

Analysis of Ground Water Quality Parameters around Kushmhi Railway Station Area

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Abstract- This study was completed around Kushmhi railway station area during December 2016 to March 2017, and evaluate the some Groundwater quality parameters of chose India Mark-II and Shallow depth hand pumps. Total 52 water samples collected from different stations and analysis of the various physical, chemical parameters such as Temperature, pH, Turbidity, Total hardness, Total alkalinity, Turbidity, Fluoride, Chloride. The results also compared with ARE 10500-2012 standards. The analysis reveals that most of the parameter is found under acceptable limit, but some are exceeding the acceptable limit of BIS standards.

Key words: Physico-Chemical Parameters, Groundwater Samples, India Mark-II and Shallow Depth Hand Pumps.

I. INTRODUCTION

Groundwater is portrayed as the water introduce in the submerged zone underneath the water table. Ground water is one of the Nation's most basic trademark resources. It gives around 40 percent of the Nation's vast water supply. In like manner, more than 40 million people, including the larger piece of the nation ample, supply their own specific drinking water from family wells. Along these lines, ground water is a basic wellspring of appreciating water each state. Ground water is moreover the wellspring of an awesome piece of the water used for watering framework. It is the Country's key store of new water and addresses a noteworthy, some portion of the potential future water supply. Ground water is a significant supporter to stream in various streams and conduits and has an in numbing effect on conduit and wetland living spaces for plants and animals. The zone of Kushmhi railway station is a basic essential being discovered totally near Indo-Nepal Border and greatly especially joined by Railway avenues and Airways from different parts of the Nation. Ground water can get the chance to be contaminated from trademark sources or different sorts of human activities. Private, metropolitan, business, currency, and cultivating activities can all impact ground water quality. Contaminants may accomplish ground water from activities on the range surface, for instance, releases or spills from set away industrial wastes; from sources underneath the territory surface yet over the water table, for instance, septic systems or discharging, underground oil stockpiling systems; from structures

underneath the water table, for instance, wells; or from contaminated restore water.

II. STUDY AREA

The study area is around Kushmhi railway station is situated in the eastern part of District Gorakhpur in Uttar Pradesh (India). It is lies between Latitude 26° 41' N and longitude 83° 30' E, and having approximate area 12 km square shown in fig.1.

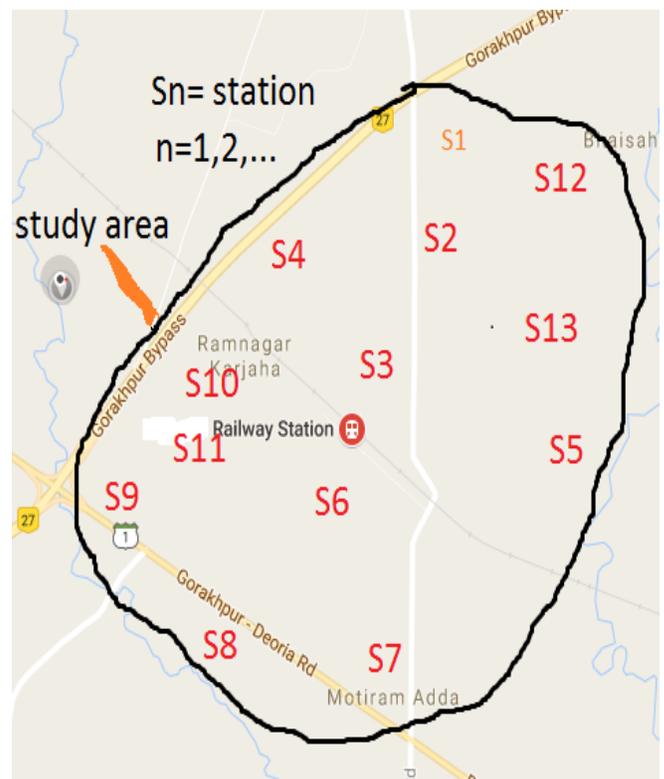


Fig.1-study area

III. METHODS AND METHODOLOGY

Ground water samples were collected from thirteen different villages around Kushmhi railway station during December to March. Eight station (village) shallow depth and five station India mark-II hand pump selected. The samples were

collected one litre plastic bottle which has been carefully washed with acid and rinsed with distilled water. The sample were analyses for physico-chemical parameters such as Temperature (Thermometer), pH (Colorimetric method), Turbidity (Digital turbidity meter), Total dissolve solid (Digital TDS meter), Fluoride (Colorimetric method), Alkalinity (Titration method), Acidity (Titration method), Hardness (Titration method), Chloride (Titration method) in MMMUT, P.H.E. laboratory.

IV. RESULTS AND DISCUSSION

The results and discussion physico-chemical parameters of the groundwater sample of both type of hand pumps, shallow depth and India mark-II hand pumps are discuss below.

A. pH

pH is measure intensity of acidity or alkalinity and measures of the concentration hydrogen ion in water sample. The pH value varies from the 6.5 to 9, of groundwater samples in study area and according to IS 10500:2012 acceptable limit 6.5 to 8.5 for drinking water. In study area one sample exceed acceptable limit and remaining samples found in within limit, Shown in Fig-2 & Fig-3

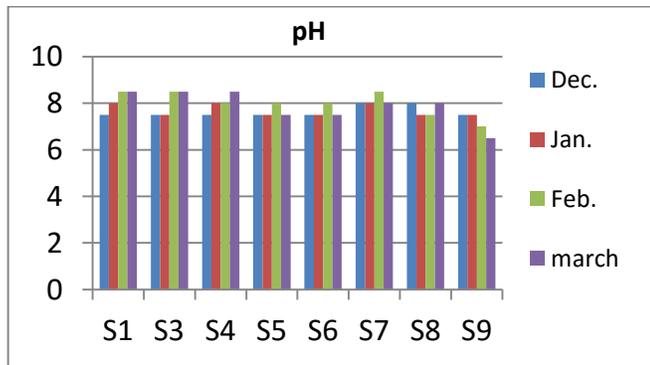


Fig.2- monthly variation of pH shallow depth hand pumps

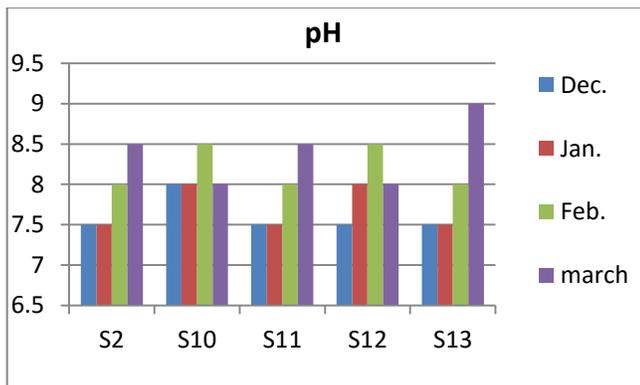


Fig.3-Monthly variation of pH India mark-II hand pumps

B. Acidity

Acidity is caused by the presence of mineral acids, free carbon dioxide, sulphates of iron and aluminum, etc in water. The acidity in natural waters is primarily due to dissolved carbon dioxide. In ground water samples mineral acidity was absent and CO₂ acidity ranges from 16 mg/l to 56 mg/l in study area shown in Fig-4 & Fig-5.

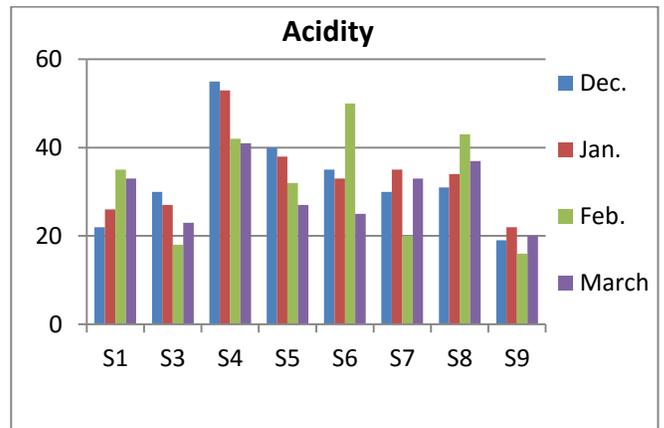


Fig.4-Monthly variation of acidity shallow depth hand pumps

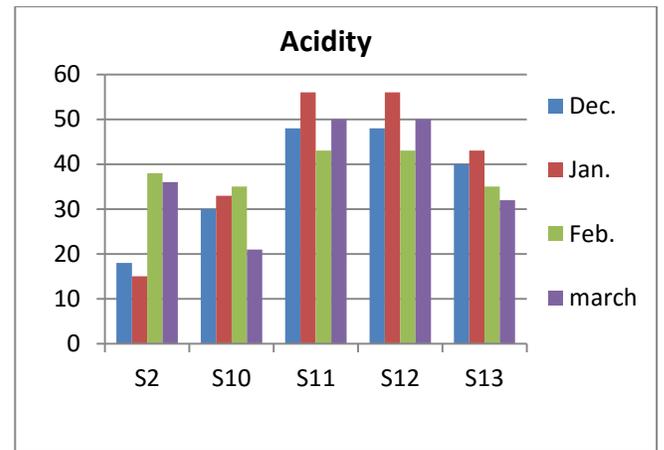


Fig.5-Monthly variation of acidity India mark-II hand pumps

C. Total dissolve solid (TDS)

Total Dissolve Solid (T.D.S.) in water may responsible for carbonate and bicarbonate of Ca⁺ and Mg⁺ ions. About 55 to 65% these organic matter is responsible for T.D.S. and remain other organic matters like, Na, K, Mn, CO₃⁻, HCO₃⁻, Cl⁻, salt etc, TDS values found in ranges from 140 mg/l to 640 mg/l in study area and according to IS 10500-2012 the acceptable limit 500 mg/l for drinking water. In study area 9 samples exceed in acceptable limit and remaining samples found in within limit, shown in Fig-6 & Fig-7.

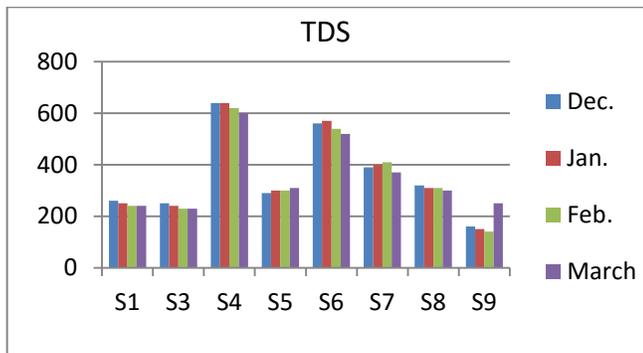


Fig.6- Monthly variation of TDS shallow depth hand pumps

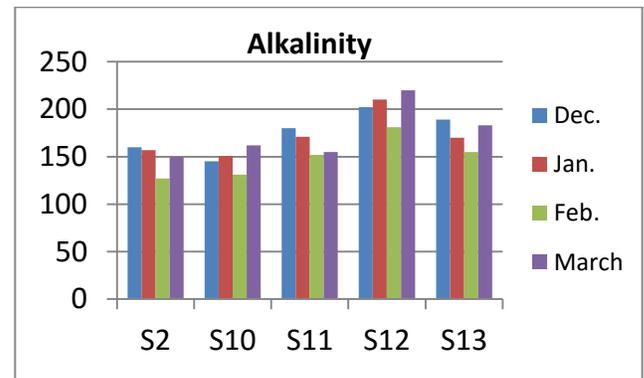


Fig.8-Monthly variation of alkalinity India mark-II hand pumps

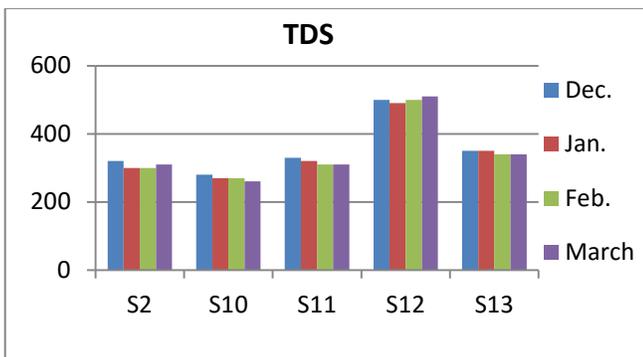


Fig.7-Monthly variation of TDS shallow depth hand pumps

E-Hardness

Hardness is occurred in water mainly due to presence of carbonate, bicarbonate and calcium, magnesium ions. Hardness values found in ranges from 74 mg/l to 272 mg/l in the study area and according to IS 10500:2012 acceptable limit 200 mg/l are prescribed. In study area 12 samples exceed acceptable limit and remaining samples found in within limit shown in Fig-9 & Fig-10.

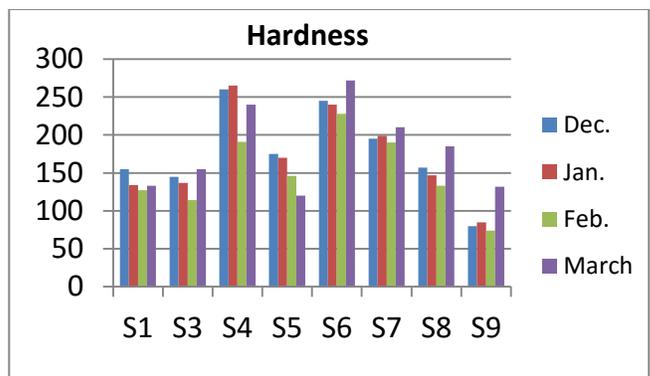


Fig.9- Monthly variation of Hardness shallow depth hand pumps

D-Alkalinity

By testing the pH value of water samples we can easily find that water is alkaline or acidic nature. Generally alkalinity is caused by the occurrence of bicarbonates of calcium and magnesium or by the carbonates or hydroxide of sodium, potassium, calcium and magnesium. Alkalinity caused by bicarbonates is called carbonate alkalinity and that the caused by hydroxide is called hydroxide alkalinity or caustic alkalinity. Alkalinity values found in ranges from 33 mg/l to 415 mg/l in study area and according IS 10500:2012 acceptable limit 200 mg/l are prescribed. In study area 13 samples exceed the acceptable limit and remaining samples found in within limit, shown in Fig-8 & Fig-9.

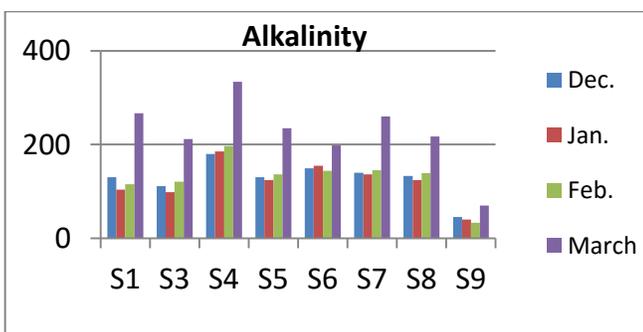


Fig.8- Monthly variation of Alkalinity shallow depth hand pumps

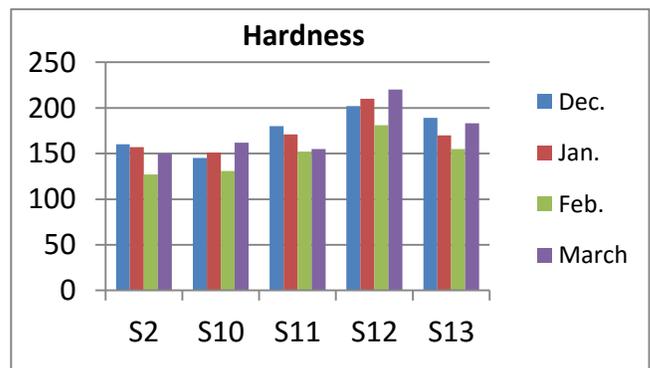


Fig.10. Monthly variation of Hardness India mark-II hand pumps

F-Chloride

Chloride is a generally distributed constituent in all types of rocks in one or other form. Its affinity towards sodium is high. So, its concentration is high in groundwater, where the temperature is high and rainfall is less, Chloride values found in ranges from 13 mg/l to 82 mg/l in the study area. According to IS 10500:2012 acceptable limit 250 mg/l for drinking water and all sample chloride values found in within acceptable limit Shown in Fig-11 & Fig-12.

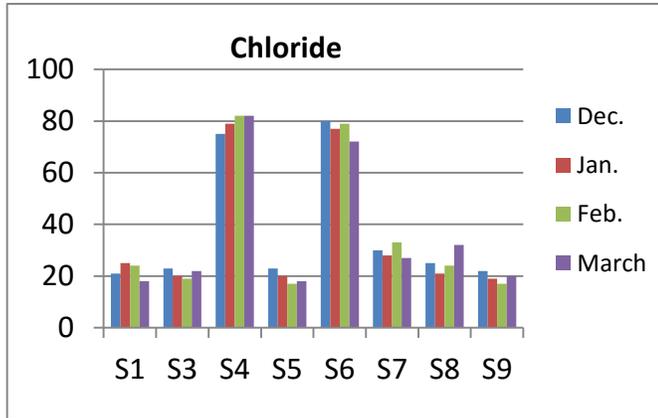


Fig.11- Monthly variation of chloride shallow depth hand pumps

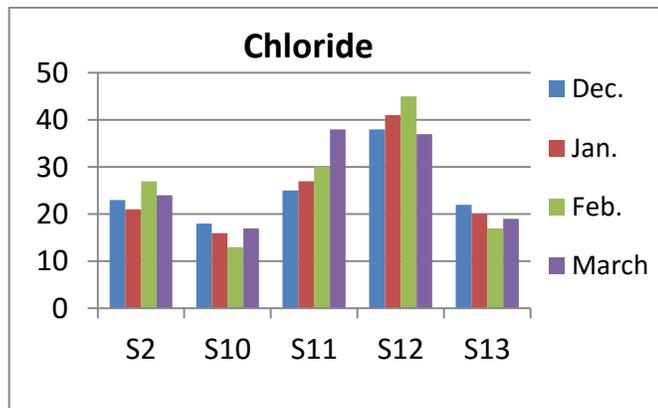


Fig.12-Monthly variation of chloride India mark-II hand pumps

H-Turbidity

Turbidity is occurred in water due to presence of suspended organic matters and clay, silts, other microscopic organisms. Turbidity values found in ranges from 2 NTU to 12 NTU in study area and According to IS 10500:2012 acceptable limit 1 NTU and permissible limit 5 NTU. All samples exceed in acceptable limit in study area shown in Fig-13 & Fig-14.

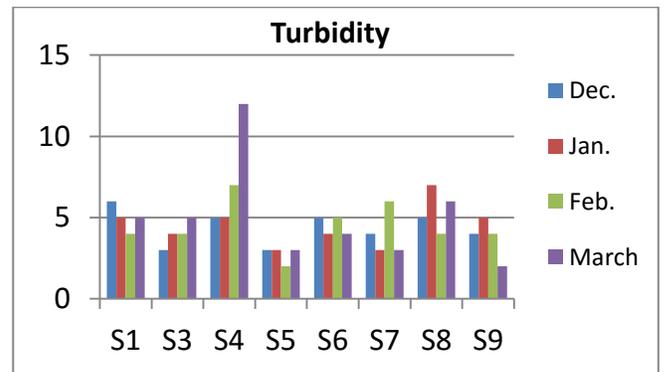


Fig.13- Monthly variation of Turbidity shallow depth hand pumps

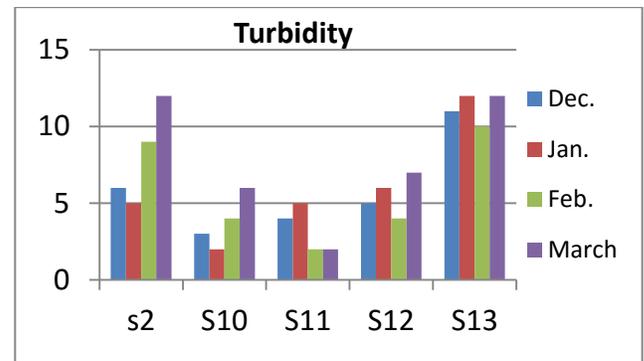


Fig.14- Monthly variation of Turbidity India mark-II hand pumps

I-Fluoride

Probable source of high fluoride in Indian waters seems to be that during weathering and circulation of water in rocks and soils, fluorine is leached out and dissolved in groundwater, Fluoride values found in ranges from 0.5 mg/l to 1.5 mg/l in study area According to IS 10500:2012 acceptable limit 0.5 mg/l and permissible limit 1.5 mg/l are prescribed and all samples found in within permissible limit Shown in Fig-15 & Fig-16.

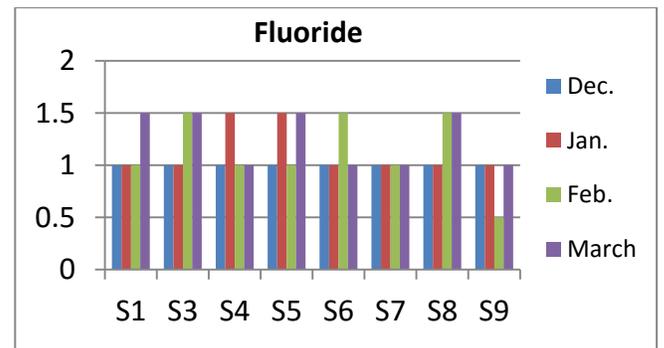


Fig.15- Monthly variation of Fluoride shallow depth hand pumps

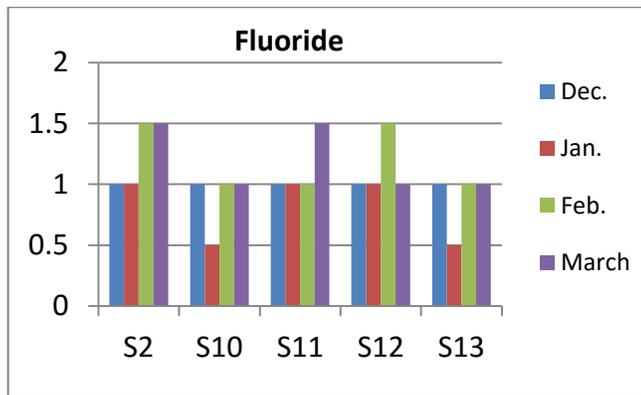


Fig.16-Monthly variation of Fluoride India mark-II hand pumps

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V. CONCLUSION

The present study is based on the results of the ground water is alkaline nature and some stations water samples contaminated for selected parameters, and exhibits that the some shallow depth hand pumps are affected by high extent of physico-chemical parameters except chloride in study area. This necessitates a detailed water quality around kushmhi railway station area. Also, there is a need to educate and convince people avoided to using shallow depth hand pumps on one hand and providing the access to safe potable water through India mark-II hand pumps or piped water supply in near future on the other hand. Such the public awareness programmes required to be taken up in study area.

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