

Investigation of Ground Water Quality for Drinking and Domestic Purpose in Nagamangala taluk, Mandya District, Karnataka-INDIA.

Karpagavalli and Dr. C. Anbalagan²

¹ Research Scholar, Department of Civil Engineering, Bharath Institute of Higher Education and Research, Chennai, Tamilnadu, INDIA.

² Professor, Department of Civil Engineering, Bharath Institute of Higher Education and Research, Chennai, Tamilnadu, INDIA.

Abstract

The Present Study was Carried out to Assess the Ground Water quality in Nagamangala Taluk , Mandya District and The Assessment involves the Determination of the Water quality. So We Select Some Locations to Monitoring the Quality of Ground Water in Nagamanagala Taluk . The Main important Agenda of the study was to Evaluate the various water quality Parameters Whether it is Suitable or Not for Drinking and Aquatic Body Purpose, Agriculture, Domestic Purpose . The Values Color, Odour, P^H@ 25°C, Total Hardness CaCO₃, Total Alkalinity CaCO₃, Iron as Fe, Chloride as Cl, Total Dissolved Solids (TDS), Calcium as Ca, Magnesium as Mg, Sulphate as SO₄, Nitrate as NO₃, Fluoride as F, Nitrite NO₂, Dissolved Phosphate as PO₄, Dissolved Oxygen (DO) All these Parameters were there compared with the ISI and WHO Standards. To investigate the above parameters for assessment of groundwater quality in Nagamangala Taluk, Mandya District. In this Nagamangala taluk was divided into two zones are randomly selected and two groundwater Samples were collected and analyzed in laboratory for the test of Physio-chemical Properties. Few of the parameters are within the accepted standard value of Bureau of Indian Standards, WHO (World Health Organization), the Permissible values are within the limits as Prescribed by WHO. The Study investigated that the ground water quality of the Nagamangala location1 and Location 2 are good and the groundwater is fit for the human consumption based on the all parameters of Physio-Chemical assessment.

Keywords: Contamination, Drinking water ,Ground Water , Nagamanagala taluk , Physio-Chemical Parameters,

1. Introduction

The Analysis of Ground water quality is very needful for the estimation of suitability of water for safe use due to the human beings, industrial activities, commercial Activities, Agricultural Activities. Most of ground water is Polluted or Contaminated. The water is more demand for the drinking purpose in all over world. The groundwater is also contaminated by unscientific methods of disposal of Solid waste, Hazardous Wastes, Sewages and Biomedical waste and also industrial effluents or Waste water are directly disposed off to the open lands. It also affects to the ground water table and it also effects to the Soil fertility. Now a days the ground water contamination is becoming a serious problem and it causes the critical and mild health problems for human beings. So the assessment of ground water quality is protect the natural ecosystem also. In the last few years the fresh water is more demand because of the high growth of the Population , Rapid growth of the urbanization and industrialization. The most of the diseases are caused by the water.

water is very essential for drinking purpose especially the ground water is the more number of people used or depending for a drinking purpose. Pesticides and Fertilizers are normally used in the Crop Cultivation, so resulting high concentration of chemical constituents are present in the groundwater, water quality investigation of groundwater quality is suitable for mainly drinking purpose and after domestic, agriculture activities. Once The ground water polluted, its quality cannot be returned back easily. Hence the present study agenda to conduct the detailed assessment of groundwater quality in Nagamangala Taluk of Mandya district, Karnataka state in India. The Samples of groundwater were collected from six identified locations. It includes open wells and Bore wells. The physical, Chemical, biological parameters were analyzed for Values Color, Odor, P^H@ 25°C, Total Hardness CaCO₃, Total Alkalinity CaCO₃, Iron as Fe, Chloride as Cl, Total Dissolved Solids (TDS), Calcium as Ca, Magnesium as Mg, Sulphate as SO₄, Nitrate as NO₃, Fluoride as F, Nitrite NO₂, Dissolved Phosphate as PO₄, Dissolved Oxygen (DO), with the by using the APHA Standard Methods.

2. Materials and Methodology

Mainly the groundwater supply for safe drinking Agriculture, and Domestic Purpose in Rural and urban Areas and Many treatments infrastructure is necessary for treatment and supply of safe drinking water. Urgently we do not taken the steps for the treatment of Polluted groundwater resources. The samples were collected from two different loaatons of Nagamangala Taluk ,Mandya, Districts that are being extensively used for drinking, domestic, agriculture Purpose. The Samples were taken from the average depth 30-35 mtr. All above samples were collected in sterile glasses schottt bottles (5 Liters) . Ph and Conductance’s are measured in the field by using portable kits. For remaining parameters samples were collected, stored, transported in a cool box kept below 4 degree Celsius by using APHA, 2005 Standard Methods. The Physio-chemical, Biological Parameters analysis were Performed in the laboratories. The collected Samples were analyzed and examined by using APHA, 2005 Standard Methods.

3. Results and Discussion

The study was done to assess the quality of groundwater in different locations of Nagamangala Taluk. The below table shows the location of the groundwater sample collection and investigation of Physio-Chemical Parameters of two locations of Nagamangala taluk , Mandya District are shown in the table.

Table. 1

Shows the Locations of Sample Collections in Nagamangala Taluk, Mandya District.

Locations	District
Crusher- Nagamanagala Location-1	Nagamangala, Mandya
Quarry- Nagamangala Location-2	Nagamangala, Mandya

Table. 2

Shows the Physio- Chemical Parameters and the water quality assessment results. Of Nagagamangala Location-1 (Crusher)

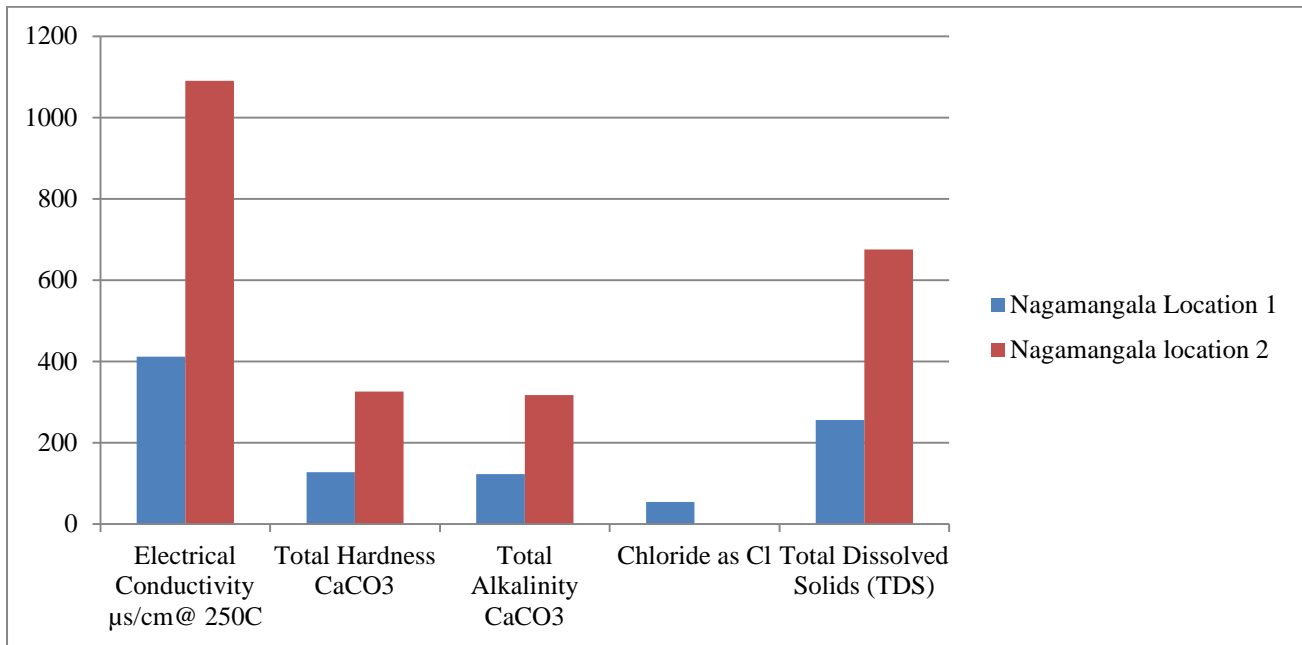
Parameters	Protocol as Per APHA 23 rd Edition-2017	unit	Result Nagamangala Location-1	Standard IS 1500-2012(RA-2018)	
				Requirement Acceptable Limits	Permissible Limits
Color	2120 B	Hazen	5	5 Max	15 Max
Odor	2150 B	.....	Agreeable	Agreeable	Agreeable
PH@ 25°C	4500 H ⁺ .B	.....	7.75	6.5-8.5	No relaxation
Electrical Conductivity µs/cm@ 25°C	2510-B	µs/cm	412	Not Specified	
Total Hardness CaCO3	2340-C	mg/l	127.36	200 Max	600 Max
Total Alkalinity CaCO3	2320 B	mg/l	122.61	200 Max	600 Max
Iron as Fe	3500 - Fe ,B	mg/l	0.06	0.3 Max	No Relaxation
Chloride as Cl	4500-Cl, B	mg/l	54.79	250 Max	1000 Max
Total Dissolved Solids (TDS)	2540 C	mg/l	256	500 Max	2000 Max
Calcium as Ca	3500- Ca,B	mg/l	28.65	75 Max	200 Max

Magnesium as Mg	3500-Mg, B	mg/l	13.54	30 Max	100 Max
Sulphate as SO ₄	4500-SO ₄ , E	mg/l	24.62	200 Max	400 Max
Nitrate as NO ₃	4500- NO ₃ , E	mg/l	4.18	45 Max	No Relaxation
Fluoride as F	4500-F,B,D	mg/l	0.18	1.0 Max	1.5 Max
Nitrite NO ₂	4500-NO ₂ , B	mg/l	0.09	Not Specified	
Dissolved Phosphate as PO ₄	4500-PBD	mg/l	0.04	Not Specified	
Dissolved Oxygen	4500-O,C	mg/l	5.7	Not Specified	

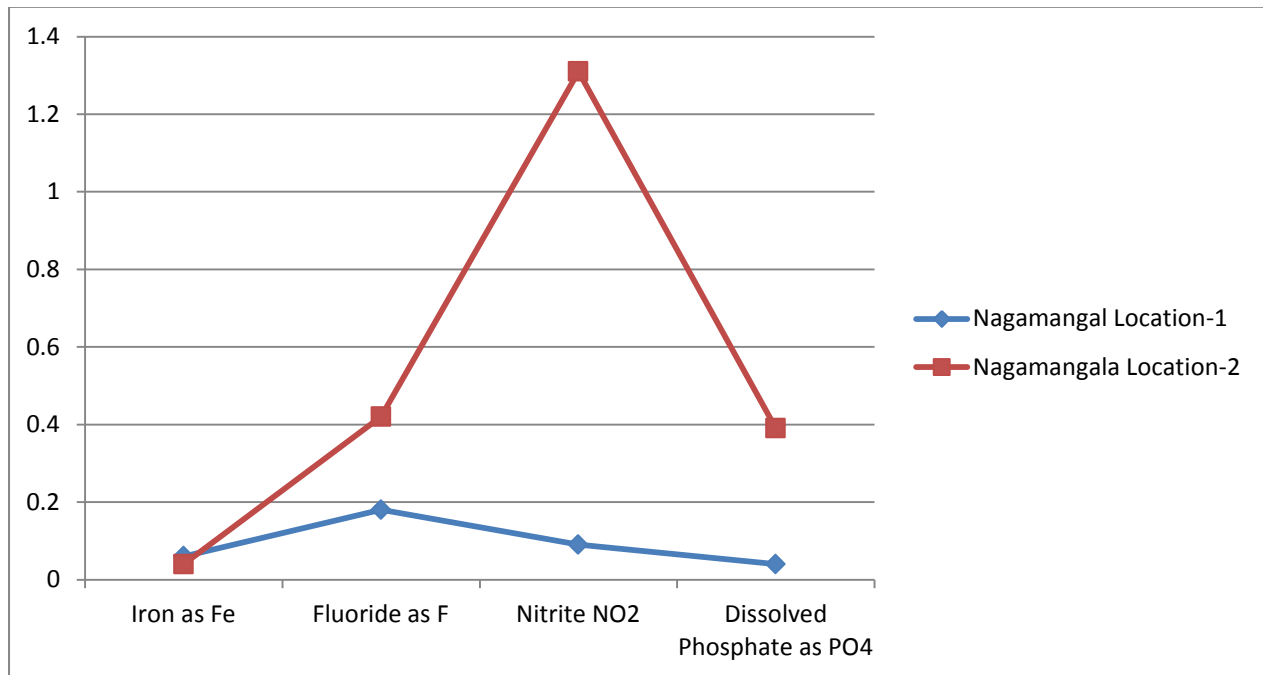
Table 3

Shows the Physio- Chemical Parameters and the water quality assessment results. of Nagagamangala Location-2. (Quarry)

Parameters	Protocol as Per APHA 23 rd Edition-2017	unit	Result Nagamangala Location-1	Standard IS 1500-2012(RA-2018)	
				Requirement Acceptable Limits	Permissible Limits
Color	2120 B	Hazen	6	5 Max	15 Max
Odor	2150 B	.....	Agreeable	Agreeable	Agreeable
P ^H @ 25°C	4500 H ⁺ .B	.....	7.71	6.5-8.5	No relaxation
Electrical Conductivity µs/cm@ 25°C	2510-B	µs/cm	1090	Not Specified	
Total Hardness CaCO ₃	2340-C	mg/l	326.36	200 Max	600 Max
Total Alkalinity CaCO ₃	2320 B	mg/l	317.58	200 Max	600 Max
Iron as Fe	3500 - Fe ,B	mg/l	0.004	0.3 Max	No Relaxation
Chloride as Cl	4500-Cl, B	mg/l	147.74	250 Max	1000 Max
Total Dissolved Solids (TDS)	2540 C	mg/l	675.80	500 Max	2000 Max
Calcium as Ca	3500- Ca,B	mg/l	70.84	75 Max	200 Max
Magnesium as Mg	3500-Mg, B	mg/l	36.27	30 Max	100 Max
Sulphate as SO ₄	4500-SO ₄ , E	mg/l	32.42	200 Max	400 Max
Nitrate as NO ₃	4500- NO ₃ , E	mg/l	11.25	45 Max	No Relaxation
Fluoride as F	4500-F,B,D	mg/l	0.42	1.0 Max	1.5 Max
Nitrite NO ₂	4500-NO ₂ , B	mg/l	1.31	Not Specified	
Dissolved Phosphate as PO ₄	4500-PBD	mg/l	0.39	Not Specified	
Dissolved Oxygen	4500-O,C	mg/l	5.6	Not Specified	



Graph :1. Shows the Physio- Chemical Parameters and the water quality assessment results. Of Nagamangala Location (Crusher)- 1 and 2(Quarry)



Graph :2& 3 . Shows the Physio- Chemical Parameters and the water quality assessment results. Of Nagamangala Location- 1 (Crusher) and Location 2 (Quarry)

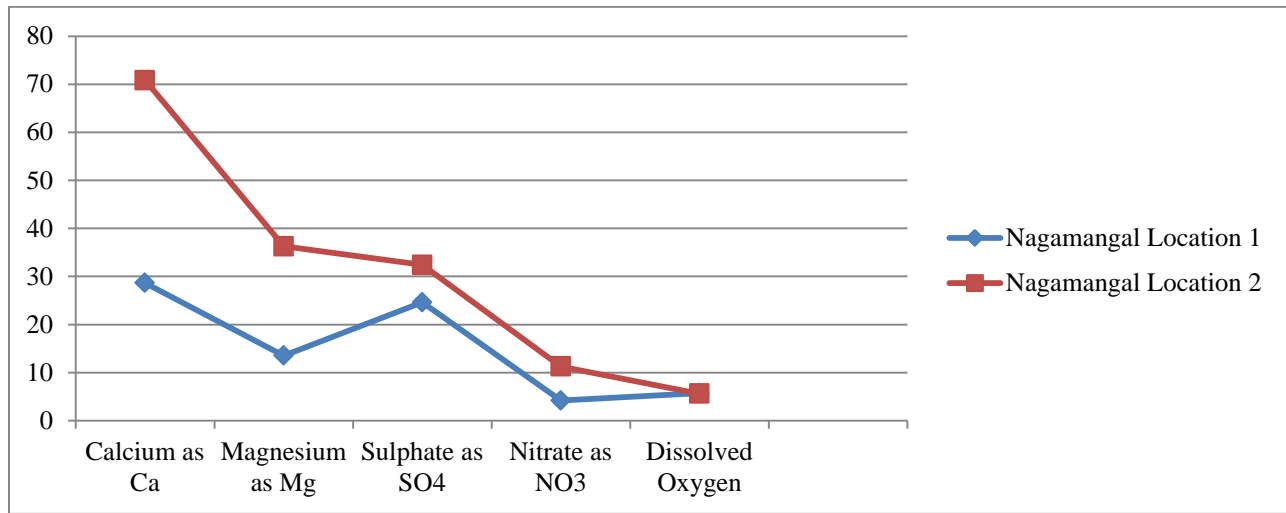


Table. 4

The unit factors and BIS Drinking water standards (IS 10500-91, Revised 2003) of Each Parameters

Parameters	Standard Values	Permissible Values	Unit Factors
pH	6.5-8.5	NO Relaxation	0.219
Turbidity (NTU)	5	25	0.08
TDS (mg/l)	500	2000	0.00370
Total Hardness mg/l	300	600	0.01236
Sulphates (mg/l)	200	400	0.618
Magnesium (mg/l)	30	100	0.0412
Nitrates (mg/l)	45	No relaxation	0.00741
Chloride (mg/l)	250	1000	0.007421
Calcium(mg/l)	45	200	0.02472

This investigation focus on the groundwater quality status in different locations of the Nagamangala taluk, Mandya District. Physio-chemical parameter assessment was which determine whether the water can be used for drinking, agriculture, domestic purpose. In this study in location one Total Hardness CaCO₃, Total Alkalinity CaCO₃, Iron as Fe, Chloride as Cl, Total Dissolved Solids (TDS), Calcium as Ca, Magnesium as Mg, Sulphate as SO₄, the values are very less, the TDS Concentration in Drinking Water and it causes cardiovascular diseases and Heart Diseases. Whether turbidity more in the ground water it causes water born bacteria, viruses, protozoa etc..and also it causes the water born diseases. Hence some of the Physio-chemical Parameters results are very less to the Standard values and remaining parameters are within the Standard limits.

Conclusion

The study analyzes that in groundwater quality status of Nagamangal Taluk, Mandya District ranged from excellent to good conditions .and the Ground water is fit for the human consumptions, Agricultural Activities, Domestic Purpose, Commercial Purpose, Industrial Purpose etc...Some Parameters like Total Hardness CaCO₃, Total Alkalinity CaCO₃, Iron as Fe, Chloride as Cl, Total Dissolved Solids (TDS), Calcium as Ca, Magnesium as Mg, Sulphate as SO₄, Parameters are little bit less in front of the

Permissible limits and remaining Parameters results were within the Permissible limits. None of the Physio-chemical Parameters exceeded the Permissible Value for Water Quality Assessment as Prescribed by the WHO (World Health Organization) and BIS.

Acknowledgment:

The Authors are Grateful to the KNR Construction Limited for providing facilities to conduct and complete this study.

References

- [1] Kelly Denise and Geoff Wright. An Assessment of Groundwater Quality in South Cork; Cork Country Council. 2002.
- [2] WHO. Guidelines for drinking water quality. Geneva: World Health Organization.2004.
- [3] ISI. Indian Standard Specification for drinking water, New Delhi: ISI 10500.1993.
- [4] Hem JD. Study and interpretation of the chemical characteristics of natural water . 3rd Edition, USSGS Water Supply paper.1985 , pp 117-120.
- [5] Davis SN., De Wiest RJM, Hydrology, New York wiley. Vol463.1996.
- [6] Karanth KR, Groundwater assessment, development and management, NewDelhi: Tata McGrew hill Publishing Company Limited.1987.
- [7] Wilox LV. Classification and use of irrigation water, USD Circular No.969.1955,pp 19.
- [8] Paliwal KV. Irrigation with saline water, IARI , New Delhi: Monogram No.2 (new series).1972,p 198.
- [9] Piper, A.M. A Graphic Procedure in the Geochemical interpretation of water Analysis. Washington .DC: Trans, AM. Geophys. Union.1994.
- [10] Park K. Textbook of Preventive and Soial medicine 20th ed 2009. Banarasidas Bhanot Publishers, Jabalpur, India.
- [11] Chatterjee R, Purohit R, Estimation of replenish able ground water resources of India and their status of utilization. Curr sci 2009;96:1581-91.
- [12] Ramakrishnaiah CR, Sadashivaiah C, Ranganna G. Assessment of water quality index for the groundwater in Tumkuru Taluk, Karnataka State,india.E-J Chem 2009;6:523-30.
- [13] Maushkar JM. Guidelines for water quality monitoring. Central Pollution Control Board (A Government of India Organization) 2007, Delhi.
- [14] Rahankar. Water Quality Assessment of groundwater Resources in Nagapur region (india) Based on the Wqi,E-j Chem2009;6;905-8.
- [15] Loganathan D, Kamatchiammai s, Ramanibai R, Status of groundwater at Chennai City , India. Indian j Sci Technol 2011;4:566-72.