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Assessment of Quality of Ground Water in Sonipat District of Haryana

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Abstract: The present study is the water quality analysis of Sonipat District of Haryana and their surrounding areas which includes tests for various physico-chemical parameters like Temperature, pH value, Total solids, Total suspended solids, Total dissolved solids and Total fixed solids, Total volatile solids, Total hardness, Alkalinity, Water quality index and Correlation coefficient matrix. A water quality standard is a rule or law comprised of the uses to be made of a water body or segment and the water quality criteria necessary to protect that uses. In our study 20 samples were collected from Sonipt district and their surrounding areas. Out of 20 samples 10 samples found within permissible limit, 10 samples found out of permissible limit set by WHO, BIS, IS 10500. The water is badly affected may be due to disposal of industrial wastes into ground, open land areas and water bodies. In the light of this analysis we can conclude that these water samples require some treatment before their use for drinking purpose. Such poor quality of water reasoned severe waterborne diseases like diarrhea, cholera etc.

Key Words: Water quality, IS: 3025, pH, hardness, total suspended solids, alkalinity, total dissolved solids.

Introduction: Water is indispensable natural resources on earth and is the primary need for every human being and other animals as well as for plants and micro-organisms. The quality of water is of vital concern for mankind since it is directly linked with human health, protection of the environment, plant growth and sustainable development. Due to increase in human population, industrialization, use of fertilizers and pesticides in the agriculture and several other activities, water get polluted with different harmful contaminants in past few decades. Water pollution is a serious problem in India as almost 70 % of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities, such as irrigation and industrial needs. This shows that degraded water quality can contribute to water scarcity as it limits its availability for both human use and for the ecosystem sustainability. Therefore it is necessary that the quality of drinking water should be checked at regular intervals, as use of contaminated drinking water, may lead to rise in water borne diseases. The quality of ground water varies with location, depth of water table, season and by the extent and composition of dissolved solids. Generally, higher proportions of dissolved constituents are found in ground water than in surface water because of greater interaction of ground water with various materials in geologic strata. Water quality index is one of the most effective tools to communicate information on the quality of water to the concerned citizens and policy makers. The greater part of the soluble constituents in ground water comes from soluble minerals in soils and sedimentary rocks. The growing competition for water and declining fresh water resources, the utilization of marginal quality water for agriculture has posed a new challenge for environmental management. Contamination of water resources available for household and drinking purposes with heavy elements, metal ions and harmful microorganisms may cause serious major health problems. The research in Haryana (India) concluded that it is the high rate of exploration of groundwater than its recharging, inappropriate dumping of solid and liquid wastes, lack of strict enforcement of law and loose governance are the cause of deterioration of ground water quality A water quality index provides a single number (like a grade) that expresses overall water quality at a certain location and time based on several water quality parameters. The objective of an index is to turn complex water quality data into information that is understandable and useable by the public. A single number cannot tell the whole story of water quality; there are many other water quality

parameters that are not included in the index. The index presented here is not specifically aimed at human health or aquatic life regulations. However, a water index based on some very important parameters can provide a simple indicator of water quality. It gives the public a general idea about the possible problems with the water in the region.

Sonipat district: It contains seven blocks namely, Sonipat, Gohana, Ganaur, Kharkhoda, Rai, Mundlana and Kathura with different levels of groundwater depth. Data show the block-wise historical trend in groundwater level depth from 1984 to 2017. Kathura block noticed minimum and Ganaur block noticed maximum fluctuation in pre monsoon and post monsoon during 1984 to 2017. Depth to water level in Kathura block varies between 4.36 meters and 3.7 in June 1984 and 2017 respectively. The post monsoon water level depth varies between 2.60 and 2.32 meters in 1984 and 2017 respectively. The decadal fluctuation in water level from June 1984 to 2017 is 0.61 meters and 0.28 in October 1984-2017 shows rise in water level. However, the seasonal fluctuation from June 1984 to October 1984 was 1.76 meters and June 2017 to October 2017 is 1.43 due to appreciate rainfall recharge. Kathura block exhibits rise in groundwater level. The depth of water level in Ganaur block varies between 4.52 and 11.50 meters in June 1984 and 2017 during pre-monsoon whereas the depth of water level ranging between 3.69 and 11.26 meters in October 1984 and 2017 during post monsoon period respectively. The seasonal fluctuation for June 1984 to October 1984 was 0.83 meters and in June 2017to October 2017 is 0.24 meters indicates rise in water level during 2017 in spite of this, water level is decline by -6.98 meters from June 1984-2017 and -7.57 from October 1984- 2017.

Water Quality Index: A water quality index provides a single number (like a grade) that expresses overall water quality at a certain location and time based on several water quality parameters. The objective of an index is to turn complex water quality data into information that is understandable and useable by the public. A single number cannot tell the whole story of water quality; there are many other water quality parameters that are not included in the index. The index presented here is not specifically aimed at human health or aquatic life regulations. However, a water index based on some very important parameters can provide a simple indicator of water quality. It gives the public a general idea the possible problems with the water in the region. WQI is a mathematical tool to integrate the complex water quality data into a numerical score that describes the overall water quality status. WQI may be used as indicator to measure the watershed pollution as recommended by Enrique was also pointed out the quality index could be used for groundwater to assess the scenario in a distributed manner and subsequently a communication tool has been developed for adaptation strategy towards agro-environment at policy level.

Correlation Coefficient Analysis: Correlation and regression analysis are related in the sense that both deal with relationships among variables. The correlation coefficient is a measure of linear association between two variables. Values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear sense; a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense, and a correlation coefficient of 0 indicates that there is no linear relationship between the two variables.

Result Analyses: Hand pumps and tube wells used by people and industries of Sonipat district were collected in clean polythene bottles and brought to the laboratory for analysis. The temperature of the water samples was determined on the spot using thermometer. The standard methods of (APHA) were used for the determination of various parameters.

Conclusion: The present study characterizes the physico-chemical parameters of groundwater from twenty different locations of Sonipat, Haryana is carried out. These are most pollution prone areas, requires kind of treatment before drinking. Some of water samples has higher amount of total hardness. Groundwater of location S3 (near Moja shoe factory) has highest value of TS. TS of S3 water sample is

very much high and is recorded as 5170 mg/l may be due to so much groundwater contamination from industrial effluents. TS of 10 ground water samples (Sersa village temple, Piomanyari, plot no.22, plot no.51, near DTDC office, Jenius Pvt. Ltd, plot no.18, Allwyn bikes pvt.ltd, Sarveshwari pvt. ltd and Antarctica equipment pvt ltd. are within the range of 1000-2000 mg/l much more than permissible limit. Remaining 10 samples are within the range of 2000-5000 mg/L. The TSS of the water in the study area range from 90–955 mg/L. 4 samples S3, S4, S5 and S9; 1.2 km away from Moja factory, 800 km away from Moja factory, 1.5 km away from Moja factory and 1 km away from Kundli village respectively) are out of the permissible limits. The value of total dissolved solids (TDS) in the ground water varied from 1000 to 4215 mg/l. All samples analyzed were found out of the desirable limit of 500 mg/L, while some samples were found above the desirable limit but well within the maximum permissible limit of 2000 mg/L and 6 samples were out of the permissible limit. Total alkalinity ranged from 59.34 to 690 mg/l. According to WHO standards, two locations have higher value of Alkalinity from its permissible limit. Remaining locations are within the permissible limit. Water with high amount of alkalinity results in unpleasant taste to water and it turns boiled rice to yellowish color. Most alkalinity in surface water comes from calcium carbonate (CaCO3) being leached from rocks and soil. In this analysis of groundwater, the results of temperature and pH fell within the safe limits set by the WHO for water used for drinking and other domestic purposes. WQI for groundwater samples of Sonipat district found that 50% water samples are good for drinking purpose and 50% not suitable for drinking and other domestic purposes. These localities having poor water quality status are most pollution prone areas, requires kind of treatment before drinking, and thus requiring treatment. Reverse Osmosis can be used individually at home to purify water.

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