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Assessment of Water Quality Parameters for Regional Water Samples

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ABSTRACT:

The present work is aimed at assessing the water quality parameter for the regional water samples of 10 different areas in Ambala district of Haryana State. The different parameters determined are pH (7.42 -7.77), TDS (100-400) mg/l, Calcium (0-138.89) mg/l, TSS (300-4300) mg/l, Absorbance (0.857-20.451), Electrical conductivity (0.08-0.23),Total hardness (55.55-402.77) mg/l etc. Most parameters were found within permissible limits described by various health agencies like WHO, IS, BIS. The results indicate that these water sources are Non-polluted and can be used for potable purpose safely.

I.INTRODUCTION:-

Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life (Gorde and Jadav, 2013). It is used for domestic and industrial water supply and also for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. According to WHO organization, about 80% of all the diseases in human beings are caused by water (Kavitha and Elangovan, 2010). These include gastrointestinal diseases, reproductive problems, neurological disorders, and even cancer. Anyone can be affected, but babies, young children, elderly individuals, and pregnant women, especially those who have weakened immune systems, are susceptible to illnesses from various water contaminants. Various water born diseases may be Cholera, Diarrhea, Lead poisoning, Malaria, Polio (Infantile paralysis), Typhoid Fever, Trachoma (Eye infection).

The quality of water is a very sensitive issue. Anthropogenic influences (urban, industrial and agricultural activities, increasing consumption of water resources) as well as natural processes (changes in precipitation inputs, erosion, and weathering of crustal materials) degrade waters and impair their use for drinking, industrial, agricultural, recreation or other purposes (Carpenter, Caraco, 1998). Due to spatial and temporal variations in water chemistry a monitoring program that will provide a representative and reliable estimation of the quality of water is necessary. Thus, monitoring programs including frequent water samplings at many sites and determination of a large number of physicochemical parameters are usually conducted resulting in a large data matrix, which needs a complex data interpretation (Chapman, 1992).

Although statistics, the WHO reports that approximately 36% of urban and 65% of rural Indian are without access to safe drinking water. Fresh water is one of the most important resources crucial for the survival of all the living beings. It is even more important for the human being as they depend upon it for food production, industrial and waste disposal, as well as cultural requirement. Human and ecological use of ground water depends upon ambient water quality. Human alteration of the landscape has an extensive influence on watershed hydrology. Ground water plugs a vital role in human life. The consequences of urbanization and industrialization leads to spoil the water for agricultural (Nidhi Sexenal et al.) purposes ground water is explored in rural especially in those areas where other sources of water like dam and river or a canal is not considerable. During last decade, this is observed that ground water get polluted drastically because of increased human activities. An understanding of water chemistry is the bases of the knowledge of the multidimensional aspect of aquatic environmental chemistry which involves the source, composition, reactions and transportation of water. The quality of water is of vital concern for the mankind since it is directly linked with human welfare. The present work is an attempt to measure the water quality of various water sources (Neerja Kalra, 2012).

.Central Pollution Control Board has formulated a comprehensive set of guidelines on the practice of idol immersion in lakes, rivers and seas (CPCB, Guidelines for Idol Immersion, 2006). These guidelines delineate and specify the role of the state pollution control boards in conducting water quality assessments of water bodies and classifying them on the basis of certain physio-chemical parameters. These guidelines if followed and acted upon can help in bringing tremendous change in the water quality of river post idol immersion (CPCB, 2006).

II.OBJECTIVE:-

- To assess Physical Properties of portable water sample like color, temperature, turbidity etc.
- To assess Chemical Properties of portable water samples like Alkanity, pH, BOD, COD, TDS, TSS and Hardness etc.
- To compare the results with water quality standards specified by various health agencies.

III.REVIEW OF LITERATURE:-

Kumar and Kumar (2013) have studied experimental work on Physico-Chemical Properties of Ground Water of U.P. (India). The study deals with evaluation of granite mines situated in Jhansi (Goramachia) for their status about physicochemical contamination of ground water. Six different sites are selected for sample testing collected from mines and urban area. The physic-chemical parameters such as pH (6.47-7.70), DO (5-8.9) mg/l, EC (560-974), TDS (290-560) mg/l, alkalinity (119-272) mg/l, turbidity (1 -2.4), Ca^{++} (40-102) mg/l and Mg^{++}(20-38) mg/l, TH (206- 411)mg/l, NO_3^- (19-55) mg/l, F^- (0.11-0.89) mg/l, Fe^{++} (0.11-1) mg/l and Cl^- (32-77) mg/l have been tested. It has been found that parameters are not in limit when compared with W.H.O. standards.

Kushtagi and Sriniwas (2011) have studied on water quality index of Groundwater of Aland taluka, Gulbarga (INDIA) states that main aim of the current work is to evaluate the quality of well water for rural and urban population based on W.Q.I. results, groundwater characteristics and quality assessment .Ten villages of Aland taluka are selected and at each village water samples at three places were collected using standard procedural methods and analyzed for ph (6.5-8.5), TH (300-600) mg/l, Ca^{++} (75-200) mg/l, Mg^{++} (30-100) mg/l, Cl^{-} (250-1000) mg/l, TDS (500-2000) mg/l, F^{-} (1-1.5) mg/l, Fe^{++} (0.3-1) mg/l, NO_3- (45-100) mg/l, SO_4^{-} (200-400) mg/l. BIS-10500 -1991 standards were adopted for calculation of water quality index.

Sharma Shraddha, Dixit Savita et al. (2011). In this paper Evaluation of Water Quality of Narmada River with reference to Physcochemical Parameters at Hoshangabad city, MP, India carried out For this study total one year monitoring of water quality was carried out by selecting four sample stations at downstream of Hoshangabad city. The river water sample were collected in different sampling bottle as per the standard method APHA ph (7.6-9.9), EC (272-462) µs and turbidity (12.11-29.64) were calculated at site itself, other parameter were check into laboratory by following APHA standard methods. After the study they got following results, activity, and agricultural runoff and due to the industrial effluent. So, if untreated sewage continuously gets discharge into the river then potable nature of Narmada River will be lost. Agarwal et al. (2014) studied to provide an informative data and helps to understand water characteristics and indicate that the water of Bihar River can serve as a good habitat. The pH value indicates the alkaline water of in the month of May might be due to high temperature that indicates the solubility of CO_2. The analysis of the quality parameters of water from Baba Ghat of Bihar River shows that pH, alkalinity, Cl^{-}, TH, BOD and COD etc. are well within the permissible limit. Hence proper strategies should be designed to counter.

U.S.Pujeri, A.S.Pujar et al. (2010). This paper evaluates and summarized the result of the pollution of surface water of Bijapur by pesticides, as pesticides are used for the agriculture purpose; runoff from agriculture contaminates the source of drinking water. For this study, water sample was collected from seven sample point by grab sampling technique. Samples were kept in plastic bottle and immediately preserved it, and brought to the laboratory and analytical procedure of APHA, AWWA was adopted. From above analysis it shows that the water samples from Bijapur lakes contained significantly higher levels of Endosulphan, 4-bromo-2-chlorophenol, chloropyrifos respectively. From the results it can be seen endosulphan was detected in the range of (0.00025 to 0.005) mg/l. The concentration of 4-bromo-2-chlorophenol ranged from(0.01 to 0.009) mg/l. The concentration of captan was bellowing the limit of WHO. The concentration of chlorpyriphos ethyl ranged from (0.0002 to 0.004) mg/l which was above the WHO limit. The Fipronil was detected in only one sample i.e. (0.004) mg/l. The concentration of oxyfluorfen was (0.0025) mg/l which bellow the limit while monochrotophos was not detected in all the samples. Thus from the result it is conducted that lakes of the bijapur get contaminated due to the pesticides used in the agriculture.

IV.EXPERIMENTAL METHODS:-

- Parameters (Alkalinity, Hardness, DO) measured by titrations.
- Parameter (pH) by pH meter instrument
- Parameter (conductance) by conductivity cell.

V.METHODOLOGY:-

Temperature: The fluctuations in temperature ofdifferent stations may be due to the influence of environmental temperature due to that point of time.

pH: The pH is one of the most important factorsthat influence the aquatic production. In the present study the pH was found to be basic. The range of pH was 7.0-8.15.The higher basic state of pH at Station 6.

Electrical conductivity: is useful tool to evaluatethe purity of water which is minimum at Stations 1 and 5 and maximum at Station 7.

TDS are those which get dissolved in watercannot be separated from water by filtration. They may be chemically organic or inorganic. According to (Trivedi and Goel) TDS are composed mainly of carbonates, bicarbonates, chlorides, sulphates, calcium, magnesium, phosphate, nitrate, sodium, potassium and iron. In the present investigation, the highest value of TDS was recorded at Station 7. The high value may be due to the evaporative loss of water and consequent increase in the concentration of salts present in water. The ISI standard for dissolved solids is up to 500 mg/lit and the maximum permissible quantity is 1500 mg/lit (WHO Guidelines for drinking water quality). The results indicate that all the samples of water from all stations were less than permissible limit of ISI standard.

Total Hardness: The total hardness of watersamples ranges from (55.55-402.77) mg/lit. According to ISI, the acceptance limit of total hardness (as CaCO3) is 200 mg/lit which can be extended to 600 mg/lit. Ca^{++}& Mg^{++} are important ions contributing towards total hardness.

Hardness has no known adverse effects. Hardness above 200 mg/lit of water is not suitable for domestic use in washing, cleaning and laundry. The acceptable limit of Ca^{++}& Mg^{++} for domestic use are 75 mg/lit & 200 mg/lit respectively (ISI).But according to Ministry of Rural

Development , India , in ground water in case of non-availability of alternate water source , Ca^{++}& Mg^{++} up to 200 and 400 mg/lit respectively can be accepted. In studied area, Ca^{++} content ranged from (0-138.89 mg/lit). It means all three stations have Ca^{++} content within the Acceptable limit. Similarly Mg^{++} content is also within the permissible limit (52.08-263.88 mg/lit).

Alkalinity: The phenolphthalein alkalinity of allthe water samples is 0. But the total alkalinity is found between 225 to 662.5 mg/lit. According to ISI, the acceptable limit of total alkalinity of drinking water sample is 500 mg/lit and maximum desirable limit is 1500 mg/lit.

DO: In the present investigation, DO was found tobe in the range of 2.0-4.52 mg/l. This reveals that the DO at all Station is within the acceptable limit. **Color:** Color is vital as most water users, be itdomestic or industrial, usually prefer colorless water. Determination of color can help in estimated costs related to discoloration of the water.

TSS: Total Suspended solids are an indication ofthe amount of erosion that took place nearby or upstream. This parameter would be the most significant measurement as it would depict the effective and compliance of control measures e.g. riparian reserve along the waterways. The series of sediment-induced changes that can occur in a water body may change the composition of an aquatic community. The settling of suspended solids from turbid waters threatens benthic aquatic communities. Deposited particles may obscure sources of food, habitat, hiding places, and nesting sites. Most aquatic insects will simply drift with the current out of the affected area. Benthic invertebrates that prefer a low-silt substrate, such as mayflies, stoneflies, and caddis flies, may be replaced by silt-loving communities of oligochaetae, pulmonate snails, and chironomid larvae. Increased sediment may impact plant communities. Primary production will decline because of a reduction in light penetration. Sediment may damage plants by abrasion, scouring, and burial. Finally, sediment deposition may encourage species shifts because of a change of substrate. Sediment deposition may also affect the physical characteristics of the stream bed. Sediment accumulation causes stream bed elevation and a decrease in channel capacity. Flooding is more likely after sediment accumulation because the stream cannot accommodate the same volume of water. Also, a substrate that is closer to the surface receives more light and supports increased numbers of photosynthetic organisms, such as rooted algae. As a result, recreational use may be threatened because moving parts of boats may become tangled in aquatic plants. Sediment, which is generally negatively charged, attracts positively charged molecules. Some of these molecules (phosphorus, heavy metals, and pesticides) are pollutants. These positively charged pollutants are in equilibrium with the water column and are often released slowly into the water resource.

Absorbance: It is the measure of the capacity of asubstance to absorb light of a specified wavelength. It is equal to the logarithm of the reciprocal of the transmittance. Absorbance is dimensionless.

Transmittance: It is the fraction of incidentelectromagnetic power that is transmitted through a sample, in contrast to the transmission coefficient, which is the ratio of the transmitted to incident electric field. Internal transmittance refers to energy loss by absorption; whereas total transmittance is that due to absorption, scattering, reflection etc.

Turbidity: Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual practicle**.**

S. No	Parameter	Units	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	Colour	-	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
2	Temp.	Oc	22	21	23	21	24	22	25	21	23	22
3	pH	-	7.71	7.60	7.52	7.64	7.40	7.77	7.71	7.70	7.47	7.60
4	Conductance	mM	0..8	0.12	0.09	0.12	0.08	0.12	0.23	0.11	0.14	0.12
5	TSS	mg/1	2000	4300	300	1400	2100	3000	2400	1950	1400	2300
6	TDS	mg/1	200	400	100	300	200	300	700	300	100	300
7	Temporary Hardness	Mg of $Caco_3$ /1	11.11	8.33	8.33	33.33	13.89	5.55	100	0	27.78	2.73
8	Permanent	mg of $Caco_3$	127.77	47.22	94.44	155.55	69.44	72.22	302.77	177.77	233.33	127.77
9	DO	mg/1	3.26	4.0	3.8	3.8	2.0	4.06	3.66	4.52	3.4	2.6
10	Total Hardness	Mg of $Caco_3$ /	138.88	55.55	102.77	188.88	83.33	77.77	102.77	55.55	261.11	130.55
11	Ca Hardness	mg of $Caco_3$ /	48.603	0	9.02	95.13	24.31	3.46	138.89	2.77	87.5	64.78
12	Mg Hardness	mg of $Caco_3$ /	90.22	55.55	93.75	93.75	59.02	52.08	263.88	69.44	173.61	65.97
13	Alkalinity of water	-	-	--	-	-	-	-	-	-	-	-

a	Total Alkalinity	mg/1	237.5	400	225	437.5	425	425	662.5	425	625	462.5
b	Phenolphthalein alkalinity	0	0	0	0	0	0	0	0	0	0	0
c	Methyl Orange Alkalinity	Mg/1	237.5	400.0	25.0	437.5	425.0	425.0	662.5	425.0	625.0	462.5
14	Absorbance	µs	1.230	1.931	0.937	1.281	0.857	20.451	20.058	1.505	1.493	1.545
15	Transmittance		0.813	0.517	1.067	0.780	1.166	0.049	0.049	0.664	0.669	0.487
16	Turbidity		Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid	Visible Y not turbid
17	BOD	mg/1	20	19.7	17.9	22.3	25.7	30.1	24.1	28.4	21.5	27.9
18	COD	mg/1	210	195	232.7	244.2	257.1	212	220	250.5	212	223

VI.RESULT AND DISCUSSION:-

This paper describes the important results of the Physio-chemical analysis of the regional water samples of different areas in Ambala district of Haryana State.

Quality Parameters

Parameter	WHO	IS	BIS	Gorde sp el al	Sandeep Mutharw al et al	Almas hamid Et al	/neeraj Kalra at	Present
Colour	Less than	5 Hazen	5 Hazen	5		Less		Colourless

	15	Unit	Unit			than equal to 15TCU		
Temp.	NS	NS	NS	NS	NS	NS	NS	NS
pH	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	7.5-8.5	6.5-8.5	7.0-85	7.40-7.77
Conductance	0.5-1.5µs	NS	NS			0.5-1.5	NS	0.8-0.23
TSS	NS	NS	NS					300-4300
TDS	500	500	500	500	500	500	500	100-700
Temporary Hardness	NS	NS	NS					0-27.78
Permanent hardness	NS	NS	NS					47.22-302.77
DO	4-6	NS	NS				NS	2.0-4.52
Total Hardness	500	200	300	200	300	NS	300	55.55-261.11
Ca Hardness	Less than 75	75	75				75	0.138.89
Mg Hardness	50	30	30	30			60	52.08-263.88
Turbidity	Less than equal to NTU	1	5NTU	1NTU	-	-Less than 5 NTU	5 NTU	0.857-20.451
BOD		Less than 30	30					17.9-30.1
COD		Less than 250	Less than 200					195.257.1
Absorbance								0.857-20.451
Transmittance	-	-	-	-	-	-	-	0.487-1.166
Total Alkalinity	200	200	200	200	200	200	600	225-662.5

VII.ABBREVIATIONS USED:-

- BOD- Biological Oxygen Demand
- COD- Chemical Oxygen Demand

- NS- Not Specific
- NTU- Nephelometric Turbidity Unit
- TDS- Total Dissolved solid
- TSS- Total suspended solid
- DO- Dissolved oxygen
- WHO- World Health Organization
- BIS- Bureau Of Indian Standards
- IS- Indian Standards
- CPCB- Central Pollution Control Board
- EC- Electrical Conductivity
- UNESCO- United Nations Educational, Scientific and Cultural Organization
- UNEP- United Nations Environment Programme

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