International Journal of Scientific Engineering and Research (IJSER)
ISSN (Online): 2347-3878 (UGC Approved, Sr. No. 48096)
Index Copernicus Value (2015): 62.86 | Impact Factor (2015): 3.791

Studies on the Physico-Chemical Parameters of Ground Water Quality Analysis in and around Kalburagi, Karnataka, India

Rekha S. Choudhary, Dr. Mohan I Naik*

Department of Environmental Science, Gulbarga University, Kalburagi
*Agricultural science University GKVK, Bangaluru.
*Corresponding Author: mohanishwarnaik[at]yahoo.in

Abstract: ***Ground water is one of the major drinking water in rural area of Gulbarga district, the present study groundwater quality of the selected villages near by jewargi taluka were taken for under investigation by collecting water samples 5 sites ground water samples from randomly sites were selected from each taluka, assessed for suitability of human consumption. Physico-chemical parameters were carried out during different months of the pre-monsoon and monsoon, post-monsoon season in 2014 to 2016. A comprehensive study on distribution pattern of fluoride content and some of physico- chemical parameters of Ground water quality analysis in chittapur& Aland taluka around the 10 selected villages is extensively monitored for seasonal wise monsoon, pre-monsoon, and post monsoon from 2014to 2016.Borewlls from different areas were selected and fixed for sampling station, Gulbarga District for Ground water Quality Analysis. The collected samples were analyzed for physico-chemical parameters and majorly fluoride content in the Ground water because gulbarga district became a high fluoride area, the study revealed that naturally occurring Flouride contamination in Ground water of study area is more wide spread than in generally recognized. Our study has been shown a higher 1) Flouride0.505 -4.05 pre-monsoon to monsoon 0.902 – 1.165ppm it's not in the permissible limits its varied 2) chloride 357to 333 & 346.7 – 325 mg/l 3)Alkalinity the values is 562 mg/l 4), PH value is within the permissible limit 7.40 to 8. 5) Colour the present values varied from minimum of 3-31HSU in all the study areas, the mean values is HSU, 6) TURBIDITY values ranged between 1.5 to 7.1 NTU in January 2013 to 2014 the mean values showed 3.74 NTU respectively it's in permissible limits, 7) TDS value is in the month of April to may it increases its values 532 – 449 and to the TDS values have exhibited has increasing trend in to pre-monsoon 502.5 -998 season of monsoon is 1151.5-979 8) EC value is 40% of the sampling station its fall in the permissible limits pre-monsoon 887.5-1778.5 to monsoon seasonal value is1897 -1824 mhos/cm 9)DO in the month of January to a maximum of 8.57 mg/l in the month of may present study revealed that pre-monsoon to monsoon season value is 5.1to 5.35 to 4.8-5.3 10) TH the mean values of TH is 343.55 mg/l its very hard category > 300 mg/l 11) calcium 262.5-260mg/l monsoon season 217.5 -255 its cross the permissible limits 12)Magnesium pre-monsoon 53- 66 and 56.0 – 73 in the monsoon value is mg/l so that the water samples in the all the months are not in the under permissible limits. The permissible limit of Flouride content in its varied station to station, as provided by WHO. Entire Gulbarga District sampling station.***

Keywords: Ground water, physical parameters, chemical parameters

1. Introduction

Water intended for human consumption must be free from organism and chemical constituents that may be hazardous to human health. With increased consumption of water, it plays important resources for all kinds of life in this planet. The quality of water depends on a large number of individual hydrological, physical, chemical and biochemical factors. Chemical parameters are the most important indices, which characterizes the quality of water.

Quality of ground water is equally important to its quantity owing to the suitability of water for varies purposes, water quality analysis in an important issue in Ground water studies, variation of Ground water quality in an area is a function of Physical –chemical parameters that are Greatly influenced by Geological formation and Anthropogenic activities (Belkhiri et al 2010).

The hydrochemical study reveals the quality of water that is suitable for drinking, Agricultural and industrial purposes and helps in understanding the change in quality due to rock. Water interaction or any type of anthropogenic influence (Kelly 1940; Wilcox 1948).

Water was created three billion years ago (Beck, 1985). Earth is said to be a water planet and 70.8% of earth's surface is covered by water. Its reserve is definite and the same water is being used in time and recycled. The self purification capacity during recycling is a prominent phenomenon. Only one percent of earth's water passes the cyclic path and is referred as hydrological cycle (Gupta et al., 2000). The water in the hydrosphere is distributed to an extent of about 97.5% in the oceans as salt water and remaining 2.7% is distributed over the continents as fresh water and as polar ice caps.

Groundwater is an important national asset and one of the earth's renewable resources which occurs as a part of hydrological cycle. It is primarily stored in aquifers, which are geological formations of permeable structured zones of rock sand or gravels (Mehta and Trivedi, 1990). The quality of groundwater depends on the quality of soil through which it percolates. Most of the bacteria, organic compounds and biocides are filtered out during percolation (Beck, 1985). The groundwater pollution is difficult to detect and it is more difficult to control and may persist for decades (Singh et al., 2001).

The present work had the objective of understanding the fluoride and anthropogenic constituents of ground water related to its suitability for domestic use.

2. Problems in the Study Area

There are three main sources of Ground water pollution. These include natural resources, waste disposal activities, industrial waste dumping, spills, leaks, non point sources activities such as Agricultural management practices.

The ground water quality is in around Gulbarga District potable. All the people used in domestic purpose. The Agricultural communities utilized the ground water for farming in their lands, but today the scenario is completely different, in many part of Gulbarga district ground water usage is obsolete. Therefore water quality monitoring is necessary in Gulbarga district.

3. Study Area

Gulbarga district lies in the northern part of Karnataka between 16°11' –17°45' N. latitudes and 76°03' - 77°30' E. longitudes, with a geographical area of 16, 174 sq. km. Gulbarga is one of the chronically drought prone district in North Karnataka. The district is bounded by Bidar district in the north, Bijapur district in west, Raichur district in south and Andhra Pradesh in the east. Gulbarga is the district headquarters. The district comprises of 7 taluks namely, Aland, Afzalpur, Gulbarga, Chincholi, Chittapur, Sedam, Jewargi.

4. Materials and Methods

Ground water samples were collected in polythene bottles. Date, time of collection and source of water and locality of the area were recorded properly. From each of the sampling site, were collected for physic-chemical Analysis, Temperature and PH determined were determined immediately at the sampling station. Samples were taken to the laboratory as early as possible and kept for further analysis. Usually 2=liters of samples were sufficient for analysis of physic-chemical parameters. Analysis caused for out for various water quality parameters, using standard methods (APHA – American Public Health Association.17TH Ed.1989).

As there are several sampling designs available, only one design has been chosen for the study area such that for a given sample size and for a given budgetary constraint will have a smaller sampling error. For the present investigation probability sampling design was selected. Probability sampling design is also known as random sampling or chance sampling has an equal chance of inclusion of every item of an object in the sample. Random sampling (Bisht, 1978) ensures the law of statistical regularity, which states that the sample should represent the composition and characteristics of the whole region as the object under consideration. This may be the reason why random sampling is considered as the best technique of selecting a representative samples.

Water samples from the sampling localities were collected from the bore wells. Initially the water was allowed to run for 15 minutes in order to flush out stationary water. Further, the sample bottles were also flushed with water before the samples were collected. As water is dynamic in nature and during sampling it enter the new environment from its natural environment, its chemical composition may not remain same but may tend to adjust itself according to its new environment (Sawyer, 1978) and its content alters at very different rates particularly with organic materials. Therefore, as soon as the collection of water, temperature and pH were measured immediately. The other parameters of water such as dissolved oxygen, total dissolved solids, and electrical conductivity were analyzed in the spot. The remaining parameters were analyzed in the laboratory. Hence, the water was carried to the laboratory in suitable inhert bottles. The samples were analyzed using various analytical method of (APHA, 1995; BIS, 1998; NEERI, 1998.

5. Result and Discussion

The various physico-chemical characteristics were analyzed for ground water 5-different sampling stations. The details of the results were summarized in the table.

PH:

The PH value of the water source is a measure of the hydrogen ion concentration in water and indicates whether the water is acidic or alkalinity. Most of the biological and chemical reactions are influenced by the pH of water system. In the present study all the ground water samples have pH values between 6.0-8.5, while WHO is between 7.0-8.5.the sampling stations of in the month of march and may they have lower value of PH than the permissible limits, if the PH is beyond the permissible limits, it damages the mucuos membrane of cells.

The pH values in the present investigation varied from a minimum of 7.0 (S7) to a maximum of 8.7 (S34) in pre-monsoon. During monsoon, it ranged between 7.12 (S18) to 8.7 (S32) and in post monsoon, it ranged between 7.5 (S6 and S31) to 8.8 in S32 (Table 9). The recommended - value of pH for drinking purposes is from 6.5 to 8.5 (BIS, 1998). The data obtained reveals that the pH in all the water samples analyzed are all well within the permissible limits except in (S44 and S42, which showed the slight increase in the water pH than the permissible limits. Similar observations were made by Narayana and Suresh 1989, Gill et al., (1993), Mehta and Trivedi (1993), Mittal et al., (1994) in their studies.

Colour (Col)

In natural water, colour may occur due to the presence of humic acids, fluvic acids, metallic ions, phytoplankton, weeds and industrial effluents. In some highly coloured industrial wastewater principally colloidal or suspended matter contributes the colour. The intensity of sewage colour is due to strength and condition of the sewage. Colour developed by dissolved solids, dissolved gases, decomposition of vegetarian organic matter, microorganisms, excess of iron and manganese etc. Colour less and above the tolerance limits causes repellant in the consumers (Abbasi, 1998).

In the present investigation, colour values varied from a minimum of 3-31 HSU in the all the study areas monsoon season and 2.1-119 HSU in post-monsoon season. The mean values 17 HSU The BIS acceptable limit for colour is 25 Hazen units. In the present study, BIS (1998) acceptable limits for drinking water (5.0 to 25.0 Hazen units)

Turbidity (Tur)

It is responsible for the light to be scattered or observed rather than straight transmission through the sample. It is the size, shape and refractive index of the suspended particulate matter rather than the total concentration of the matter present in the water samples. The size of the suspended matter varies and it ranges from colloidal to course dispersion, depending upon the degree of turbulence and also from pure inorganic substances to those that are highly organic in nature. It decreases the light penetration, limits the production of phytoplankton, which in consequence decreases the photosynthetic activity and depletion of oxygen content. It is the resistance of water to the passage of light. In natural water, it is caused by suspended matter like clay, silt organic matter, phytoplankton and other microscopic organisms and is the expression of tyndall effect. It restricts the light penetration in water, resulting in reduced primary production. Under flood conditions and soil erosion, great amounts of topsoil are washed into receiving streams. Groundwater is less turbid since, sand is a good filtering media.

In the present study, the turbidity values ranged between 1.5 to 7.1 jan 2014 and may 2014 in the bellowed table. mean valued showed 3.74 NTU respectively. The BIS (1998) acceptable limit for turbidity is 25 NTU. In the present study, the mean values shown permissible limits with reference to the BIS standards.

Electrical conductivity (EC)

Electrical conductivity is a measure of water's capacity to carry electric current. It is directly proportional to its dissolved mineral matter content. Several factors influence the conductivity, such as temperature, ionic mobility and ionic valences. It is the overall concentrations of ions present in the water which influences conductivity. In turn the conductivity becomes an indicator of dissolved ions present in any water sample. Pure water is a poor conductor of electricity and such substances are called electrolytes. Its value depends on concentration and degree of dissociation of the ions as well as migration velocity of the electric field.

In the present study, the values of electrical conductivity ranged between the minimum of 241 μmhos/cm (S31) and a maximum of 3650 μmhos/cm (S6) in pre-monsoon season (Table 10). Similarly, S31 has recorded the lowest electrical conductivity in monsoon (214 μmhos/cm) and also in post-monsoon (230 μmhos/cm) and maximum values recorded in S6 (3547 μmhos/cm and 3715 μmhos/cm respectively for monsoon and post-monsoon seasons) (Table 10). Owing to the fact that during post – monsoon season the dissolution of salts, minerals and other soil constituents increases due to increase in the ground water table (Shivashankaran, 1997, Basavarajappa 2002 and Gupta et al., 2009).

Total dissolved solids (TDS)

The substances dissolved in the water were estimated. Dissolved materials result from the solvent action of water on solids, liquids and gases. The dissolved substances may be organic or inorganic in nature. A large number of salts are found dissolved in natural water. The term solid refers to the matters either filterable or non-filterable that remain as residues in water. It includes all soluble materials in solution whether ionized or non-ionized. It does not include suspended sediments, colloids or dissolved gasses. TDS values are estimated by pursuing the empirical relationship (USSLS, 1954; Hem, 1985; Kotaiah and Kumaraswamy, 1994; Rambabu et al., 1996). TDS is commonly found in carbonates, bicarbonates, chlorides, sulphates and nitrates of calcium, magnesium sodium, potassium, iron and manganese mineral containing rocks. A high content of dissolved solids elevates the density of water, influencing osmoregulation of fresh water organisms, reduces solubility of gases (oxygen) and utility of water for drinking, irrigation and industrial purposes.

Many dissolved substances are undesirable in water. Dissolved minerals, gases and organic constituents may produce aesthetically displeasing colour, taste and odour. Some dissolved chemicals may be toxic. The dissolved solids increase with depth and with the time and water has traveled in the ground.

In the present study TDS values ranged from a minimum of 580mg/l to a maximum of 1754 mg/l in the TDS values have exhibited an increasing trend in April and May month. Groundwater chemistry changes as the water flows through the subsurface and the increase in geological environment and dissolved solids and major ions. Chebotarev (1985), Ramababu and Somashekara Rao, (1986) and Joseph (2001) expressed the dissolution of soil particles are responsible for increase in TDS concentration in groundwater. Above the permissible limit (1500 ppm), TDS causes gastrointestinal irritation (Shankar and Muttukrishnan, 1994).

Chemical Parameters

Dissolved oxygen (DO)

The amount of oxygen dissolved in water is referred as DO. It is an important parameter represents the quality of water. It is an index of physical and biological processes occurred in water. DO values varies are varying a according to the physical and chemical activities The DO values of study area are above the permissible limits of WHO (6 ppm) The ranges of DO have been found in between pre-monsoon season 5.1-5.35mg/l and 4.8-5.3 in the monsoon season.

In the present study, the values of DO varied from a minimum of 2.0 mg/L (S49) to a maximum of 7.5 mg/L (S8) in pre-monsoon season (Table 12) and in monsoon season the minimum of 1.8 mg/L (S26) and maximum of 7.0 mg/L (S9). In post-monsoon season the concentration of DO varied from a minimum of 1.8 mg/L (S26) to a maximum 6.8 mg/L (S8) (Table 12). The lowest values were not acceptable for drinking purpose and can be used for irrigation and other purposes in consideration with the dissolved oxygen alone.

Total hardness (TH)

Total hardness of water is the sum of concentration of alkaline earth metal cations present in it. Calcium and magnesium are the principle cations imparting hardness. It is defined as the concentration of multivalent metallic cations in solution. At saturated conditions, the cations react with anions in water to from solid precipitate.

Hardness in natural water comes mainly from the leaching of igneous rock and carbonate rocks (dolomite, calcite and limestone). Water containing the soluble salts of calcium and magnesium such as chlorides, sulphates and bicarbonates is called hard water (Ramaswamy and Rajaguru, 1991). Generally hard water originates in the areas where thick topsoil and lime stone formations are present. Soft water originates in the areas where the topsoil is thin and limestone formats are absent. The hardness in water is derived largely from contact with the soil and rock formation. The ability to dissolve the ions is gained in the soil where CO_2 exists in equilibrium with carbonic acid. Under low pH condition, the basic materials particularly limestone formations are converted to soluble bicarbonates.

The hardness values shown ranges from 132.0mg/l to 228.0mg/l. The values for samples from all sampling stations were below the permissible limits.

In the present study total hardness values varied from a minimum of 145 mg/L (S49) to a maximum 1260 mg/L (S6) in pre-monsoon season and minimum of 112 mg/L (S31) to a maximum of 1330 mg/L (S6) in monsoon season. In post-monsoon season the values ranged between 141 mg/L (S49) to 1442 mg/L (S6) (Table 21). The Station 6 has been recorded the highest value of the total hardness among all the seasons.

Calcium (Ca^{2+})

Calcium is found abundant in all natural waters and its source lies in the rocks from which it is leached. Its concentration varies in natural waters depending upon the nature of the river basin. Calcium is important micro-nutrient in an aquatic environment. Water receives the calcium leached from the rocks and deposits like limestone, dolomites, calcite, gypsum, amphiboles, feldspar, and industrial waste are also important sources of calcium (Mishra and Saxena, 1989).

Calcium is essential for normal human growth. It has been found in several epidemiological investigations in the USA and European countries that drinking water hardness, i.e., concentration of calcium and magnesium, is associated to cardiovascular mortality in particularly adult mortality (Schroeder, 1960; Crawford et al., 1968; CEC, 1976; Sonneborne et al., 1983).

Present investigation, reports that calcium values ranged from minimum of 63 to a maximum of 156mg/l. The lowest was recorded in the month of January. The mean values recorded as 101 mg/l The BIS (1998) acceptable limit for calcium 200 mg/l.

In the present study, reports that calcium values ranged from minimum of 50 mg/L (S30) to a maximum of 621 mg/L (S6) in pre-monsoon season, 38 mg/L (S30) to 737 mg/L(S6) in monsoon season and 30 mg/L (S20) to 568 mg/L (S32) in post monsoon season (Table below).

Magnesium (Mg^{2+})

Magnesium is a necessary constituent of chlorophyll without which no ecosystem could operate. The concentration above 500 mg/l of magnesium reduces the utility of water for domestic use and imparts water an unpleasant taste and renders it unfit for drinking purpose. High amount of magnesium has been proved to be health hazardous if present in excess quality in drinking water (Agarwal and Raj, 1978; Schroeder et al., 1960). High concentration of magnesium proves to be diuretic and laxative.

In the present study, the values of magnesium values ranged from 40 to 90mg/l. The acceptable limit for magnesium is 100 mg/l and in the present study 8.33% of the water samples in all the sampling stations crossed the permissible range.

In the present investigation, magnesium values varied from a minimum of 5.8 mg/L (S39) to a maximum of 184 mg/L (S30) in pre-monsoon season and a minimum of 4.2 mg/L (S39) to a maximum of 180 mg/L (S30) in monsoon season. In post-monsoon season, the values of magnesium ranged between 5.7 mg/L (S46) to 185 mg/L (S30) (Table 23)

Chloride (Cl^-)

Chlorides occur in natural water in varying concentrations. The chloride content increases as the mineral contents increases. It is commonly found in soils and rocks. The primary source of chloride is sedimentary rocks and saline water intrusion and the minor sources are igneous rocks. High concentration of chloride makes water unpalatable and unfit for drinking and other purposes.

The chloride concentrations serve as an indicator by sewage. Chloride in water is subjected to laxative effects. in the present analysis, chloride concentration was found in the range of 112.0mg/l to 467.6mg/l, the study areas chloride level is above and below the permissible limits of WHO (200ppm) which indicates high concentration of chloride present in chittapur taluka shahabad s1 and

Tengali S2and S6 Khajuri & Attur S7 remaining station indicates that below the permissible limits.

Fluoride (F-)

Fluoride is widely dispersed in nature and is common constituent of most soils, rocks, plants and animals. Due to its high electronegativity, it forms only fluorides and no other oxidation state are found (Hem, 1992).

Fluorine is a common element representing about 0.38 gm/kg of the earth crust, which exists in the form of fluorides in a number of minerals. Fluorides are used in the production of alluminium, brick, tiles, ceramics, phosphate fertilizers and toothpaste (GCDWK, 1979). The high concentration of fluoride causes mottling of teeth, skeletal fluorosis, bending of vertebral column, deformation of knee joints and other bone disorders of the body and even causes paralysis.

Fluoride enters the environment through natural as well as anthropogenic sources. The chief sources of fluoride are minerals viz., (fluorite, fluorapatite, micas and hornblend) rocks and sediments. Fluoride bearing minerals occur in all geological factors such as sedimentary, metamorphic and igneous deposits (Korting, 1979 and Hemm, 1985).

Robinson et al. (1996) had reported the main source of fluoride in ordinary soil that contains clay minerals. Natural concentration of fluoride in groundwater depends on the availability of fluoride in rocks and minerals encountered by the water as it moves along the flow path. The distribution of fluoride in groundwater depends on number of factors, such as amount of soluble and insoluble fluorine in source rocks, rainfall, vegetation, redox potential, pH and ion exchange process. Fluorides are more common in groundwater than in surface water. The main sources of fluoride in water are various fluoride bearing rocks. Fluoride occurs in traces in many waters but higher concentration is observed in groundwater. The highest natural level of fluoride in groundwater was 2800 ppm (WHO, 1994). High concentrations of fluorides have been reported in India in the states of Tamil Nadu, Andhra Pradesh, Kerala, Karnataka, Gujarat, Rajastan, Punjab and Bihar (Pathak and Badre, 1999).

Fluoride ions have dual significance in water supplies. High concentration of fluoride causes dental fluorosis (disfigurement of the teeth). At the same time, concentration less than 0.6 ppm results in dental caries and dental mottling (Rao et al., 1994). Hence, it is essential to maintain fluoride concentration between 0.6-1.2 ppm in drinking water (WHO, 1994).

In the present investigation, fluoride values varied from a minimum of 0.12 mg/l to a maximum of 1.68 mg/l.all the samples were shown above the permissible limits it cross the limits.

Table No A: Average result of the physical–chemical parameters of different sites in Gulbarga District surrounding villages:

Table A: Physicochemical parameters of the study sites - Monsoon for the year: 2014-16

Sample No.	AT	pH	EC	TDS	DO	Alk	Mg^{++}	Cl^-	F^-	TH	Ca^{++}
S_1	30	7.78	897	479	4.4	46	46	61	1.84	304	113
S_2	29	7.45	1380	737	4.7	50	55	205	1.54	456	228
S_3	24.5	7.7	2030	1091	3.3	40	67	348	1.13	540	262
S_4	23.5	7.93	1793	960	4.8	56	23	243	3.5	164	67
S_5	25	7.65	953	508	3.5	38	28	88	1.68	270	151
S_6	24	7.17	3625	1952	5.5	60	144	863	0.35	1330	737
S_7	24	7.46	1921	1028	4.8	48	108	365	0.66	770	323
S_8	22	7.67	1456	779	6.9	55	62	200	0.88	476	218
S_9	20	7.23	2804	1505	7	50	119	572	0.87	964	474
S_{10}	31.5	7.37	2320	1241	5.4	48	78	469	0.78	678	354
S_{11}	28.5	7.65	650	347	3.9	33	30	54	1.23	240	113
S_{12}	28	7.44	3294	1756	6.4	46	103	764	0.97	906	480
S_{13}	32	7.49	1662	889	5.5	44	79	341	0.87	540	214
S_{14}	30	7.67	1487	795	3.8	45	62	235	2.33	378	123
S_{15}	27	7.58	2788	1488	5.3	63	96	673	1.14	650	256
S_{16}	28	7.76	1453	776	4.5	45	74	246	1.47	516	212
S_{17}	29	7.36	1955	1044	5.2	52	85	327	1.36	566	214
S_{18}	26	8.12	807	429	3.7	42	26	37	1.69	228	119
S_{19}	26	8.15	690	368	3.2	35	23	44	1.43	238	140
S_{20}	27.5	7.8	1108	591	3.8	46	40	153	0.55	390	222
S_{21}	31	7.6	2749	1460	6.5	52	76	601	1.48	642	329
S_{22}	33.5	7.9	1693	902	5.7	41	86	317	1.15	612	258
S_{23}	32	7.9	1828	441	4.5	45	31	75	0.8	336	208
S_{24}	30.5	7.93	1551	830	6	48	72	225	0.094	614	305
S_{25}	29	7.8	1525	812	5.2	58	76	207	1.42	418	102
S_{26}	27	7.7	1880	1003	5.2	47	50	341	2.51	384	178
S_{27}	23	7.97	1368	725	4.7	39	24	215	4.53	208	109
S_{28}	23	8.1	930	496	3.2	50	32	77	0.67	298	163

S_{29}	26	7.8	1071	568	4.1	48	35	103	2.16	256	109
S_{30}	24	7.5	2529	1349	6.5	33	167	663	0.86	1086	401
S_{31}	22	7.8	266	133	2.8	34	10	21	0.29	112	69
S_{32}	22	7.6	2114	1127	6.1	44	56	48	0.2	886	535
S_{33}	21	8.1	997	526	3.4	48	19	73	4.14	130	50
S_{34}	30.5	7.7	1489	795	4.6	51	60	225	1.79	464	214
S_{35}	28	7.4	1824	973	5.1		69	325	0.71	542	258

Table A: Physicochemical parameters of the study sites - Pre Monsoon for the year: 2014-16

Parameters	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Temp										
PH	7.12	6.78	7.38	7.7	6.72	6.78	7.2	6.78	8	7.5
EC	1880	2107	1278	956	1980	1910	2250	1265	980	1910
TDS	1410	1520	692	580	1528	1610	672	675	612	1520
Turbidity	1.8	6.4	3.2	3.4	5.6	6.4	3.6	1.5	5.3	3.6
DO	14.5	9, 37	14.4	13.24	7.65	7	14.05	8.2	9.42	7.23
TH	362	408	292	280	393	410	318	309	370	400
Calcium	48	40	18	6.8	102.4	112	110	118	130	128
Magnesium	23.4	36.1	27.7	76	83	55.6	81	20	27.328	41.13
Chloride	96.5	234	213	112.2	156.8	114.7	467.6	250	298	420
Flouride	2	1.5	2.2	1.7	1.8	1.2	2	2.1	2.2	1.9
Alkalinity	300	250	350	240	340	360	530	400	370	520

Atmospheric Temperature

Gulbarga district lies in the northern plains of Karnataka and has semi – arid type of climate. Dry climate prevails for most part of the year. December is the coldest month with mean daily maximum and minimum temperatures being the mean value of pre-monsoon season has 28.5^{o}C & monsoon 24^{o} C in the month post monsoon is 26.5 ^{o}C respectively.

6. Result and Discussion

Fresh water is limited and a precious resource is often taken for granted. While many areas of the developing world has lack supply of safe drinking water. Water has become a major issue for the 21st century and an international and national conflict.

In most part of our country, extraction of water from rivers and underground aquifers is being a severe environmental problem. It is therefore important that adequate supply of water is necessary to sustain the life. Development of water supply services be undertaken in such a way as to preserve the hydrological balance and the biological functions of the ecosystem. The development of water sources must be within the capacity of nature to replenish and to sustain. If this is not done, more mistakes can occur with serious consequences.

Recently, due to climatic changes and demographic pressure, there is an increasing demand for water resources. India is one of those very few countries in the world, which are facing an extremely severe water scarcity problem. The available information indicates that groundwater resources have been severely over exploited and in most cases it has exceeded safe yield level.

Physico-Chemical Parameters

Water analysis was carried out, by taking 12 parameters, which are very essential to know the water qualities for drinking purpose. The parameters are differentiated as physical and chemical. The physical parameters includes colour, turbidity, pH, electrical conductivity, total dissolved solids, while chemical parameters includes dissolved oxygen, total hardness, calcium, magnesium, Fluoride, Akalinity chloride. The standard values of various physico and chemical parameters for drinking water as per BIS and WHO are presented.

7. Conclusion

- In this study area, an attempt has been made to identify the pathway and contamination of major ions, nutrients in the groundwater of some of talukas of Gulbarga Districts and surrounding area. The prominent sources of Pollutants and natural agencies that are responsible for contamination in the study area are Domestic/ Municipal sewage and over exploitation of Ground water to meet the demand for fresh water are the prominent causes for decreasing quality of Ground water. Hence, the following recommendation needs to minimize or reduce the further deterioration of Ground water quality in the present investigation.
- The study revealed that the Gulbarga District and Surrounding talukas. Comprising lack of adequate sanitary and drainage facilities. Therefore, an attention of concerned authorities must be made to take appropriate steps in providing the necessary facilities to supply safe drinking water to the people of this area.
- An artificial recharge of Ground water may be adopted to reduce higher concentration of chemical parameters where it is necessary.

References

[1] ABBASI, S.A. 1998. Water quality sampling and analysis, 1: 40-48

[2] Abdulla, H., A.B. Choudary, S.M. Rahaman and M.A. Zaman. 2000. Impact of sugar mills effluent on water quality and aquatic biota in Rajashahi, Bangladesh. Ecology, Environment and Conservation, 6(1): 121-126

[3] ADHIKARI, S., S.K. GUPTA AND S.K. BANERJEE. 1997. Long term effect of raw sewage application on the chemical composition of groundwater. Journal of Indian Society of Soil Science, 45(2): 392-394

[4] Adrino, D.C. 1986. Trace elements in the terrestrial environment, Springer Verlag, New York, p. 533

[5] Mishra K.R. Pradip, Tripathi: S.P Ground water quality of open wells Tube wells, Acta Cieneia Indica, 2

[6] Patil.P.R Badgujar S.R and Warker A.M Evaluation of ground water quality in Ganesh colony Area of Jalgaon city, oriental J Chem, 17(2), 283(2001).

[7] Lokeshwari H. And Chandraprabha G, T. Impact of Heavy metals contamination of Bellandur lake on soil and cultivated vegetation curr, sci, 91 (5), 584(2006).

[8] Chilton, P.J., A.R. Lawrence and M.E. Stuart. 1995. The impact of tropical agriculture on groundwater quality. In: H. Nash and G.J.H McCall (ed.), Groundwater quality. Chapman and Hall, London. 113-122.

[9] Harish Babu, K., E.T. Puttaiah and Vijaya Kumara. 2006. Groundwater quality of Tarikere taluk, Karnataka state. Journal of Living

[10] Dara, S.S. 1993. A textbook of environmental chemistry and pollution control. S. Chand and Company Pvt. Ltd., New Delhi. 64-99.

[11] Das, S., B.C. Mehta, S.K. Samanta, P.K. Das and S.K. Srivastava. 2000. Flouride hazards in groundwater of Orissa, India. Indian Journal of Environment Health, 1(1): 40-46

[12] Davina, V. Gonzalves and Joe D'Souza. 1999. Impact of the tourism industry on groundwater in Calangute of Goa. J. Ecology, Environment and Conservation, 5(1): 19-24.

[13] Drever, J.I. 1988. The geochemistry of natural waters. 2nd ed. Prentice Hall, p. 22.

[14] Duan, A. and D. Kofi. 1993. Hazardous waste risk assessment, Library of congress cataloging in publication, Data Lewis Publication, 8-9.

[15] Edmunds, W.M., J.M. Cook, W.G. Darling, D.G. Kinniburgh, D.L. Miles, Bath., J.M. Margan and J.N. Andrew. 1987. Baseline geochemical conditions in the chalk aquifers, Berkshire, U.K. A basic for groundwater quality management. Applied Geochem, 2: 251-274.

[16] Elango, L., T. Subramani and S.R. Damodarasamy. 2004. Hydrogeological setup and quality assessment of groundwater in Chithar Minor Basin of Tamirabarani River basin Tamil Nadu. Proceedings of Abstract volume of International Seminar on Earth Resources Management, Dept. of Post Graduate Studies and Research in Applied Geology, Kuvempu University, Shankaraghatta, 41-42.

[17] Fe Achem, R., R. Me Garry and D. Mara. 1978. Water wastes and health in hot climates. English Language Book. Society and John Wiley and Son's Chichester, 18-20.

[18] Foster, S.S.D., M. Ventura and R. Hirataa. 1987. Groundwater pollution; An executive overview of the Latin America-Caribbean situation in relation to potable water supply. Pan American Center for Sanitary Engineering and Environmental Sciences. Lima, p. 38.

[19] World, 13(1): 18-25