

Assessment of Physico chemical parameters of groundwater near dyeing industries at Tiruppur

¹Suganthapriya K, ²Jenifer Priyanka RM, ³Karthick S, ⁴Kanchana S

^{1,3}Final year UG student, ^{2,4}Assistant professor,

¹ Department of civil engineering, R V S Technical Campus, Coimbatore, India

Abstract - The scenario of the present era shows that the environmental impact was high on water resources. Water is the eternal source for living with nature. The contamination of groundwater resources is like at many areas. In this paper an attempt has been taken to analyze the physical and chemical parameters groundwater in the city of Tiruppur. The city of Tiruppur is famous for textiles. There is an high water scarcity in the city due to its various demands but the water is highly polluted. Due to increase in industries the water has higher effluent contamination. The four samples were collected and analyzed for pH, Temperature, Turbidity, electrical conductivity, TH, Calcium hardness, Magnesium Hardness, PH, Sulphates, Chlorides, BOD, COD, DO, TS, TVS, TFS. The results were taken and compared with IS 10500:2012 standards. The results showed that sulphates, Biochemical Oxygen Demand (BOD) were found to be higher than the permissible limits. The groundwater should be treated for drinking purposes.

Index Terms – BOD, COD, Groundwater, Physico chemical parameters

I. INTRODUCTION

The escalation of population is a major threat to environment. The impact of environmental effect on water resources is a vital research area. Water is the main source for living in the world. It is primarily required by all living organisms. Due to rapid exploitation of the industrial effluents easily affects the groundwater the famous textile city in Tamil Nadu is Tiruppur. A majority of dyeing industries, textile mills, binning factories were located. Many recent researches were undertaken for water this is due to the increase in pollution caused by the industries. The pollution is the serious threat to the environment. One of such heavily affected is the groundwater. Groundwater is majorly used by many people for agriculture, irrigation, etc. Thus the concern for groundwater increased. The wastewater and other effluents started to effects the groundwater. The chemicals used in the dyeing industries were very easily contagion the groundwater resources. The heavy metal present in the dyeing industry was high pollutant. Hence it easily affects the bio life. Hence to remove the impurities that is such as dissolved, colloidal, suspended from the water the analysis is necessary. The industrial city Trippur has high pollution in all ways one of the important affected region is the water resources.

II. REVIEW OF LITERATURES:

P.G. Smitha et al (2007) studied on the Physico-chemical characteristics of water samples of Bantwal Taluk, south-western Karnataka, India. This study analyzed water samples collected from different sources like streams, rivers open wells, bore wells, and farm ponds of 20 villages of Bantwal taluk of Dakshina Kannada district, SW Karnataka had been carried out. The physical and chemical characteristics of this water showed that it were suitable for both the agricultural and irrigational purposes.

Rizwan Ulla et al (2009) studied on Assessment of groundwater contamination in an industrial city, Sialkot, Pakistan. This study had been designed to assess the groundwater quality in relation with heavy metal pollution and its implication to human health. The groundwater water samples were collected from 25 localities in 2005 during October-November in the industrial city of Pakistan. Nearly 22 physiochemical parameters including pH, Temperature, Electric Conductivity (EC), Salinity, Total Dissolved Solids (TDS), Turbidity, Chloride (Cl), Nitrate (NO₃), Sulfate (SO₄), Total Hardness, Fluoride, Iodide, Ferric (Fe+3), Alkalinity, Zinc, Total Chlorine, Manganese (Iron (Chromium Nickel, Copper and Lead were noted. These results were compared with standard guidelines from WHO and Pakistan Standard Quality Control Authority (PSQCA) for groundwater quality. The results proved that the groundwater of the study area could not be considered as good quality as it is highly turbid (57% of total sites) & with high levels of Fe, Pb and Zn which were above the standards of WHO and PSQCA permissible limits. Using Geographic Information System (GIS) the spatial distribution maps of water quality parameters were produced. By the use of distribution maps which served as an important information to understand ecological status of the groundwater systems and for the identification of quality parameters of groundwater with concentration above the allowable limits of World Health Organization and also to determine potential areas where water treatment plants and technologies can be targeted in Sialkot

Deepali et al (2010) studied on Metals Concentration in Textile and Tannery Effluents, Associated Soils and Ground Water. An assessment has been made to ascertain the concentration of metals in the effluents and associated with soil and groundwater samples collected from various tannery and textile industries located near the Haridwar. The physicochemical examination for metallic parameters has been conducted by using Atomic absorption spectrometer (AAS) and spectrophotometer. The outcome showed that all the metals such as Mn, Cu, Fe, Cr, Pb and Cd beat the standard limits in effluents of tannery and textile industries and the associated soil samples, while Chromium (Cr) contamination in groundwater samples were observed only in the samples

collected from areas nearby tannery industries. The findings also indicated that the contamination of Cr was higher than other metals. The calculated metal levels in the soil and water were compared with the safe limits laid down by WHO.

P. Shanthi et al (2012) studied on Physico chemical analysis of ground water near municipal solid waste dumping sites in coimbatore city. This paper assessed the physical and chemical parameters of groundwater in Coimbatore city. These groundwater samples were collected near the municipal solid waste dumping area during the rainy seasons 2011. These samples were studied for various physicochemical properties. A comparative study on ground water i.e. bore well and hand pump water were carried out by taking certain vital parameters such as pH, TS, TSS, TDS, TA, COD, Nitrate, Cl-, F- etc. In this present study it was founded that the maximum parameters were not at the level of pollution except few parameters like nitrate, TDS, TSS, TS and TH in ground water. Hence both the type of ground water satisfies the requirement for the use in. Therefore, the best accepted option was to avoid the possibility of polluting the groundwater resources.

Paula Popa et al (2012) studied on Study of Physico-Chemical Characteristics of Wastewater in an Urban Agglomeration in Romania. This study investigated the level of wastewater pollution by analyzing its chemical characteristics at 5 wastewater collectors. The samples were collected before they discharge into the Danube during a monitoring campaign of 2 weeks. The Inorganic and Organic compounds, biogenic compounds and heavy metals, have been analyzed using potentiometric and spectrophotometric methods. The Experimental results shown that the quality of wastewater varies from site to site which greatly depends on the origin of the wastewater. Correlation analysis were used in order to identify possible relationships between concentrations of various interpreted parameters, which could be used in selecting the appropriate method for wastewater treatment to be implemented at wastewater plants

Nowara Tamanna Meghla et al (2013) studied on Assessment of Physicochemical Properties of Water from the Turag River in Dhaka City, Bangladesh. A study had been conducted in the River of Turag River in Dhaka to get an idea about the water quality and its temporal changes over post monsoon, pre monsoon and monsoon seasons due to change of physicochemical parameters during the period from October 2011 to September 2012. The inspection demonstrated the present scenario of the water quality of the River Turag which has been highly polluted due to dumping of untreated waste of corporation and industrial directly. The contents of total phosphorus (P), nitrogen (N), hardness and alkalinity in the river water unevenly exceeded than the permissible limit of the standard values (EQS, 1997) in all seasons. Though the levels of pH, total dissolved solid (TDS), electric conductivity (EC), and cadmium (Cd) were highly outpace the standard level in both post and pre monsoon season but in monsoon they were under the permissible limit in the Turag River. The lowest concentration of dissolved oxygen (DO) and higher concentration of biological oxygen demand (BOD) were observed that severely harmed the aquatic organisms and destroyed their habitat in the river. Temperature, the contents of sodium (Na), potassium (K) and copper (Cu) were within the standard level in all seasons. The comparative study showed that the water qualities of the Turag River were highly degraded due to the presence of significant amount of pollutants discharged from Dhaka city. This deterioration not only affects the aquatic organisms but also worse affects the entire ecosystem as well as the local people who depend on river water for their daily activities.

III. MATERIALS AND METHOD

A. SAMPLE COLLECTION

All the groundwater samples were collected from the textile city of Tamil Nadu near the dyeing industry area. The test was carried immediately after collection and few were carried by refrigerating it at 4o.

B. PHYSICO CHEMICAL ASSESSMENT

The samples were analyzed for the following parameters: pH, Temperature, Electrical conductivity, Turbidity, Total hardness (TH), Calcium Hardness (CaH), Magnesium Hardness (MgH), sulphates, chlorides, Biochemical Oxygen Demand (BOD), Chemical oxygen demand (COD), Total solids(TS), Total fixed solids(TFS), Total alkalinity(TA). These analyses were carried in accordance with standard analytical method.

C. METHODOLOGY

pH:

The pH of the sample was determined with pH meter.

Turbidity (NTU):

The turbidity meter has been used to found out the value of turbidity for the ground water samples.

Temperature:

Thermometer was used for determining the temperature of the samples when taken immediately from the location.

Electrical Conductivity:

The samples were checked for conductivity by the conductivity meter.

Total hardness:

The sample was added with EBT and ammonia buffer the titrated against EDTA solution until the color changes from wine red to deep blue. The same procedure has been carried out for remaining samples too.

Calcium hardness:

The groundwater samples were titrated against EDTA by adding murexide indicator till the color changes from pink to purple. The value was noted.

Biochemical Oxygen Demand (BOD):

The sample was diluted with addition of phosphate buffer, $MgSO_4$, $CaCl_2$. The initial Do was found immediately. The sample was incubated for 5 days at 120° and final DO was determined. The same procedure was carried out together for other samples.

Chemical Oxygen Demand (COD)

The samples were kept in a reflux flask and potassium dichromate, H_2SO_4 reagent and the apparatus was kept at 160° for 2 hours and cooled. Then the samples were titrated against FAS with Ferrion indicator till the color changes from blue green to wine red.

Sulphates:

The sample was titrated with the addition of Phenolphthalein indicator till the color changes to pink. Simultaneously the procedure was done for other samples.

Chlorides:

The sample was added with potassium chromate and titrated to brick red color with silver Nitrate solution.

Total solids:

The samples were kept in water bath until the water evaporates and the crucible was kept in oven at 103° . the crucibles were weighed and total solids were founded out.

IV. RESULTS AND DISSCUSSION

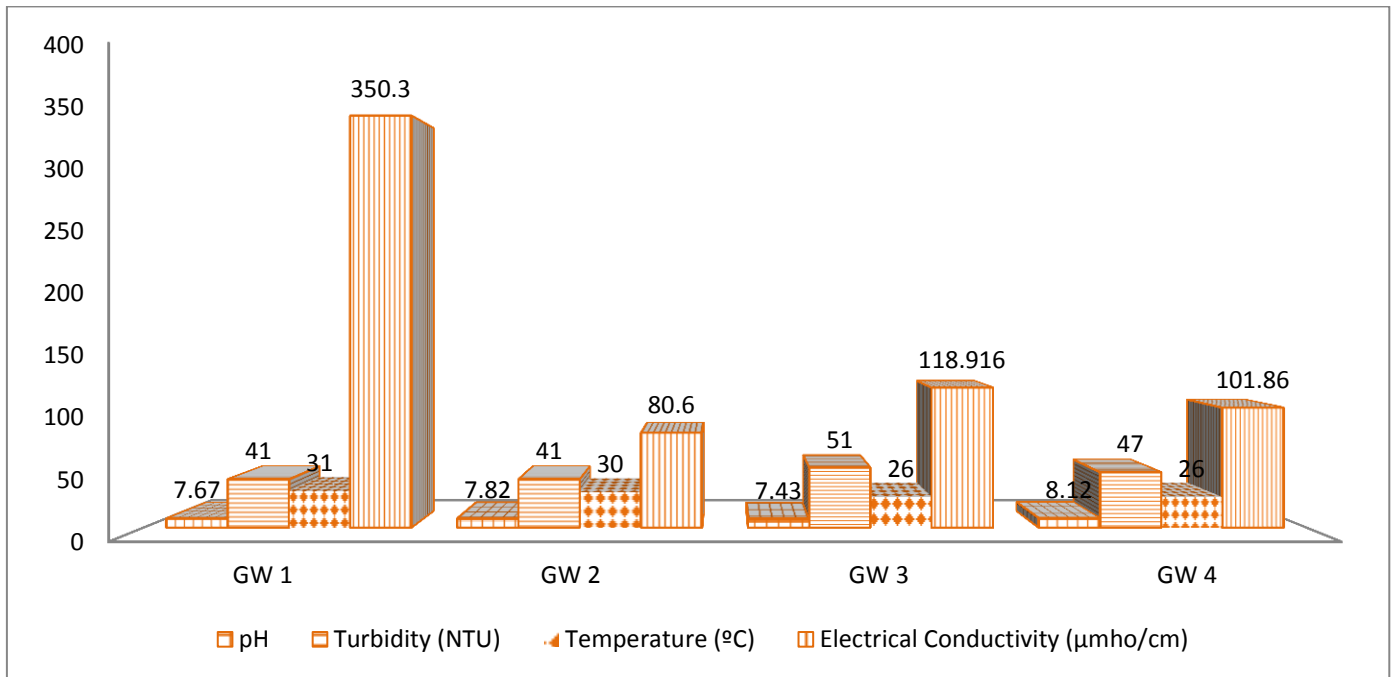
The present study assess the Physico chemical parameters such as pH, Turbidity, Temperature, Electrical Conductivity, Total Hardness, Calcium hardness (CaH), Magnesium hardness (MgH), DO, BOD, COD, Sulphates, Chlorides, Total solids(TS). The area was the groundwater sample taken has been contaminated due to the effluent released from the groundwater. From the results it has been shown that the few parameters were exceeding the permissible limits such as Sulphates, BOD of IS 10500:2012. It has also been shown in the result that the Electrical conductivity was very good for all the 4 ground water samples.

The table 1 shows the Physico chemical parameters of the groundwater samples taken near dyeing industries located at Tiruppur City. These results were compared with the permissible limits of IS 10500:2012.

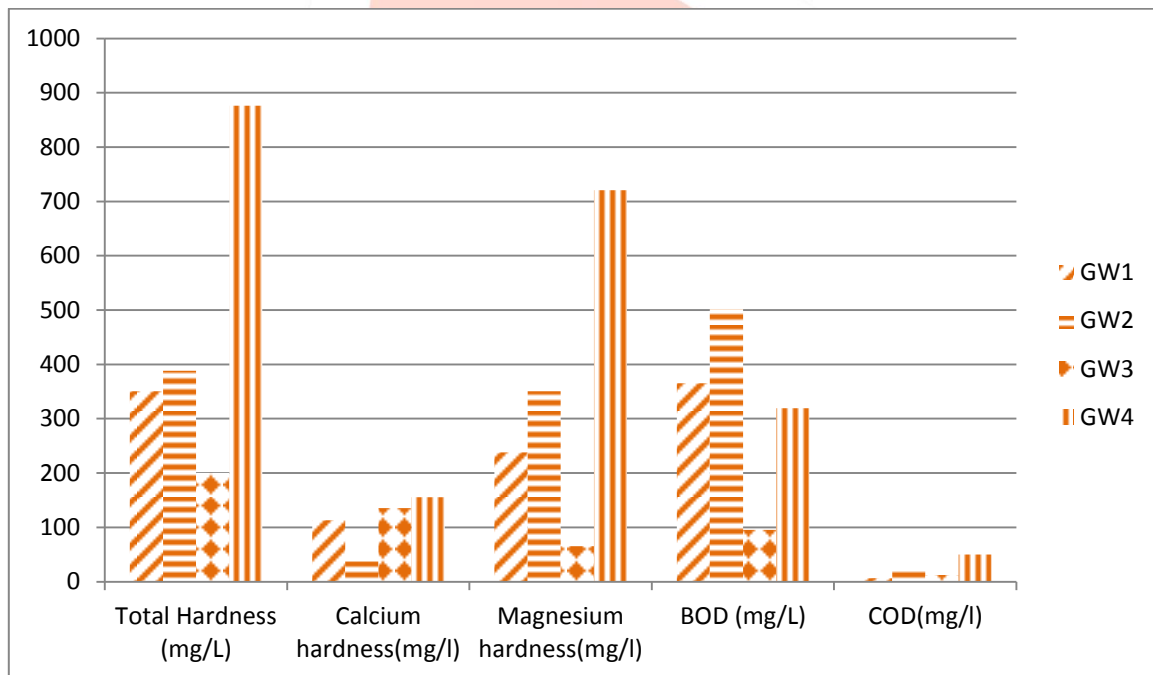
Table 1: Physico chemical parameters of the groundwater samples.

S No	PARAMETERS	GW1	GW 2	GW 3	GW 4
1	pH	7.67	7.82	7.43	8.12
2	Turbidity (NTU)	41	41	51	47
3	Temperature ($^\circ C$)	31	30	26	26
4	Electrical Conductivity ($\mu mho/cm$)	350.3	80.6	118.916	101.86
5	Total Hardness (mg/L)	112.59	387.8	200.16	875.7
6	Calcium hardness(mg/l)	112.59	37.53	135.08	155.124
7	Magnesium hardness(mg/l)	237.71	350.27	65.142	720.57
9	BOD (mg/L)	364.8	501.6	95.1	319.2
10	COD(mg/l)	6	20	12	50
11	Sulphates (mg/L)	1680	1209.6	48	38.4
12	Chlorides (mg/L)	48.998	24.99	132.496	83.49
13	Total Solids (mg/L)	30	20	50	30
14	Total Volatile Solids (mg/L)	25	15	40	20
15	Total Fixed Solids (mg/L)	5	5	10	10

The Figure1 shows the chart representing the values of Physical parameters the groundwater samples.



The Figure2 shows the chart representing the values of Chemical parameters the groundwater samples.



V. CONCLUSION

The current scenario shows that there is major scarcity for water but evidently seen that the water has been contaminated to a greater extent. From the current study it was concluded that the groundwater samples taken near the Dyeing Industries were at most under permissible limits of CPCB and IS 10500:2012. The turbidity (51 NTU), sulphates (1609 mg/l), BOD(501.6 mg/l) maximum exceeds the limits. Hence the samples had been highly recommended for treating. The treated water may be used for the purpose of drinking.

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