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Ground Water and Surface Water Studies in and around Nagarbhavi

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ABSTRACT: Due to human and industrial activities the water bodies are contaminated. This is a serious problem now a days . Thus the analysis of the water quality is very important to preserve natural ecosystem.The assessment of the water quality is carried out on surface water and ground water in and around NAGARBHAVI , BENGALURU.The present work is aimed to at assessing the ground water quality index for the surface water and ground water in and around NAGARBHAVI. The lake water samples and ground water samples of all the selected borewells were collected for a physicochemical and biological analysis. For calculating present water quality status by statistical evaluation and water quality index. Following parameters pH value, Specific conductance,odour, taste, colour, turbidity, total dissolved solids, alkalinity, total hardness, calcium, magnesium, chloride ,sulphate, fluorides, nitrate, iron and etc. The obtained results are compared with IS 10500;2012 and WHO. The study of physicochemical and biological characteristics of water samples suggests that the evaluation of water quality parametersas well as water quality management practices should be to protect the water resources.

Keywords: Parameters pH value, Specific conductance,odour, taste, colour, turbidity, total dissolved solids, alkalinity, total hardness, calcium, magnesium, chloride ,sulphate, fluorides, nitrate, iron and etc.

I. INTRODUCTION

Water is the most essential component for all living things. Living things cannot survive without water. It is one of the most essential constituents of the human environments. It is used for many purposes viz. drinking, irrigation, industrial water supply. It is also used for hydro- electric power generation. The quality of ground water varies from one place to another along with the depth of water table .it also changes with seasonal variation and is primarily governed by the extent and composition of dissolved solids present in it. Drinking water needs to be protected from pollution and biological contamination. Underground water is clean but it depends upon quality and quantity of materials dispersed and dissolved in it. The reason for contamination and pollution of water in the surroundings and in the storage are pesticides, fertilizers, industrial wastes .

The physico-chemical contaminants that adversely affect the quality of groundwater may be arises from a variety of sources, including land application of agricultural chemicals and organic wastes, infiltration of irrigation water, septic tanks. Ground water quality is usually characterized by different physico-chemical characteristics.These parameters varies widely due to the various types of pollution, seasonal fluctuation and groundwater extraction Therefore, a continuous monitoring on groundwater becomes essential in order to minimize the groundwater pollution have control on the pollution- caused agents.

II. LITERATURE REVIEW

Alimuddin;Assessment of Ground Water Quality in Rajajinagar of Bangalore.Water borne diseases continue to be a dominant cause of water borne morbidities and mortality all over the world. Hence, drinking water needs to be protected from pollution and biological contamination. Ground water samples were collected from ten different sampling point in Rajajinagar area of Bangalore and analysed for water quality parameters viz. pH , total alkalinity, chloride, total dissolved solids, electrical conductivity, sodium, potassium, calcium, magnesium, dissolved

oxygen, BOD, COD and total hardness. The pH value of the study area ranges between 7.3 to 8.4 indicating that ground water is slightly alkaline. The total alkalinity are varied in the range from 122 to 282 mg/l which is well within the limit prescribed by BIS. The TDS value found from 397 to 546 mg/l. The values of hardness of water ranges from 125 to 267 mg/l which is within the prescribed limit as per BIS.

Venkatesha. G, Samarth. Urs. M, Ramaraju. H. K, Arun KumarSharma;Groundwater Geophysical Studies in the Developed and Sub-Urban BBMP Area, Bangalore, Karnataka, South India.The projection for Groundwater states that the total domestic water demand for greater Bangalore would increase from 1,170 MLD in 2010 to 1,336 MLD in 2016. Dependence on groundwater is ever increasing due to rapid Industrialization & Urbanization. It is estimated that almost 40% of the population of Bangalore is dependent on groundwater. Due to the unscientific disposal of domestic and industrial waste generated, groundwater is getting highly polluted in the city. The scale of this impact will depend mainly upon the water-service infrastructure, the superficial geology and the regional setting. The quality of ground water is equally important as that of quantity. Jointed and fractured granites and gneisses constitute the major aquifer system of BBMP area.Two new observatory Borewells were drilled and lithology report has been prepared. Petrographic Analysis (XRD/XRF) and Water quality Analysis were carried out as per the standard methods. Petrographic samples were analysed by collecting chip of rock from the borewell for every 20ft depth, most of the samples were similar and samples were identified asBiotite-Gneiss, Schistose Amphibolite.Water quality analysis was carried out for individual chemical parameters for two borewells drilled. 1st Borewell struck water at 150ft (Total depth-200ft) & 2nd struck at 740ft (Total depth-960ft). 5 water samples were collected till end of depth in each borewell. Chemical parameter values such as, Total Hardness (360-348, 280-320) mg/ltr, Nitrate (12.24-13.5, 45-48) mg/ltr, Chloride (104-90, 70-70)mg/ltr, Fe (0.75-0.09, 1.288-0.312)mg/ltr etc. are calculated respectively. Water samples were analysed from various parts of BBMP covering 750 sq kms, also thematic maps (IDW method) of water quality is generated for these samples for Post-Monsoon season.The study aims to explore the sub-surface Lithological layers and the thickness of weathered zone, which indirectly helps to know the Groundwater pollution source near surface water bodies, dug wells, etc. The above data are interpreted for future ground water resources planning and management.

Pallavi and T.M. Mohan Kumar;To explore the quality of drinking water in Devanahalli Taluk Karnataka.One of the important source of water is Ground water, 50% of the world's population depends on groundwater of which 43% is used for irrigation use. Hence the quality of groundwater is important . In this project the selected area for studies is devanahali taluk which is located in Bengaluru Rural district. Due to the drastic development of Bengaluru urban city and the location of KIA (Kempegowda International Airport) we need to concentrate on this area in all the aspects for the future sustainability of Bengaluru city. There are about 212 villages and 2 towns in this taluk with a population of 2,09,622 lakh. The total area of devanahali taluk is 446sqkm. Identification of bore wells with the respective latitude and longitude and checking physical-chemical parameters of the water sample and mapping in the software the given task can be executed by integrating various shape file and validated collected bore well data using GIS.

R. Srinivasan, S. A. Pandit, N. Karunakara , Deepak Salim , K. Sudeep Kumara , M. Rajesh Kumar , Ganesh Khatei and Kavitha Devi Ramkumar;High uranium concentration in groundwater used for drinking in parts of eastern Karnataka, India.The limits recommended by World Health Organization (WHO) and the Atomic Energy Regulatory Board (AERB) of India for uranium concentration in drinking water are 30 µg/l and 60 µg/l respectively. The present study on uranium concentration in groundwater used for drinking purposes in 73 villages of Karnataka, India, shows that in 57 villages uranium concentration is more than 30 µg/l, including 48 villages where it exceeds 60 µg/l. Thus in 78% and 66% of the villages studied,uranium concentration exceeds permissible limits given by WHO and AERB respectively. It is alarming to note that in one village each in Tumkur and Chitradurga districts, five in Kolar and seven inChikkaballapura districts, uraniumconcentration is in thousands of micrograms per litre. None of the borewells from which water has been sampled is anywhere in the vicinity of nuclear facilities or urban waste disposal channels. Thus, the observed uranium contamination is considered to be geogenic. Previous geological studies have shown that the eastern portion of Karnataka is a part of the Neoarchean Eastern Dharwar Craton dominated by large ion lithophile element-rich K-feldspar granites and gneisses with higher abundance of radioactive elements (uranium and thorium) compared to the Mesoarchean tonalite–trondhjemite– gneisses and granitoids widely distributed in the Western Dharwar Craton.

PawanKumarPiyushTripathi;Arsenicandfluoridecontamination in groundwater: A review of global scenarios with special reference to India.The groundwater contamination with arsenic

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and fluoride has threatened the well-being of a vast number of people worldwide. Countries of South-East Asia, including Bangladesh, China, and India, are severely affected. In India, people residing in the middle and lower Gangetic planes and some Central and South-India areas characterized by hard rock terrain are worse affected by arsenic and fluoride contamination. These contaminants are introduced into groundwater through multiple sources, including both natural and anthropogenic sources. The last three decades have witnessed a vast amount of literature published on the concerned issues. This review analyzes the work-done on arsenic and fluoride contamination in the groundwater. It includes studies about the occurrence, co-occurrence, dissolution, andhealtheffect.Mechanisms related to mobilization, toxicity, and removal techniques were also studied. Release mechanisms such asreductive dissolution, oxidation of sulfide minerals, alkali desorption, geothermal activity, contact time, and aqueous ionic concentrations were also discussed in detail, along with the mitigation techniques of arsenic and fluoride like adsorption, ion-exchange, biological methods, coagulation, and precipitation methods.

M. Sekhar, Sat Kumar TomerID , S. Thiyaku, P. Giriraj , Sanjeeva Murthy and Vishal K. Mehta;Groundwater accounts for half of Indian urban water use. However, little is known about its sustainability, because of inadequate monitoring and evaluation. We deployed a dense monitoring network in 154 locations in Bengaluru, India between 2015 and 2017. Groundwater levels collected at these locations were analyzed to understand the behavior of the city's groundwater system. At a local scale, groundwater behavior is non-classical, with valleys showing deeper groundwater than ridge-tops. We hypothesize that this is due to relatively less pumping compared to artificial recharge from leaking pipes and wastewater in the higher, city core areas, than in the rapidly growing, lower peripheral areas, where the converse is true. In the drought year of 2016, groundwater depletion was estimated at 27 mm, or 19 Mm3 over the study area. The data show that rainfall has the potential to replenish the aquifer. High rainfall during August–September 2017 led to a mean recharge of 67 mm, or 47 Mm3 for the study area. A rainfall recharge factor of 13.5% was estimated from the data for 2016. Sustainable groundwater management in Bengaluru must account for substantial spatial socio-hydrological heterogeneity. Continuous monitoring at high spatial density will be needed to inform evidence-based policy.

III. MATERIALS AND METHODOLOGY

OBJECTIVES

MAIN OBJECTIVES

• To analyse the surface water and ground water quality.

SPECIFIC OBJECTIVES

. Characterization pf physio chemical parameters of ground water and surface water

. Comparitive study of ground water and surface water

STUDY AREA

Area Name: Nagarabhavi

City Name : Bangalore

Demographics Of Nagarbhavi

Nagarbhavi is geographically located at Latitude 12^0 57'0" and longitude 77^0 34'50.3148"E .

Sample collection

Fig; Sample collection in and around nagarabhavi

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Test parameters for ground water analysis

Determination of pH of Water

Take the pH standard solution and the water that is to be tested. Take the colorimetric paper. Dip this paper on the water sample. The obtained color is computed from the standard table and the respectivepH value is recorded. This pH Value willconclude whether the sample of water is acidic or alkaline.

Hardness

Hard water is generally considered to be one which requires considerable amount of soap to produce foam or leather. Hard water cause scale formation in boilers heaters and hot water pipes. The rain water catches CO_2 from the atmosphere when the water pass through $CaCO_3$ rock in the Soil, these compounds make the water hard. Calcium and magnesium chlorides and sulphates also cause hardness.

Alkalinity

Alkalinity is significant in many uses and treatments of natural waters and wastewaters. As alkalinity of many surface waters constitute of carbonates, bicarbonate and hydroxide contents, it is assumed to be an indicator of these constituents as well. Alkalinity in excess of alkaline earth metal concentrations is significant in determining the suitability of water for irrigation. Alkalinity measurements are used in the interpretation and control of water and wastewater treatment processes. Raw domestic wastewater has an alkalinity less than or only slightly greater than that of the water supply.

Turbudity

Water is said to turbid when it is seen containing materials of suspension inside it. While turbidity may be defined as the measure of visible material in suspension in water, turbidity may be caused by algae or other organisms. It is generally caused by silt or clay.

Total dissolved solids

TDS in water is due to the dissolved salts and minerals in water which are usually present in the form of ions; ex- sodium, potassium, carbonates, sulphates etc. Sometimes these dissolved solids can be toxic and also causes formation of scales in pipes and hence determination of the same is essential.

Colour

Colour Is A Useful Index Of Dissolved Humid Substances In Water. Dissolved And Particulate Material In Water Can Cause Discolouration.

Odour

Related to taste, a strong odour from a water for consumption will obviously causerevulsion or rejection on the part of the consumer. Its cause is normally dissolved volatileorganic compounds small concentrations of which may have great organoleptic effects.

Sulphate

It Is One Of The Major Dissolved Components Of Rain. High Concentrations Of Sulphate In Water We Drink Can Have Laxative Effect When Combined With Calcium And Magnesium, The Two Most Common Constituents Of Hardness. Natural Water Contains Sulphate Ions And Most Of These Ions Are Also Soluble In Water. Many Sulphate Ions Are Produced By Oxidation Process Of Their Ores, They Also Present In Industrial Wastes.

Nitrate

Relatively little of the nitrate found in natural waters is of mineral origin, most comingfrom organic and inorganic sources, the former including waste discharges and the lattercomprising chiefly artificial fertilisers. , bacterial oxidation and fixing of nitrogen byplants can both produce nitrate. Interest is centred on nitrate concentrations for various reasons.Most importantly, high nitrate levels in waters to be used for drinking will render themhazardous to infants as they induce the "blue baby" syndrome (methaemoglobinaemia). Thenitrate itself is not a direct toxicant but is a health hazard because of its conversion to nitrite [seealso below] which reacts with blood haemoglobin to cause methaemoglobinaemia.Of increasing importance is the degree to which fertiliser run-off can contribute toeutrophication problems in lakes. Sewage is rich in nitrogenous matter which through bacterialaction may ultimately appear in the aquatic environment as nitrate. Hence, the presence of nitratein ground waters, for example, is cause for suspicion of past sewage pollution or of excess levelsoffertilisers or manure slurries spread on land. (High nitrite levels would indicate more recentpollution as nitrite is an intermediate stage in the ammonia-to-nitrate oxidation).

Fluoride

Occurs naturally in quite rare instances; arises almost exclusively from fluoridation ofpublic water supplies and from industrial discharges. At levels markedly over 1.5 mg/l aninverse effect occurs and mottling of teeth (or severe damage at gross levels) will arise. For thisreason there is a constraint

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on fluoride levels, the effects of which vary with temperature.

Iron

Iron is the second most abundant metal in the earth's crust. Dissolved iron in water,causes the water to taste metallic. The water may also be discolored due to suspended solidscontaining minerals of iron that appear brownish in color. Iron will leave red or orange russtains in the sink, toilet and bathtub. It can build up in your dishwasher and discolor ceramicdishes. It can also enter into the laundry equipment and cause stains on clothing. "Even thoughthe EPA says that the iron in the drinking water is safe to drink, the iron sediments, other traceimpurities may support bacteria that are harmful, and these bacteria are mostly found in wellswhere the water has not been chlorinated".

Calcium

This element is the most important and abundant in the human body and an adequateintake is essential for normal growth and health. The maximum daily requirement is of the orderof 1-2grams and comes especially from dairy products. There is some evidence to show thatthe incidence of heart disease is reduced in areas served by a public water supply with a highdegree of hardness, the primary constituent of which is calcium, so that the presence of theelement in a water supply is beneficial to health.

Magnesium

magnesium is abundant and a major dietary requirement for humans(0.3-0.5 g/day). It is the second major constituent of hardness (see above) and it generallyomprises 15-20 per cent of the total hardness expressed as CaCO3. Its concentration is verysignificant when considered in conjunction with that of sulphate.

Chloride

Chloride in the form of chloride (CI -) ion is one of the major inorganic anions in waterand wastewater. The chloride concentration is higher in wastewater than in raw water becausesodium chloride is a common article of diet and passes unchanged through the digestive system(Average estimate of excretion: 6 g of chlorides/person/day; additional chloride burden due tohuman consumption on wastewater.

IV. RESULT

Sample Particulars: BoreWell Water (WL-I)			Sample quantity:l Litre		
Sl.No	Test	Results	Acceptable Limit IS 10500 : 2012 RA:2018	Permissible Limit IS 10500 : 2012 RA:2018	Protocol
Description: Colourless liquid.					
1.	pH Value @25 ^{O}CTemp	7.37	6.5-8.5	No relaxation	IS 3025 (Part-Il) : 1983
2.	Specific Conductance, gS/cm@25 ^{o}c Temp	771			IS 3025 (Part-14) : 1984
3.	Odour	Agreeable	Agreeable	Agreeable	IS 3025 (Part-5 &
4.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part8 1993
5.	Colour, Hazen Units	05	5	15	IS 3025 (Part-4) :2021
6.	Turbidity, NTU	< 0.5	1	5	IS 3025 (Part-10) . 1984
7.	Total Dissolved Solids @ 180^{0} C, mg/l	468	500	2000	IS 3025 (Part-16) • 1984
8.	Alkalinity as CaC03, mg/l	296.38	200	600	IS 3025 (Part-23) : 1986
9.	Total Hardness as CaC03, mg/l	388.20	200	600	IS 3025 (Part-21) : 2009

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10.	Calcium as Ca, mg,/l	80.94	75	200	IS 3025 (Part-40) : 1991
11.	Magnesium as Mg, mg/l	45.16	30	100	IS 3025 (Part-46) : 1994
12.	Chloride as Cl, mg/l	67.50	250	1000	IS 3025 (Part-32) : 1988
13.	Sulphate as S04, mg/l	55.88	200	400	IS 3025 (Part-24) : 1986
14	Fluoride as F, mg/l	0.60	1	1.5	APHA 23frdition
15.	Nitrate as N03, mg/l	3.30	45	No relaxation	APHA 23 rdEdition
16.	Iron as Fe, mg/l	< 0.1	1	No relaxation	IS 3025 (Part-53) : 2003
Remarks: The Given sample meets IS 10500-2012 : 2018 requirement for above tested parameters.					

Sample Particulars: Bore well water. BW-2)				Sample quantity:1 Litre	
st.No	Test	Results	Acceptable Limit IS 10500 : 2012 RA:2018	Permissible Limit IS 10500 : 2012 RA:2018	Protocol
Description: Colourless liquid.					
1.	pH Value •C Temp	7.26	6.5-8.5	No relaxation	IS 3025 (Part-Il) : 1983
2.	Specific Conductance, PS/cm@25 •C Temp	1171			IS 3025 (Part-14) : 1984
3.	Odour	Agreeable	Agreeable	Agreeable	IS 3025 (Part-5 &
4.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 (Part-8):1983
5.	Colour, Hazen Units	05	5	15	IS 3025 (Part-4) :2021
6.	Turbidity, NTU	< 0.5	1	5	IS 3025 (Part-IO) : 1984
7.	Total Dissolved Solids @ 180°C, mg/l	706	500	2000	IS 3025 (Part-16) :1984
8.	Alkalinity as CaC03, mg/l	397.88	200	600	IS 3025 (Part-23) :1986
9.	Total Hardness as CaC03, mg/l	598.46	200	600	IS 3025 (Part-21) : 2009
10.	Calcium as Ca, mg/l	127.90	75	200	IS 3025 (Part-40) :1991
11.	Magnesium as Mg, mg/l	67.74	30	100	IS 3025 (Part-46) .• 1994
12.	Chloride as Cl, mg/l	138.96	250	1000	IS 3025 (Part-32) : 1988
13.	Sulphate as S04, mg/l	61.36	200	400	IS 3025 (Part-24) :1986
14.	Fluoride as F, mg/l	1.02	1	1.5	APHA 23%dition
15.	Nitrate as N03, mg/l	42.87	45	No relaxation	APHA 23rd Edition
16.	Iron as Fe, mg/l	< 0.1	1	No relaxation	IS 3025 (Part-53) : 2003
Remarks: The Given sample meets IS 10500-2012 : 2018 requirement for above tested parameters.					

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Sample Particutats: Bore well water. BW-3				Sample Taken 1 litre	
SL	Test	Results	Acceptable Limit IS 10500 : 2012 RA:2018	Permissible Limit IS 10500 : 2012 RA:2018	Protocol
Description: Colourless liquid.					
1.	pH Value @2S °c Temp	7.24	6.5-8.5	No relaxation	IS 3025 (Part-Il) : 1983
2.	Specific Conductance, gS/cm@25 ° c Temp	817			IS 3025 (Part-14) : 1984
3.	Odour	Agreeable	Agreeable	Agreeable	IS 3025 (Part-5 a
4.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 (Part-8):1983
S.	Colour, Hazen Units	05	5	15	IS 3025 (Part-4) :2021
6.	Turbidity, NTU	< 0.5	1	5	IS 3025 (Part-10) : 1984
7.	Total Dissolved Solids @ 180°C, mg/l	494	500	2000	IS 3025 (Part-16) : 1984
8.	Alkalinity as CaC03, mg/l	288.26	200	600	IS 3025 (Part-23) : 1986
9.	Total Hardness as CaC03, mg/l	505.45	200	600	IS 3025 (Part-21) : 2009
10.	Calcium as Ca, mg/l	103.60	75	200	IS 3025 (Part-40) : 1991
11.	Magnesium as Mg, mg/l	59.88	30	100	IS 3025 (Part-46) : 1994
12.	Chloride as Cl, mg/l	77.42	250	1000	IS 3025 (Part-32) : 1988
13.	Sulphate as S04, mg/l	57.45	200	400	IS 3025 (Part-24) : 1986
14.	Fluoride as F, mg/l	1.16	1	1.5	APHA 2$Edition
15.	Nitrate as N03, mg/l	5.06	45	No relaxation	APHA Edition
16.	Iron as Fe, mg/l	< 0.1	1	No relaxation	IS 3025 (Part-53) : 2003
Remarks: The Given sample meets IS 10500-2012 : 2018 requirement for above tested parameters.					

Sample Particulars: Bore well water. (BW-4)				Sample quantity:1 Litre	
st.No	Test	Results	Acceptable Limit IS 10500 : 2012 RA:2018	Permissible Limit IS 10500 : 2012 RA:2018	Protocol
Description: Colourless liquid.					
1.	pH Value @25 ° c Temp	7.13	6.5-8.5	No relaxation	IS 3025 (Part-Il) : 1983
2.	Specific Conductance, gS/cm@25 °c Temp	894			IS 3025 (Part-14) : 1984
3.	Odour	Agreeable	Agreeable	Agreeable	IS 3025 (Part-5 &
4.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 (Part-8):1983
5.	Colour, Hazen Units	05	5	15	IS 3025 (Part-4) :2021
6.	Turbidity, NTU	< 0.5	1	5	IS 3025 (Part-10) : 1984
7.	Total Dissolved Solids @ 180°C, mg/l	540	500	2000	IS 3025 (Part-16) : 1984
8.	Alkalinity as CaC03, mg/l	336.98	200	600	IS 3025 (Part-23) : 1986
9.	Total Hardness as CaC03, mg/l	566.11	200	600	IS 3025 (Part-21) :2009
10.	Calcium as Ca, mg/l	118.17	75	200	IS 3025 (Part-40) : 1991
11.	Magnesium as Mg, mg/l	65.78	30	100	IS 3025 (Part-46) : 1994
12.	Chloride as Cl, mg/l	69.48	250	1000	IS 3025 (Part-32) : 1988
13.	Sulphate as S04, mg/l	54.91	200	400	IS 3025 (Part-24) :1986
	Fluoride as F, mg/l	1.33	1	1.5	APHA23 Edition
15.	Nitrate as N03, mg/l	3.28	45	No relaxation	APHA 23rd Edition
16.	Iron as Fe, mg/l	< 0.1	1	No relaxation	IS 3025 (Part-53) : 2003
Remarks: The Given sample meets IS 10500- 2012 : 2018 requirement for above tested parameters.					

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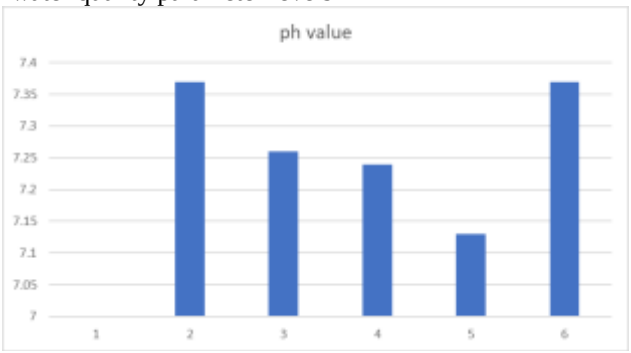
Sample Particulars: Suface water. SW-I				Sample quantity:l Litre	
SINO	Test	Results	Acceptable Limit IS 10500 : 2012 RA:2018	Permissible Limit IS 10500 : 2012 RA:2018	Protocol
Description: Colourless liquid.					
1.	pH Value @2S • C Temp	7.37	- 6.5 8.5	No relaxation	IS 3025 (Part-Il) : 1983
2.	Specific Conductance, gS/cm@25 •C Temp	675			IS 3025 (Part-14) : 1984
3.	Odour	Agreeable	Agreeable	Agreeable	IS 3025 (Part-5 &
4.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 (Part-8):1983
5.	Colour, Hazen Units	30	5	15	IS 3025 (Part-4) :2021
6.	Turbidity, NTU	< 0.5	1	5	IS 3025 (Part-IO) : 1984
7.	Total Dissolved Solids @ 180^0 C, mg/l	406	500	2000	IS 3025 (Part-16) : 1984
8.	Alkalinity as CaC03, mg/l	288.26	200	600	IS 3025 (Part-23) : 1986
9.	Total Hardness as CaC03, mg/l	331.58	200	600	IS 3025 (Part-21) : 2009
10.	Calcium as Ca, mg/l	71.23	75	200	IS 3025 (Part-40) : 1991
11.	Magnesium as Mg, mg/l	37.31	30	100	IS 3025 (Part46) : 1994
12.	Chloride as Cl, mg/l	95.30	250	1000	IS 3025 (Part-32) : 1988
13.	Sulphate as S04, mg/l	11.04	200	400	IS 3025 (Part-24) : 1986
14.	Fluoride as F, mg/l	0.15	1	1.5	APHA 23%dition
15.	Nitrate as N03, mg/l	10.23	45	No relaxation	APHA 23rd Edition
16.	Iron as Fe, mg/l	< 0.1	1	No relaxation	IS 3025 (Part-53) : 2003
Remarks: The Given sample meets IS 10500-2012 : 2018 requirement for above tested parameters, Except Colour.					

Graphical representation of water quality parameter levels



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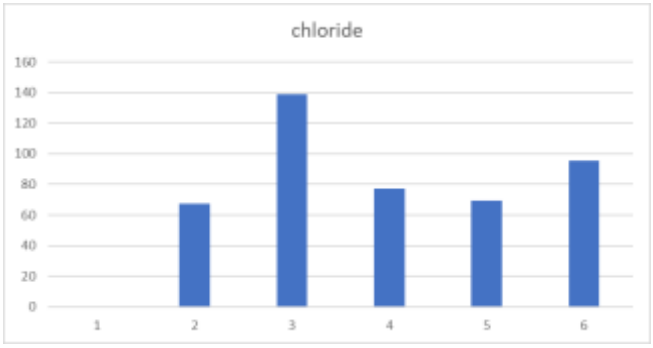

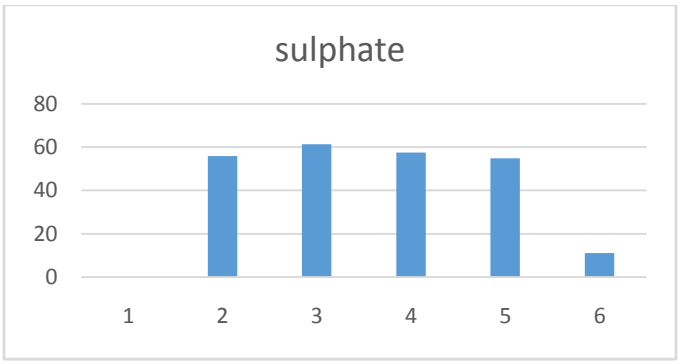

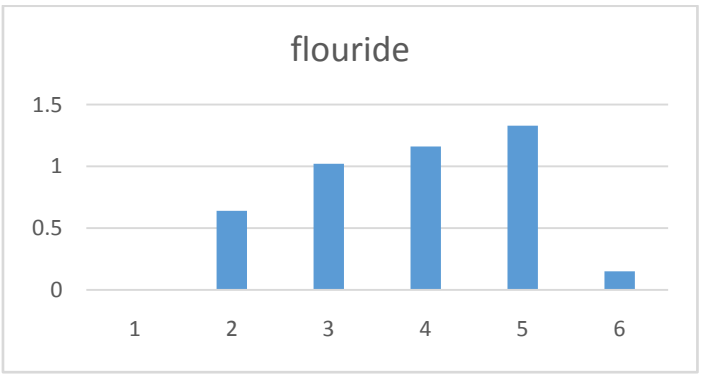

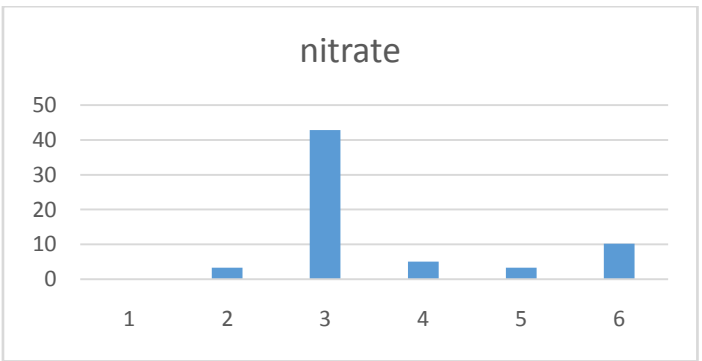

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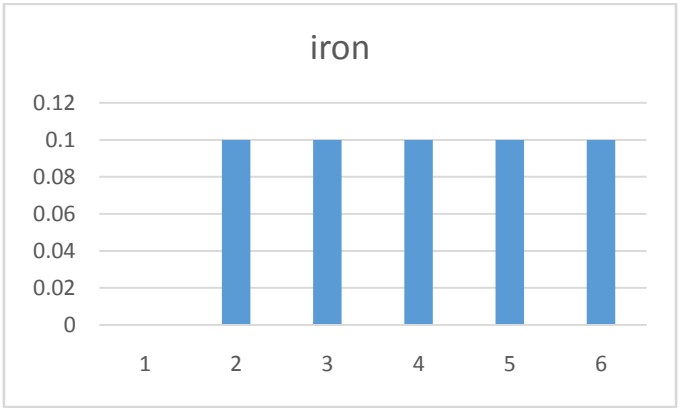

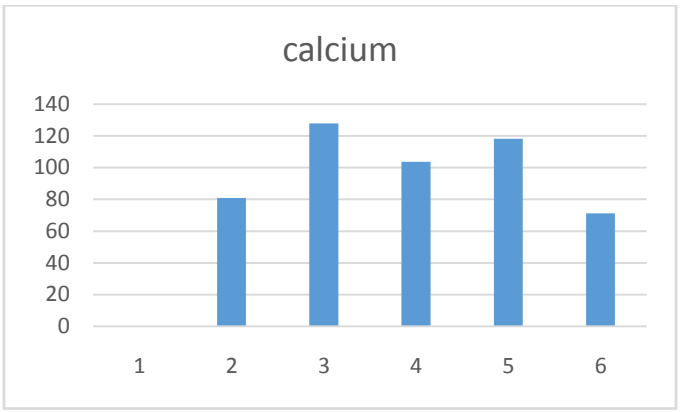

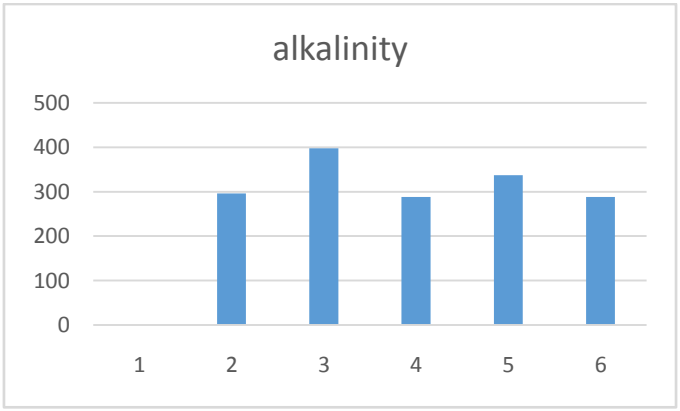

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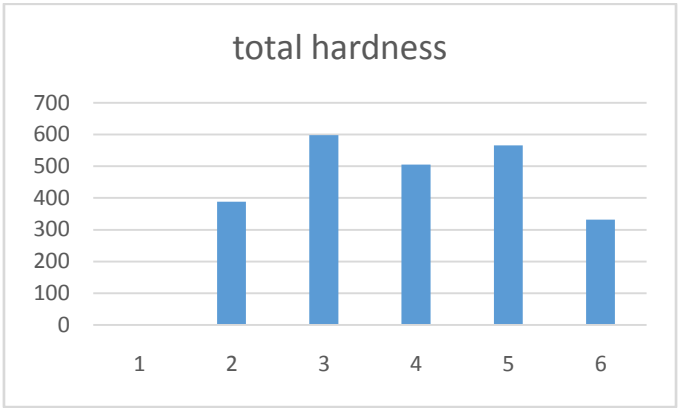

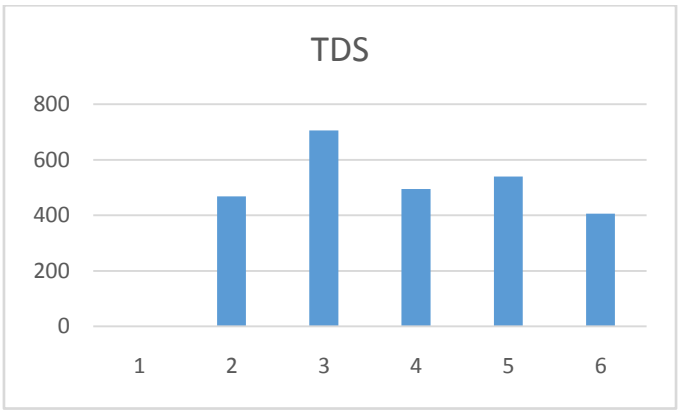

V. CONCLUSION

Water is one of the preciousss gifts of nature, because of its reusability. It is essential for the substance and propagation of life on earth. A world without water cannot even be visualized. Its importance is readily recognized when it becomes scare or when it gets polluted. Per capita consumption of water doubtlessly serves as an index of civilization. A country's prosperity solely depends on its farm output which in turn depends on good quality water and fertile soil. Uncontrolled growths of population augmentation of agricultural activities and so have to put considerably strain on surface and subsurface water resources.

Global distribution of water is highly variable of earth's total volume of 1386 Mkm^3 (0.06%) as fresh water lakes. Of these water resources nearly 90% available in Canada (Great lake) the remaining 10% is distributed all over the world. This water is used for drinking purpose etc…. in the entire world. Of these fresh surface water bodies some have been contaminated due to the inputs of polluted water through their tributaries.

Under this condition the present study is made on surface water resource and the ground water resources in Nagarbhavi ,Bengaluru. One sample is collected from Mallathalli lake and five ground water samples are collected in and around Nagarbhavi. These water samples are subjected to quantitative analysis for its physical, chemical and biological characteristics. The results of analysis for all the 23 parameters are visualized as per IS-3025. All the results of samples are compared with Indian standards and WHO specifications of drinking water.

- From the test parameters we tested in the laboratory, we found that the water samples of all the borewells are within permissible limits and suitable for domestic use.
- In surface water turbidity, fluoride, total dissolved solids contents are within the permissible limits and suitable for domestic use.

The water samples in and around Nagar Bhavi (including surface and ground water) are fit for intended domestic use.

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