PO43- (r =0.585) at P≤0.05 level. During winter 2014, turbidity varied from 1.33 NTU (B13) to 25.76 NTU (B11). It was significantly and positively correlated with DO (r = 0.909) at P≤0.05 level and BOD (r = 0.998) and PO43- (r = 0.687) at P≤0.01 level.

Dissolved oxygen (DO) and Biochemical oxygen demand (BOD)

Water samples taken in the Jind region during the summer of 2013 showed a DO of between 4.7 mg/l (B8) and 6.1 mg/l (B10). BOD levels in the water samples ranged from 1.1 mg/l (B8) to 2.2 mg/l, according to the results (B10). A close correlation was found between DO and PO43- (r =0.927, P 0.05). The BOD was inversely associated to both thiamin (TH) and potassium (K+) at the P0.05 level (r = -0.953 and r = -0.890, respectively). There was a wide range of fluctuation in the quantities of dissolved oxygen (DO) in water samples taken in the Jind district during the 2013 monsoon, from 5.1 mg/l (B9) to 6.7 mg/l (B10). BOD levels in the samples ranged from 1.2 mg/l (B8) to 3 mg/l (B10). When we looked at the link between DO and SO42- and PO43-, we discovered two very positive correlations: r = 0.884 (P 0.05) and r = 0.959. (P 0.01). We found a significant positive correlation between BOD and TA (r = 0.914), HCO3- (r = 0.914), NO3- (r = 0.883), SO42- (r = 0.941), and PO43- (r = 0.937), and a significant negative correlation between BOD and TH (r = -0.909) and Ca2+ (r = -0.885), all at the P0.05 level. The DO contents of winter 2013 water samples taken in the Jind area ranged from 5.3 mg/l (B8) to 6.9 mg/l (B10).

The collected water samples had a BOD value ranging from 1 mg/l (B8) to 2.1 mg/l (B10). When comparing BOD and PO43-, a positive correlation was found (r = 0.895), which was statistically significant at the 0.05 level. Dissolved oxygen (DO) levels in water samples taken in the Jind region during the summer of 2014 measured between 5 and 6 mg/l (B8) (B11). The range of BOD levels found in the samples we analysed was 1.8-6 mg/l (B9) (B11). At the 5% significance level, there was a positive correlation between DO and F- (r = 0.889) and a substantial negative correlation between DO and TH (r = -0.897). TA, HCO3-, NO3-, and PO43- all had strong positive correlations with BOD (r = 0.989, 0.994, and 0.992, respectively) (P0.01). Jind district water samples taken during the 2014 monsoon indicated dissolved oxygen

(DO) values between 5.6 and 6.5 mg/l (B8 and C8) (B10). The BOD ranges from 1.8 to 5.30 mg/l (B8) in the provided samples (B11). Research found a statistically significant inverse relationship (r = -0.940, P 0.05) between DO and TH. We found that at the P0.01 level, BOD was positively linked with TA (r = 0.986), HCO3- (r = 0.986), and NO3- (r = 0.969), and at the P0.05 level, with SO42- (r = 0.887) and PO43- (r = 0.956). DO levels ranged from 5.8 mg/l (B7) to 6.9 mg/l (C9) in winter 2014 water samples collected in the Jind region (B11). Concentrations of BOD ranged from 2 mg/l (B7, B8, and B9) to 5 mg/l (B11). DO was shown to have a positive connection with BOD(r = 0.912), TDS(r = 0.891), EC(r = 0.901), NO3(r = 0.900), and PO43(r = 0.884) at the P0.05 level. BOD was shown to be positively correlated with TDS (r = 0.937), EC (r = 0.945), TA (r = 0.973), NO3- (r = 0.992), and PO43- (r = 0.981) at the P0.01 level.

Total dissolved solids (TDS)

The total dissolved solids (TDS) content of the water samples varied from 98 mg/l (B7) to 2800 mg/l (B5). TDS was positively and substantially linked with thiazide concentration (r = 0.890), electrolyte concentration (r = 1.000), calcium ion concentration (r = 0.887), and magnesium ion concentration (r = 0.878) throughout the summer of 2013. There was a wide variation in the total dissolved solids concentrations from 84 mg/l (B7) to 2642 mg/l throughout the water samples (B5). Positive and substantial relationships between TDS and TH (r = 0.859), EC (r = 1.000), Ca2+ (r = 0.834), and Mg2+ (r = 0.840) have been observed since the start of the 2013 monsoon season. The total dissolved solids (TDS) in the samples measured between 92 mg/l (B7) to 2780 mg/l (B5). TDS associated favourably and substantially with TH (r = 0.859), EC (r = 1.000), Ca2+ (r = 0.908), Mg2+ (r = 0.816), and F- (r = 0.666) during the winter of 2013 at the P0.01 level. TDS levels varied from 110 to 3029 mg/l (B7 and F8) throughout the samples (B3). The TDS correlated positively with TH (r = 0.767), EC (r = 1.000), and TA (r = 0.687). During the summer of 2014, the correlations between Ca2+ (r = 0.820), Mg2+ (r = 0.725), and HCO3- (r = 0.687), as well as K+ (r = 0.582) and K+ (r = 0.582), were all significant at the P0.01 level (P0.05). The total dissolved solids (TDS) contents of the tested water samples ranged from 102 mg/l (B9) to 2678 mg/l (B5). The TDS concentrations in the 2014 monsoon samples varied from 110 mg/l (B8) to 2673 mg/l, and they were shown to have a positive correlation with the TH (r = 0.845), EC (r = 1.000), Ca2+ (r = 0.863), and Mg2+ (r = 0.824) concentrations at the P0.01 level (B5). During the 2014-2015 winter, TDS was significantly and positively linked with TH (r = 0.841), EC (r = 1.000), Ca2+ (r = 0.861), Mg2+ (r = 0.813), and HCO3- (r = 0.613) at the P0.01 level.

Concentrations of calcium (Ca2+) and magnesium (Mg2+), as well as overall hardness (TH)

The amounts of TH in water samples taken from the Jind area varied from 60 mg/l (B10) to 1706 mg/l (B5). The positive associations between TH and EC (r = 0.889), Ca2+ (r = 0.975), and Mg2+ (r = 0.996) were statistically significant at the P0.01 level. The range of Ca2+ and Mg2+ contents in midsummer water samples was determined to be 11.2–188.8 mg/l in the B10 buffer solution and 7.78–299.9 mg/l in the B5 buffer solution (B5). During the summer of 2013, Ca2+ had a positive correlation with Mg2+ (r = 0.950) at the P0.01 level. The amounts of TH in water samples taken from the Jind area varied from 72 mg/l (B10) to 1720 mg/l (B5). There was a significant positive connection between TH and all three cations at the P0.01 level: EC (r = 0.859), Ca2+ (r = 0.940), and Mg2+ (r = 0.990). Samples of monsoon water showed a wide range of Ca2+ and Mg2+ contents, from 11.2 to 179.2 mg/l (B10 to B5, respectively) and 10.69 to 309.1 mg/l (B10 to B5, respectively). As shown by the statistics, Ca2+ and Mg2+ were positively correlated during the 2013 monsoon (r = 0.883, P0.01). The concentrations of TH in water samples from the Jind area were anywhere from 64 mg/l (B10) to 1764 mg/l (B5).

Correlations between TH and EC (r = 0.859), Ca2+ (r = 0.947), and Mg2+ (r = 0.992) were all positive and statistically significant at the P0.01 level. During the cold season, Ca2+ concentrations ranged from 9.6 mg/l (B10 and B11) to 180.8 mg/l (B6) while Mg2+ concentrations ranged from 9.72 mg/l (B10) to 324.65 mg/l (B5). Ca2+ and Mg2+ were shown to be positively correlated throughout the 2013 winter (r = 0.899, P0.01). Jind district water samples had TH concentrations ranging from 72 mg/l (B10) to 1700 mg/l (B5). Significant positive correlations were seen between TH and EC (r = 0.767), Ca2+ (r = 0.967), and Mg2+ (r = 0.993). This summer, Ca2+ and Mg2+ values in the water samples ranged from 8 (B7) to 211.2 (B5) and 8.74 (B10) to 284.8 mg/l, respectively (B5). This positive association between Ca2+ and Mg2+ (r = 0.930) was determined to be statistically significant at the P0.01 level in the summer of 2014. A wide range of TH concentrations, from 72 mg/l (B10) to 1660 mg/l, was found in water samples taken from several locations in the Jind area (B5).

There were positive and significant associations between TH and EC (r = 0.845), Ca2+ (r = 0.975), and Mg2+ (r = 0.995), all at the P0.01 level. Ca2+ and Mg2+ concentrations in water samples during the 2014 monsoon season ranged from 9.6 (B7) to 201.6 (B5) milligrams per liter and 6.8 (B10) to 280.91 (B5) milligrams per liter, respectively. There was a large variation in TH concentration across samples taken in the Jind region, with values ranging from 70 mg/l

(B10) to 1690 mg/l (B5). A positive connection was found between TH and EC (r = 0.841), Ca2+ (r = 0.968), and Mg2+ (r = 0.993) at the P0.01 level. Water samples taken in the winter had Ca2+ values ranging from 8 (B7) to 209.6 (B5) and Mg2+ concentrations ranging from 5.45 (B10) to 283.34 mg/l (B5). There was a positive and statistically significant association between Ca2+ and Mg2+ throughout the 2014 winter (r = 0.932; P 0.01;

Electrical conductivity (EC)

To put it another way, the EC of the samples ranged from 0.15 mS/cm (B7) to 4.37 mS/cm (B5). During the summer of 2013, EC associated favourably with Ca2+ (r = 0.886) and Mg2+ (r = 0.887) at the P0.01 level. The 2013 monsoon had an EC range of 0.13 mS/cm (B7) to 4.13 mS/cm in water samples (B5). Ca2+ (r = 0.833) and Mg2+ (r = 0.840) were positively linked with EC at the P0.01 level. Water samples' electrical conductivity (EC) ranged from 0.14 mS/cm (B7) to 4.34 mS/cm (B5). The EC had a positive and significant correlation with Ca2+ (r = 0.907), Mg2+ (r = 0.815), and F- (r = 0.666), all at the P0.01 level, throughout the 2013 winter.

From 0.17 mS/cm (B7) to 4.73 mS/cm (D3), the EC of the water samples ranged widely (B3). In the summer of 2014, EC was favourably connected with many other ions at the P0.01 level, including TA (r = 0.687), Ca2+ (r = 0.820), Mg2+ (r = 0.725), and HCO3- (r = 0.687), and K+ (r = 0.582). From 0.16 mS/cm (B9) to 4.18 mS/cm (A1), the EC of the water samples ranged widely (B5). During the 2014 monsoon, EC had a positive and significant correlation with both Ca2+ (r = 0.863) and Mg2+ (r = 0.824) at the P0.01 level. These water samples showed an EC range of 0.17 mS/cm (B8) to 4.18 mS/cm when tested for electrical conductivity (B5). During the winter of 2014, EC was positively and substantially linked with TA (r = 0.578), HCO3- (r = 0.595), Ca2+ (r = 0.861), and Mg2+ (r = 0.814), all at the P0.01 level.

Total alkalinity (TA), carbonate (CO32-) and bicarbonate (HCO3-)

HCO3- values in the samples vary from 92.72 mg/l (B8) to 668.56 mg/l (B3), while TA values span the range of 76 mg/l (B8) to 548 mg/l (B3) (B3). CO32- levels may be anything from 0 to 12 mg/l (B12). TA was positively correlated with HCO3- (r = 1.000), K+ (r = 0.753), and SO42- (r = 0.788) at the P0.01 level. CO32- correlated positively with both Cl- and SO42- (r = 0.643 and r = 0.583, respectively), and with SO42- (r = 0.643). During the summer of 2013, HCO3- was positively correlated with Na+ (r = 0.756) and SO42- (r = 0.780) at the P0.01 level. The HCO3- concentrations of the samples varied from 87.84 mg/l (B7 and B9) to 614.88 mg/l, whereas the TA values varied from 72 mg/l (B7 and B9) to 504 mg/l (B3) (B3). With respect to HCO3- (r = 1.000), K+ (r = 0.718), and SO42- (r = 0.712), the TA correlated positively and was statistically significant at the P0.01 level. We found a significant correlation between HCO3- and K+ (r = 0.718) and SO42- (r = 0.712) at the P0.01 level during the 2013 monsoon season. Concentrations of HCO3- in the samples varied from 92.72 mg/l (B9) to 658.8 mg/l, whereas TA values ran the gamut from 76 mg/l (B9) to 540 mg/l (B3) (B3).

Statistically significant positive correlations between the TA and HCO3- (r = 1.000), K+ (r = 0.726), and SO42- (r = 0.776) were found at the P0.01 level, whereas a connection between the TA and F- (r = 0.637) was found at the P0.05 level. HCO3- was positively correlated with K+ (r = 0.726), SO42- (r = 0.776), and F- (r = 0.637), all at the P0.01 level, during the winter of 2013 at the Jind site. HCO3- concentrations in the samples varied from 102.48 to 673.44 mg/l, and TA values from 84 to 552.48 mg/l (B9 to B3) (B3). At the P0.01 level, there was a positive and statistically significant connection between TA and HCO3- (r = 1.000), K+ (r = 0.768), and SO42- (r = 0.755). HCO3- demonstrated a positive and significant connection with K+ (r = 0.768) and SO42- (r = 0.755) throughout the summer of 2014, at the P0.01 level.

The range of TA concentrations was 80-516 mmol/L (B8-B3), while the range of HCO3- concentrations was 97-629 mmol/L (B8-HCO3) (B3). Significant positive correlations were found between TA and HCO3- (r = 1.000), K+ (r = 0.763), and SO42- (r = 0.697) at the P0.01 level. HCO3- had a positive correlation with K+ (r = 0.763) and SO42- (r = 0.697) at the P0.01 level during the 2014 monsoon. A wide range of TA concentrations (80 mg/l for sample B9 to 536 mg/l for sample B3) and HCO3- concentrations (3.5 mg/l for sample B10 to 653.92 mg/l) were found in the samples (B3). TA correlated positively and significantly with HCO3- (r = 0.964), K+ (r = 0.740), and SO42- (r = 0.693), all at the P0.01 level. For the 2014-2015 winter season, we found a positive association between HCO3- and K+ (r = 0.695, P0.01) and a positive correlation between HCO3- and SO42- (r = 0.639, P0.05).

Sodium (Na+) and potassium (K+)

Over the course of the 2013 summer, the Na+ level of the water ranged from 3.6 mg/l (B10) to 304 mg/l. (B1). Observed K+ values varied from 1.7 mg/l (B12) to 51.6 mg/l (B3). Na+ concentrations ranged from 3 mg/l (B11) to 328 mg/l (B1). We measured K+ concentrations from 1.9 mg/l (B12) to 52.3 mg/l during the 2013 monsoon (B3).

Na+ levels ranged from 3.3% (B11) to 3.33 %. (331). (B1). The K+ content fluctuated between 1.9 mg/l (B10) to 51.6 mg/l over the 2013 winter (B3). Na+ concentrations range from 5.1 mg/l (B10) to 329 mg/l (B1). There was a wide variation in K+ concentration from 2 mg/l (B9) to 54.2 mg/l over the summer of 2014. (B3). Na+ concentrations range from 7 mg/l (B11) to 332.2 mg/l (B1). Throughout the 2014 monsoon season, the K+ content varied widely from 1.8 mg/l

(B12) to 55.9 mg/l (B3). Na+ concentrations vary from 5.7 mg/l (B11) to 320.8 mg/l, which is a significant range (B1). There was a wide variation in the amount of K+ present in Jind from 2 mg/l (B12) to 54 mg/l over the 2014 winter (B3).

Chloride (Cl-)

Seasonally, the Cl- concentration was as high as 22.02 mg/l (B10) and as low as 180.2 mg/l (B12) in the summer of 2013, 20.02 mg/l (B10) and as high as 182.2 mg/l (B12) in the monsoon, and 18.02 mg/l (B11) and 172.1 mg/l (B12) in the winter. Cl- was shown to have a strong positive connection with NO3- (r = 0.708) at the P0.01 level, as revealed by the correlation matrix. Different samples taken in the summer of 2014 showed a wide range of Cl- concentrations, from 30.03 mg/l (B10) to 186.2 mg/l (B12). Based on the results of the correlation matrix, Cl- was shown to have a positive and significant relationship with SO42- (r = 0.755, P0.01) and NO3- (r = 0.633, P0.05). During the 2014 monsoon season, the Cl- concentration ranged from 30.03 mg/l (B11) to 192.2 mg/l (B12). A positive connection between Cl- and NO3- (r = 0.756) was found to be statistically significant at the P0.01 level (correlation matrix). Cl- levels in 2014's winter ranged from 36.04 mg/l (B11) to 186.2 mg/l (B12). Cl- was shown to have a strong, positive connection with NO3- (r = 0.735, P 0.01) in the correlation matrix.

Nitrate (NO3-)

2013 NO3- concentrations ranged from 0.02 mg/l (B8) to 9.85 mg/l (B4) during the summer, from 0.01 mg/l (B7) to 10.2 mg/l (B4) during the monsoon, and from 0.09 mg/l (B7) to 11.4 mg/l (B4) during the winter (B12). NO3- concentrations in 2014 ranged from 0.01 mg/l (B8) to 8.83 mg/l (B4) during the summer; from 0 mg/l (B8) to 12.5 mg/l (B12) during the monsoon; and from 0.01 mg/l (B7 and B8) to 11.8 mg/l (B12) during the winter (B12).

Sulphate (SO42-)

In the summer of 2013, SO42- concentrations ranged from 2 mg/l (B7) to 92 mg/l (B12), while in the monsoon they were 1.4 mg/l (B7) to 110 mg/l (B12), and in the winter they were 2.2 mg/l (B7) to 87 mg/l (B12) (B12). Concentrations of SO42- ranged from 2 mg/l (B7 and B8) and 95 mg/l (B12) in the summer of 2014 to 1.3 mg/l (B8 and B9) and 112 mg/l (B12) in the monsoon and 1.98 mg/l (B8) and 110 mg/l (B12) in the winter (B12).

Phosphate (PO43-)

In the summer of 2013, the PO43-concentration ranges from 0 to 0.62 mg/l (B12 to B10), in the monsoon from 0 to 0.65 mg/l (B12 to B10), and in the winter from 0 to 0.6 mg/l (B8 and B12 to B6). The PO43-concentration shifts from 0 to 0.66 mg/l (B9 and B11) during summer

2014 and from 0 to 0.53 mg/l (B8 and B9) during monsoon 2014". At the P0.01 level, r = 0.697 demonstrated a positive and statistically significant relationship between PO43- and F-. In the 2014 winter, the range of PO43-concentration was from 0 (B7) to 0.55 (B10) mg/l. At the 0.05 level, a positive correlation between PO43- and F- (r = 0.646) was shown to be statistically significant.

Fluoride (F-)

In the summer of 2013, the lowest measured value of F- was 0.18 mg/l (B7) and the highest was 4.92 mg/l (B1); in the monsoon, the range was 0.03 mg/l (B8) to 4.02 mg/l (B2); and in the winter, the range was 0.04 mg/l (B8) to 3.55 mg/l (B1). In the summer of 2014, F- values ranged from 0.58 to 3.57 milligrammes per litre (B8 to B2), from 0.44 to 3.55 milligrammes per litre (B8 to B10), and from 0.8 to 3.72 milligrammes per litre (B12 to B5).

Table–1 Chemical and physical parameters of monthly value

S.R.	Parameters	April	May	June	July	Aug	Sep	Oct	Nov	Dec
1.	Atmo.Temp.(0C.)	35.24	41.90	42.73	36.79	34.52	33.55	32.19	26.32	22.80
2.	Water Temp.(0C.)	26.32	34.25	35.09	32.51	29.67	27.33	27.25	22.73	19.69
3.	PH	7.49	7.71	7.92	7.10	7.41	7.62	7.02	7.09	7.60
4.	Turbidity (NTU)	16.24	18.24	19.10	24.13	22.15	20.60	15.93	16.05	13.78
5.	Trancperency (cm.)	29.17	25.85	24.10	23.20	22.15	26.18	40.70	41.60	43.42
6.	E.C. (μs/cm)	356.45	377.9	397.2	366.5	347.76	332.4	320.21	312.2	291.5
7.	Total alkinity (mg/l)	160	182	168	161	155	149	138	136	128
8.	TDS (mg/l)	913	933	974	992	760	718	670	650	540
9.	Total hardness (mg/l)	120.28	116.14	115.20	113.15	117.15	106.15	85.21	63.50	72.17
10.	Free CO2 (mg/l)	7.12	6.21	5.43	4.20	4.45	3.87	2.67	2.45	1.55
11.	DO (mg/l)	3.10	2.90	2.70	2.83	2.86	2.95	3.18	3.29	4.50
12.	COD (mg/l)	19.50	20.57	21.24	18.50	17.33	15.23	13.20	12.50	11.21
13.	BOD (mg/l)	10.85	11.35	12.23	11.37	10.50	8.10	6.40	5.23	5.78
14.	Chloride (mg/l)	35.40	36.10	37.20	35.15	13.98	11.85	15.87	18.15	15.16
15.	Nitrate (mg/l)	1.30	1.43	1.67	1.47	1.43	1.32	1.28	1.22	1.16
16.	Sulphate (mg/l)	5.82	7.62	6.20	5.89	5.89	6.41	7.31	4.12	5.12
17.	Phosphate (mg/l)	1.65	1.82	2.12	1.93	1.82	1.73	1.62	1.46	1.25

Table–2 Chemical and physical properties of monthly value

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S.R.	Parameters	Jan	Feb	Mar	April	May	June	Minima	Maxima	Average
1.	Atmo. Temp.(0C.)	20.15	28.72	31.85	36.85	42.10	44.10	20.15	44.10	33.99
2.	Water Temp.(0C.)	18.90	21.66	26.67	30.67	34.25	36.09	18.90	36.09	28.205
3.	PH	7.90	7.35	7.62	7.89	8.02	8.12	7.02	8.12	7.59
4.	Turbidity (NTU)	15.68	16.35	17.10	18.18	19.18	20.25	13.78	24.13	18.2
5.	Trancperency (cm.)	42.75	38.60	35.93	31.20	28.27	26.20	22.15	43.42	31.95
6.	E.C. (μs/cm)	281.7	290.45	320.55	344.54	356.2	391.6	281.7	397.2	339.14
7.	Total alkinity (mg/l)	134	143	150	156	192	178	128	192	155.33
8.	TDS (mg/l)	765	810	860	930	962	953	540	992	828.67
9.	Total hardness (mg/l)	88.11	106.11	110.72	118.42	114.40	110.5	63.50	120.28	103.81
10.	Free CO2 (mg/l)	1.45	2.64	4.44	7.09	6.31	5.82	1.45	7.12	4.38
11.	DO (mg/l)	4.47	4.06	3.98	3.70	3.16	2.80	2.70	4.50	3.36
12.	COD (mg/l)	11.47	13.25	15.24	19.94	20.34	21.52	11.21	21.52	16.74
13.	BOD (mg/l)	7.50	8.50	10.50	10.65	11.20	11.88	5.23	12.23	9.47
14.	Chloride (mg/l)	23.60	28.65	31.38	35.08	36.33	39.50	11.85	39.50	27.56
15.	Nitrate (mg/l)	1.18	1.22	1.30	1.57	1.62	1.80	1.16	1.80	1.40
16.	Sulphate (mg/l)	4.87	4.49	4.22	5.23	8.86	5.51	4.12	8.86	5.84
17.	Phosphate (mg/l)	0.93	1.10	1.36	1.58	1.77	1.85	0.93	2.12	1.59

Table–3 Minima, maxima and average values are compare with WHO standards

S.R.	Parameters	Minima	Month	Maxima	Month	Average	WHO standards	result
1.	Atmo.Temp.(0C.)	20.15	January	44.10	June	33.99	--	Normal
2.	Water Temp.(0C.)	18.90	January	36.09	June	28.205	--	Normal
3.	PH	7.02	October	8.12	June	7.59	6.5-8.5	Normal
4.	Turbidity (NTU)	13.78	December	24.13	July	18.2	<5.0	High
5.	Trancperency (cm.)	22.15	August	43.42	December	31.95	--	Normal
6.	E.C. (µs/cm)	281.7	January	397.2	June	339.14	<600	Normal
7.	Total alkinity (mg/l)	128	December	192	May	155.33	<200	Normal
8.	TDS (mg/l)	540	December	992	July	828.67	<500	High
9.	Total hardness (mg/l)	63.50	November	120.28	April	103.81	<300	Normal
10.	Free CO2 (mg/l)	1.45	January	7.12	April	4.38	0.5-2.0	High
11.	DO (mg/l)	2.70	June	4.50	December	3.36	4.0-6.0	Low
12.	COD (mg/l)	11.21	December	21.52	June	16.74	10	High
13.	BOD (mg/l)	5.23	November	12.23	June	9.47	<2.0	High
14.	Chloride (mg/l)	11.85	September	39.50	June	27.56	500	Normal
15.	Nitrate (mg/l)	1.16	December	1.80	June	1.40	<45	Normal
16.	Sulphate (mg/l)	4.12	November	8.86	May	5.84	<200	Normal
17.	Phosphate (mg/l)	0.93	January	2.12	June	1.59	<0.5	High

pH: The pH levels measured were in the range of 7.02 to 8.12. The study period occurs in an era when water is naturally alkaline (Table- 1,2,3). During the hot summer (June), the water's pH reached extreme highs, while during the wet monsoon season, it reached extreme lows (October). The cost of hydrogen ions (pH) may be crucial for plankton growth,14. These findings are likewise quite similar to those seen in reports15–17.

Turbidity:

Materials in suspension in water may be seen through. Induce a haze that somewhat diminishes light penetration. The water's opacity increases as its turbidity decreases. For the most part, larger rates of water transparency (43.45 cm) are recorded in the winter (December) months, while lower rates of transparency (22.15 cm) are recorded in the summertime (August) months (desk-1,2,3). According to the readability values, this demonstrates the efficacy of this water.

Fashionable dissolved solids : The International Standards Organization (ISI) recommends a limit of 2000 mg/L of total dissolved solids (TDS) in potable water. Dissolved solids in water varied from a high of 992 mg/L in the summer to a low of 540 mg/L in the winter, according to the current research (table-1,2,3). In the summer, TDS levels tend to rise because more water is lost to evaporation and more household waste water, rubbish, fertiliser, etc. is contaminated. TDS analysis has significant implications for managing both biological and physical waste water treatment systems. In the vast majority of occurrences, total solids are of a natural origin and cause significant pollution issues.

Total hardness: Hardness in freshwater is caused by the presence of dissolved ions like calcium and magnesium, as well as sulfates, chlorides, and nitrates, and bicarbonates and carbonates. According to these findings, the total hardness was greatest in April (the height of summer) and lowest in November (the depth of winter), with average values of 120.28 and 63.50 mg/L. (table- 1,2,3). Water evaporates at a greater rate at warmer temperatures, resulting in a diminished supply. Perhaps the very high values are due to the addition of calcium and magnesium salts.

Chloride: In the current research, the levels of chloride were found to be highest in the summer (June) and lowest in the monsoon (September), with a mean value of 39.50 mg/l. There is a correlation between elevated chloride levels and increased pollution severity.

Phosphate : Among the most crucial nutrients, it plays a limiting role in keeping reservoir fertility high. The geochemical condition and surface runoff from the surrounding field determine whether or not phosphate is an important source. Algal blooms and eutrophication are both caused by excessive phosphate levels. Maximum phosphate values were recorded in June (the study's peak month), with values decreasing through January (the study's nadir).

Nitrate: Nitrate concentrations in this study ranged from a high of 1.67 mg/L in the summer (June) to a low of 1.12 mg/L in the winter (January). Nitrogen is essential for the development and reproduction of all living things. Nitrates in water at high concentrations are harmful to human health.

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Dissolved oxygen (DO): All aquatic species, including those that decompose man-made pollution, need dissolved oxygen (DO). It's one of the most crucial factors affecting aquatic life, making it a crucial metric. It's essential to the animal's survival and vitality. Dissolved Oxygen concentrations ranged from 2.70 mg/l to 4.50 mg/l in the current investigation (table-1,2,3). Water samples were found to have the highest levels of dissolved oxygen in the winter (December) and the lowest levels of dissolved oxygen in the summer (June). A greater rate of breakdown of organic materials owing to high temperature was also noted, leading to lower levels of Dissolved oxygen in the summer.

Chemical oxygen demand (COD): There should be no more than 250 mg/l of COD. In June (summer), the COD reached a high of 21.52 mg/l, while in December (winter), it dropped to a low of 11.21 mg/l (winter). The total COD value is within the allowed range of $25. Establishment of human activities near the bank of reservoir, which add domestic pollution and likely contribute to greater COD, is another possible cause of the rise in COD concentration.

Biochemical oxygen demand (BOD): Chemically synthesised oxygen The quantity of organic matter in water has been measured using demand. In June (summer), the BOD peaked at 12.67 mg/l, whereas in November (winter), it dropped to 5.23 mg/l (winter). Zooplankton cannot mask the harsh taste of a high BOD value. Based on Indian regulations, a BOD of 4.0 mg/l is optimal and 6.0 mg/l is acceptable. The optimal utilisation requires a BOD requirement of 3 mg/l or below. Ottu Reservoir was polluted by a wide variety of biochemically degradable organic wastes, as shown by the BOD value, which was much higher than the World Health Organization's allowable limit of 2 mg/l.

Total Alkalinity: If you want to know how much natural salts are in your water, just look at the alkalinity number. It is recommended that drinking water not exceed 200 milligrammes of alkalinity per litre. May (summer) had the highest alkalinity of water at 192 mg/l, while December saw the lowest at 128 mg/l (winter).

Free carbon dioxide: The current research found that the lowest concentration of free carbon dioxide (1.45 mg/L) occurred in the winter (January) and the maximum concentration occurred in the summer (April). The decay and decomposition of organic matter may account for the seasonal rise in carbon dioxide levels seen in the summer. Increasing levels of carbon dioxide in aquatic environments may be attributed mostly to the practise of draining land around water sources.

Sulphate: In aquatic systems, sulphate availability has never been a problem. For this investigation, the sulphate concentration was lowest in the winter (November) and highest in the summer (May), averaging 4.12 and 8.86 mg/L respectively.

Water is a natural resource And can be very essential to human, animal and flora. Without water existence isn't feasible on this planet. It is a part of all dwelling organisms. Groundwater is one of the earth's renewable resources and serves as a top supply of ingesting, irrigation and corporation. Groundwater is typically taken into consideration to be cleanser than floor water. Groundwater is a part of hydrological cycle and 50% of world's populace relies upon day by day on groundwater for.Their eating puipose. These days, human hobby including city development, industrial processing, agricultural wastes, home waste water, chemical spills and even character residence maintain septic structures have added on widespread groundwater infection.

In fact, it has emerge as a dumping place for all sorts of pollution which can be being discharged into the surroundings inside the form of commercial effluents, domestic robust waste and agricultural waste. These effluents are generally infiltrated to the groundwater. Water excellent is a simple need for lifestyles especially in rural zone with its huge wide style of inadequacies- poverty, unhygienic situations, malnutrition, disorder, lack of know-how, shortage of medical help and lots of others. Some of those are synchronised with the terrible high-quality of water and lack of expertise approximately water-borne microbial risks.

The fundamental records at the satisfactory and standing of water is an essential difficulty as the water has been subjected to many makes use of. The winning research is undertaken so that it will check and screen the terrific versions in groundwater on account of natural and anthropogenic activities in the test region.

In this study, multidisciplinary method has been followed concerning the most chemical and physical and bacteriological parameters and trace metals. This study is an attempt in the direction of the knowledge of numerous herbal and anthropogenic strategies influencing the water first-rate within the have a look at area. The study on water of Arsikere taluk for duration of years has located versions some of the one-of-a-kind parameters seasonally at one-of-a-kind examine locations. For the assessment of groundwater, 20 sampling web sites had been decided on. The test consists of the collection of the water samples following the random sampling approach. Few of the parameters were analyzed on the spot and the very last parameters were analyzed in the laboratory interior 24 hrs. following APHA technique.

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The evaluation became made following titration techniques and substantial procedures using Atomic Absorption Spectrophotometer (AAS). For E. Coli examination sampling have become finished the usage of a sterile glass stopper bottle, blanketed with aluminum foils to prevent contamination. Very last estimation became made with the aid of membrane filter technique. Statistical evaluation changed into finished thru SPSS version 10. The interrelationship a few of the diverse chemical and physical and bacteriological parameters inside the groundwater has been evaluated. Further, the groundwater changed into labeled on the basis of Freez and Cherry (1979), Sharma (1982) and Stuyfzand's class.

The diverse chemical and physical parameters studied, As a measure of water quality, pH is crucial. It's specifies how acidic or basic a given solution is. In the dry months before the monsoons, the PH ranged from 7.09 to 8.3, with a mean of 7.65. During the monsoon season, the pH varied from 6.7 to 8.7, with a mean of 7.55, and after the monsoons, the range was from 7.09 to 8.28, with a mean of 7.62 (table 9,,12). A high pH value suggests alkaline water is present below. For human consumption, a pH value of 6.5 to 8.5 is recommended.

Electric conductivity awareness ranged from no less than 520 mg/I to no more than 1850 mg/I before the monsoons (table 7), from no less than 750 mg/I to no more than 1950 mg/I during the monsoons (table 8), and from no less than 1200 mg/I to no more than 1850 mg/I after the monsoons (table 9). Based on the measured electrical conductivity values, we know that 20% of the samples are within the allowable class, 48% are brackish, and 32% are saline. To the same extent, it has been shown that electrical conductivity values have shown an upward tendency in the pre-monsoon and monsoon seasons, relative to the pre-monsoon and monsoon seasons that occur simultaneously. Because of a rise in groundwater table, mineral, salt, and unique soil element dissolution is greater when the monsoons end.

The values of TDS confirmed that 76% of the water samples are sparkling and 24% fall in brackish class. Further, it has been positioned that the TDS values exhibited an growing fashion in the route of positioned up-monsoon season in comparison to pre-monsoon and monsoon seasons. That is because of dissolution of greater amount of ingredients of soil debris as groundwater desk will growth in the path of put up-monsoon season. It represents the version some of the seasons.

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