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**ASSESSMENT OF WATER QUALITY PARAMETERS OF
WATERBODIES IN AND NEAR THE PADDY FIELD**

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Introduction

Today the easy availability of fresh water is a major problem as 80% of our rivers are polluted due to industrial and domestic discharge with increase pollution availability of fresh water is decreasing at greater rate. Industrial discharge increases the water pollutants such as high biochemical oxygen discharge (BOD), acidity, alkalinity, hardness, heavy metals etc., presence of high values of these parameters makes the water unfit for human consumption. Domestic sewage also creates a major problem, as organic wastes from domestic water causes problems of eutrophication, so makes water unsuitable for consumption.

Water Quality Parameters

Quality of water can be assessed by evaluating certain parameters, called water quality parameters. The following are the important parameters usually determined.

1. pH of the water

The pH of pure water refers to the measure of hydrogen ions concentrations in water. It ranges from 0 to 14. In general water with a pH of 7 is considered neutral while lower of it referred acidic and pH greater than 7 known basic. Normally, water pH ranges from 6 to 8.5. It is noticed that water with low pH is tend to be toxic and with high degree of pH is turned into a bitter taste. According to WHO standards of pH of water should be

6.5 to 8.5.

2. Electrical conductivity (ec)

Electrical conductivity is a measure of water's capacity to convey electric current .

Pure water is not a good conductor of electric current rather a good insulator .
According to WHO standards EC value should not exceeded $400 \mu\text{S} / \text{cm}$.

Conductivity of water varies directly with temperature and it is proportional to its dissolved minerals and matter content.

3. Hardness

Water hardness is the measures of the amount of calcium and magnesium salts dissolved in water . According to World Health Organization (WHO) hardness of water should be $500 \text{ mg} / \text{l}$. Hard water requires more soap and synthetic detergents for home laundry and washing , to contribute to scaling in boilers and industrial equipment.

4. Degree of hardness of drinking water

- Soft $0\text{-}60 \text{ mg} / \text{L}$
- Medium $60\text{-}120 \text{ mg} / \text{L}$
- Hard $120\text{-}180 \text{ mg} / \text{L}$
- Very hard $> 180 \text{ mg} / \text{L}$

5. Turbidity

Turbidity is a measure of cloudiness or haziness in water caused by suspended solids (eg sediment , algae) . Turbidity is expressed in Nephelometric turbidity units (NTU) and is measured using a relationship of light reflected from a given sample . Turbidity is a variable in the lower lakes and influenced primarily by wind events .

6. Total acidity

The acidity in water sample is its capacity to neutralise hydroxide ions . Acidity may be caused by mineral acids such as sulphuric or hydrochloric acid or by dissolves carbon dioxide . Most commonly in drinking water , carbon dioxide is the principal cause of acidity .

7. Alkalinity

Alkalinity is a measure of water's ability to neutralize acids or resist changes that cause acidity, maintaining a stable pH. Titration is used to measure the alkalinity of a water sample, and water with a pH of 8 or higher is considered alkaline. Soils and geology have the biggest influence on water pH and alkalinity.

8. Ammonia content

Ammonia gas is extremely soluble in water. It is the natural product of decay of organic nitrogen compounds. Natural levels in ground waters are usually below 0.2 mg of ammonia per litre. If drinking water containing more than 0.2 mg of ammonia per litre is chlorinated, as up to 68 % of chlorine may react with ammonia and become unavailable for disinfection.

9. Sulphate content

Sulphate is second to bicarbonate as major anion in hard water reservoirs. Sulphates can be naturally occurring or as a result of municipal or industrial discharges. It can be naturally occurring as a result of breakdown of leaves that falls into a stream of water passing through rock or soil containing gypsum and other common minerals or atmospheric deposition. Runoff from fertilized agricultural lands also contributes sulphate to water bodies.

10. Chloride content

Chloride is a naturally occurring element that is common in most natural waters and is most often found as a component of salt (sodium chloride) or in some cases in combination with potassium or calcium. Chlorides are leached from different rocks into soil and water due to weathering. Chloride levels in unpolluted water are generally below 10mg/L and sometimes even below 1mg/L.

Review of literature

Analysis of water quality parameters of water bodies in and near the paddy field by Brantas' upper stream along paddy fields, Karangploso Subdistrict, Malang District. The river water samples were collected along the paddy field. The samples were collected when ahead of the harvest season. During the harvest season, pesticides were not sprayed but the concentration of pesticides in the river is quite high.[7]

Gala lake is an international important lake due to its location on one of the world's most important bird migration routes. For this reason water quality of this lake is very important because the lake is surrounded by paddy Fields, it may contain eutrophication and toxic metals due to the excess use fertilizers. So the impacts of paddy fields on water quality of the gala lake was investigated. The concentrations of metals and physico-chemical parameters in surface water samples taken and compared with standard guidelines. NO₂, BOD content in the lake was exceed the permissible level. High BOD indicates contaminated water quality.[8]

Water Quality analysis of River Tawi near Sitlee pumping station by Meenakshi Khajuria and S.P.S Dutta consists of the assessment of physico-chemical characteristics of the raw water of the Tawi river near Sitlee water treatment complex and at Sitlee water treatment complex, for two years (2000-2001 and 2001-2002). The results showed that the WQI value of the water samples during both the years is less than 50 and is indicative of water quality that is optimum for drinking.[9]

The water quality analysis of River Yamuna using water quality index in the national capital territory, India (2000-2009) by Deepshikha Sharma and Arun Kansal identifies the critical pollutants affecting the river water quality during its course through the city. BOD, DetO, total and faecal coliforms and free ammonia were found to be critical parameters for the stretch.[10]

Sarala C. et al studied the groundwater quality parameters in the surrounding wells of Jawaharnagar, in upper Musi catchment area of Ranga Reddy district in Andhra Pradesh. The bore wells data was collected from the study area for two seasons i.e., post

monsoon in December 2007 and pre monsoon in June 2008. The groundwater is acidic in nature and very hard. It is done by using Arc GIS software. The study reveals that the concentrations of major constituents are well within the permissible limits of IS-10500-1994, except in few cases where total hardness and fluoride concentrations are high. The fluoride conc. exceeded the permissible limit. From the analysis it was observed that the groundwater is polluted in the entire study area. During last few years, the utilization of surface and groundwater for drinking, industrial and agricultural purposes has increased manifolds but consequently it is observed that the water is polluted and affecting the human health, soil nutrients, livestock, biomass and environment in certain areas.[13]

Shimaa M. Ghoraba et.al collected 120 ground water samples from 29 Districts of Balochistan, Pakistan. The various parameters are selected for the testing of samples.

All samples were analyzed for pH, Calcium, Carbonate, Magnesium, Sodium, Potassium, Chlorides, Sulphate and Nitrate, TDS and bicarbonate. The results revealed highly variable hydrochemistry. The chloride is found to be most predominating. The groundwater in Balochistan has high concentrations of fluoride, iron and nitrate in many districts. The pH part of the Durov diagram reveals that groundwater in study area is alkaline and electrical conductivity of most of samples lies in the range of drinking water standards adapted in Pakistan. From the SAR and conductivity plot it was found that most of groundwater cannot be used on soil without restricted drainage and special requirement of Management for salinity control. Comparison of data with WHO(2011) standards for drinking water indicate that the groundwater in the most of study area are suitable for drinking purpose except some few places. The groundwater recorded a wide range in TDS.[14]

Results and discussion

We analyzed ten samples from different sources. They are:

Sample 1 – Pond near paddy
field

Sample 2 – Pond near paddy field

Sample 3 – Pond near paddy field

Sample 4 – Well in the field

Sample 5 – Well near the field

Sample 6 – Well near the field

Sample 7 – Well near the field

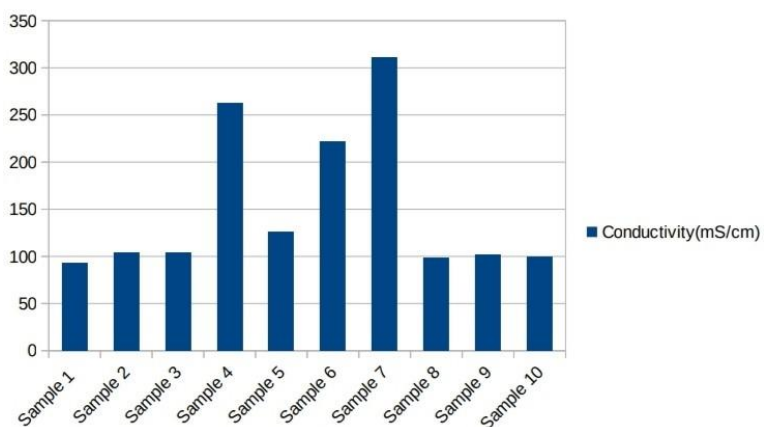
Sample 8 – Canal near the field

Sample 9- Canal near the field

Sample 10 – Canal near the field

The results obtained for various parameters are as follows

1. CONDUCTIVITY

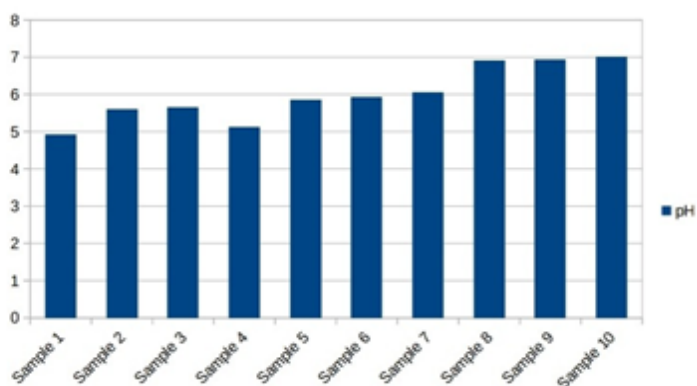


Samples	Conductivity(mS/cm)
Sample 1	93
Sample 2	104
Sample 3	104
Sample 4	263
Sample 5	126
Sample 6	222
Sample 7	311
Sample 8	99
Sample 9	102
Sample 10	100

Since conductivity is a measure of dissolved solvents, sample 7 conducts most and it may contain high amount. Conductivity of sample 1 is very less. So it contains less amount of dissolved solvents and comparatively pure than other samples.

2. pH

Samples	pH
Sample 1	4.92
Sample 2	5.61
Sample 3	5.66
Sample 4	5.13
Sample 5	5.86
Sample 6	5.93
Sample 7	6.05
Sample 8	6.92
Sample 9	6.94
Sample 10	7.0

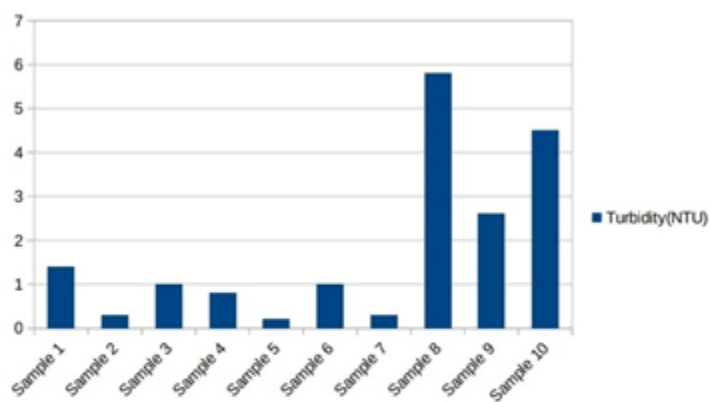


Most of the samples are acidic and only sample 10 is comparatively basic. Sample 1 is more acidic. As per Indian standard, for drinking water, pH value between 6.5 and 8.5 is desirable range. So samples 1,2,3,4,5,6,7 are not suitable for drinking purpose. pH can be raised by adding quantity of lime(Calcium hydroxide).

3. TURBIDITY

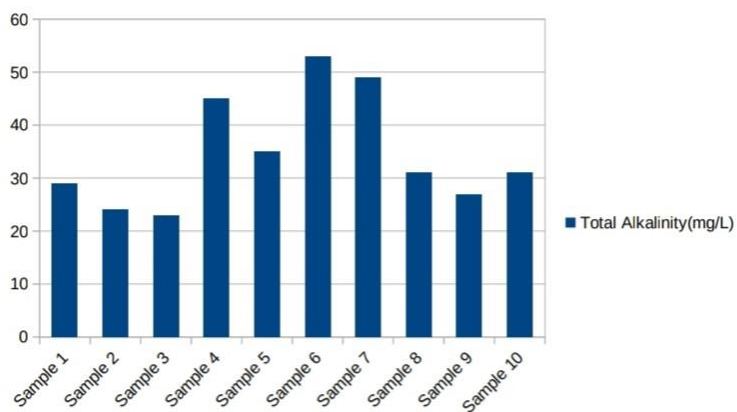
The maximum available limit of turbidity is 1 NTU. Here samples 1,3,6,8,9 and 10 have turbidity equal to greater than 1 NTU. Sample 8 has the highest turbidity.

Samples	Turbidity(NTU)
Sample 1	1.4
Sample 2	0.3
Sample 3	1.0
Sample 4	0.8
Sample 5	0.2
Sample 6	1.0
Sample 7	0.3
Sample 8	5.8
Sample 9	2.6
Sample 10	4.5



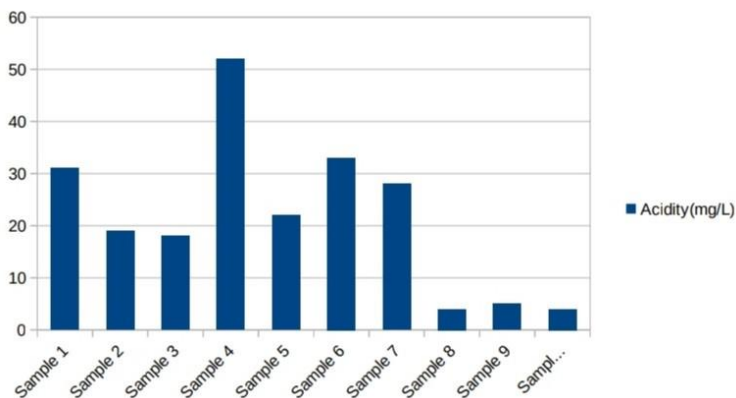
4. ALKALINITY

Samples	Total Alkalinity(mg/L)
Sample 1	29
Sample 2	24
Sample 3	23
Sample 4	45
Sample 5	35
Sample 6	53
Sample 7	49
Sample 8	31
Sample 9	27
Sample 10	31



The maximum available limit of total alkalinity is 200 mg/L. Here for all samples, the total alkalinity is less than 200 mg/L.

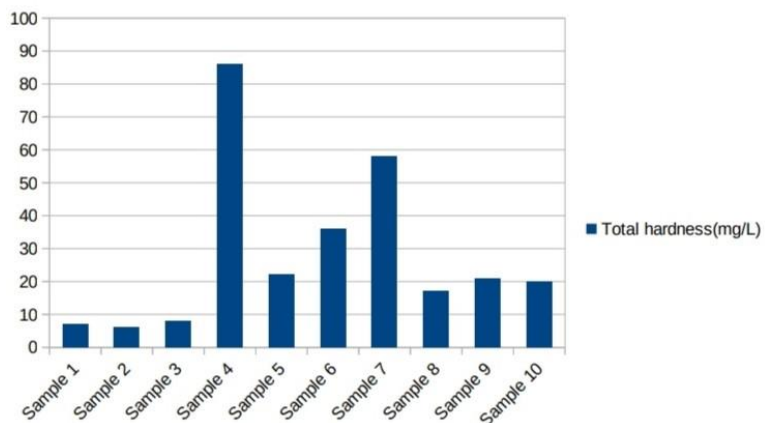
5. ACIDITY



Samples	Acidity(mg/L)
Sample 1	31
Sample 2	19
Sample 3	18
Sample 4	52
Sample 5	22
Sample 6	33
Sample 7	28
Sample 8	4
Sample 9	5
Sample 10	4

6.HARDNESS

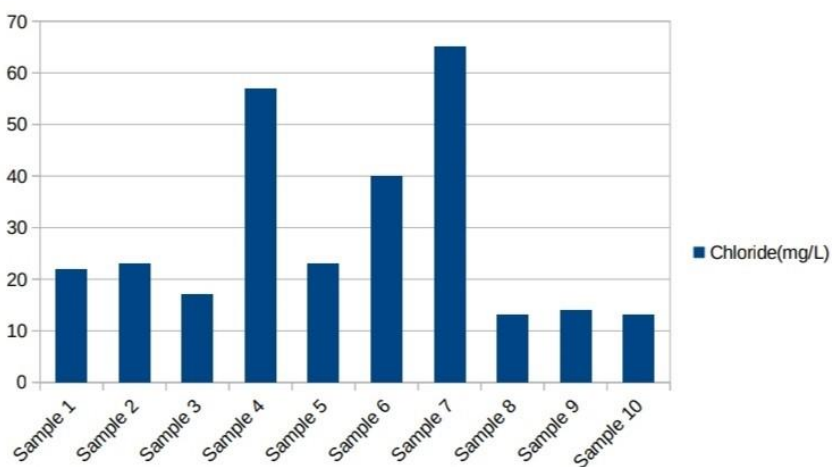
Samples	Total hardness(mg/L)
Sample 1	7
Sample 2	6
Sample 3	8
Sample 4	86
Sample 5	22
Sample 6	36
Sample 7	58
Sample 8	17
Sample 9	21
Sample 10	20



The maximum limit of total hardness is 200 mg/L. Here for samples, hardness is less than 200 mg/L.

7.CHLORIDE

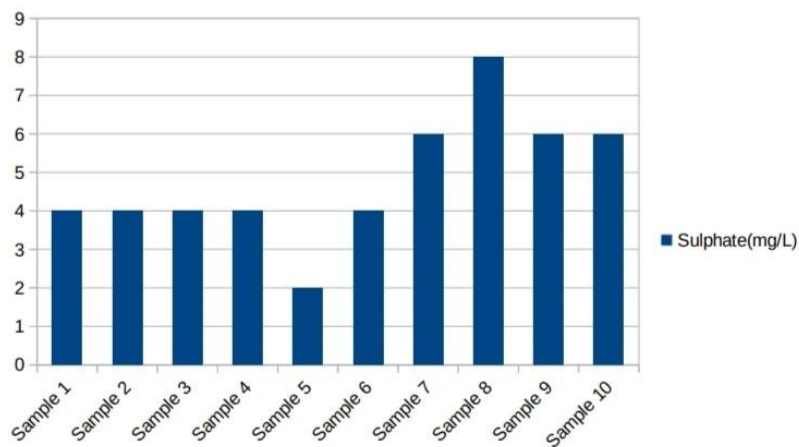
Samples	Chloride(mg/L)
Sample 1	22
Sample 2	23
Sample 3	17
Sample 4	57
Sample 5	23
Sample 6	40
Sample 7	65
Sample 8	13
Sample 9	14
Sample 10	13



The maximum available limit of chloride in water is 250 mg/L. Here for all samples, chloride level is less than 250 mg/

8.SULPHATE

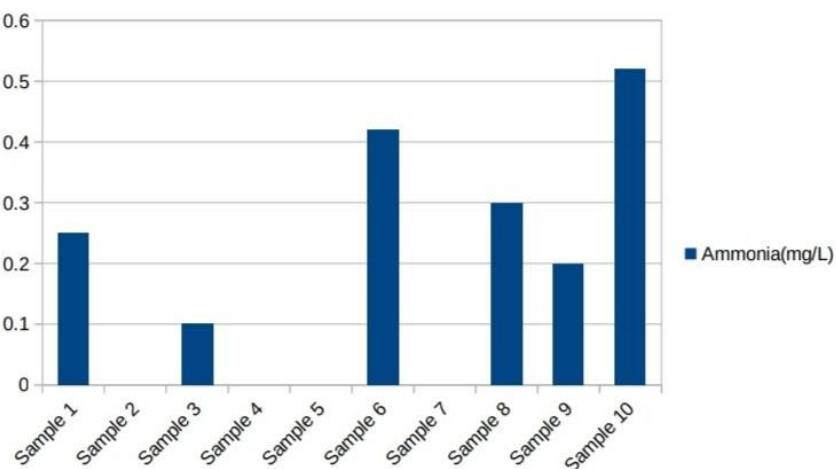
Samples	Sulphate(mg/L)
Sample 1	4
Sample 2	4
Sample 3	4
Sample 4	4
Sample 5	2
Sample 6	4
Sample 7	6
Sample 8	8
Sample 9	6
Sample 10	6



The maximum limit of sulphate is 200 mg/L. Here for all samples, sulphate level is very less than 200mg/L.

9.AMMONIA

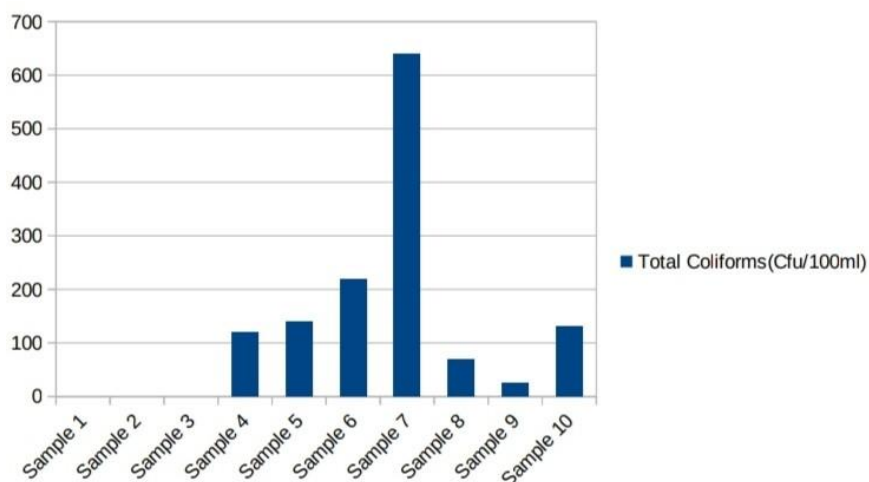
Samples	Ammonia(mg/L)
Sample 1	0.25
Sample 2	0
Sample 3	0.1
Sample 4	0
Sample 5	0
Sample 6	0.42
Sample 7	>5.0
Sample 8	0.3
Sample 9	0.2
Sample 10	0.52



The maximum limit is 0.50mg/L. Here samples 7 and 10 have exceeded the permissible limit and sample 7 has very high ammonia content.

10.TOTAL COLIFORMS

Samples	Total Coliforms(Cfu/100ml)
Sample 1	0
Sample 2	0
Sample 3	0
Sample 4	120
Sample 5	140
Sample 6	220
Sample 7	640
Sample 8	70
Sample 9	25
Sample 10	130



Total coliforms should be absent in a sample. Samples 1,2 and 3 are free of coliform bacteria. Other samples have bacteria content and sample 7 has very high coliform bacteria cont

DISCUSSION

Total 10 samples collected from different water sources of the study area from water bodies in and near the paddy field and analysed for physico-chemical parameters such as pH, electrical conductivity, turbidity, ammonia content, total hardness, acidity, alkalinity and chloride. A qualitative study to know the presence or absence of sulphate ions was also conducted.

pH is an indicator of acidic or alkaline condition of water. The pH of most neutral water falls within 4-9. Low pH causes corrosion. In the present study area, the pH value ranges from 4.92-7. In water solution, variations in pH value from 7 are mainly due to hydrolysis of salts of strong bases and weak acids or vice versa. Water pH has generally major role in the determination of solubility and biological availability of chemical constituents such as nutrients and heavy metals. The pH values of the samples are given in Table and a graphical representation also.

Electrical conductivity is the capacity of water to carry an electrical current, and varies with the number and type of ions in solution. The maximum permissible limit of conductivity in drinking water is 300 mS/cm. In present day the conductance of well water samples varies between 33 and 194. The conductivity values of the samples were listed in Table and a graphical representation of the same also.

Turbidity is beyond the limit of 1 NTU for samples 1,3,6,8,9 and 10 and sample 8 has the most.

Natural and anthropogenic sources contribute to ammonia content in water. Presence of ammonia will accelerate algal growth in water bodies. Out of 10 samples collected, ammonia is present in majority of the samples. The samples 7 and 10 contain ammonia which exceeded the permissible limit. The ammonia content in different samples are listed in a table and a graphical representation also.

The total hardness in water samples ranges from 6mg/L to 86mg/L which shows that all samples are soft and safe for drinking purpose. The chief disadvantages of hard waters are that they neutralise the lathering power of soap and,

more important that they can cause blockage of pipes and severely reduced boiler efficiency because of scale formation. The hardness measurements of samples were given in Table and a graphical representation also.

Acidity of water will affect its corrosiveness and acidity in water can corrode copper pipes. Further acidity of water will interfere in water softening. The acidity value of present samples varies from 4mg/L to 52mg/L. The acidity values of samples are given in table and a graphical representation.

Naturally sulphates are found in various minerals such as epsomite ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$), gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) and barite (BaSO_4).such dissolved minerals constitute the mineral content in drinking water. Out of 10 samples sulphates contents are less than maximum limit. Water containing sulphates in excess may attack the fabric of concrete sewer pipes.

Alkalinity of water is an important parameter. The maximum limit is 200 mg/L. The samples's alkalinity ranges from 23 to 53 mg/L. That means all samples are not beyond the permissible limit. Like that chloride is less than permissible limit of 250mg/L for all samples.

Some of the samples are detected with coliform content. It leads to health issues and some diseases.

CONCLUSION

The Present investigation gives an insight Into the probable impact of water pollution by excessive use of chemical fertilizers and pesticides used in Paddy fields.

The results of water investigation shows that most water samples of study area have all parameters within limits.This shows that water samples were least affected by urbanization. The presence of large amount of ionic substances and soluble salt may have resulted in increased value of electrical conductivity.Here sample 7 have high electrical conductivity and 1 have least. Sample 8 is more turbid and sample 10 is more basic. But the most harmful thing is the presence of coliform bacteria in almost

samples except 1,2,3, it shows that the water sources highly contaminated and chlorination or UVfiltration is essential for before it use

The parameters alkalinity, acidity, hardness, chloride, and sulphate were determined for the 10 samples and all these parameters were found within the permissible limit. The maximum ammonia limit of a sample is 0.50. Here the samples 7 and 10 exceed the permissible limit. Based on these parameters we can say that all water samples except 7 are suitable for drinking purpose.

As the value of total hardness come within the limits, the metal ion concentration is low. So the toxic effect of water is less. So the water samples collected from in and near paddy fields are not much polluted.

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