

A case study of Ground Water Quality Analysis Surrounding on Gurgaon Canal (NCR Mewat)

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Abstract- In the Haryana NCR only a canal takes delivery millions of industrial and domestic waste matter containing fluctuating quantity of undemanding nutrient and more than desire able contaminated materials as a result of unmanageable supply of waste water . Impact of industrial waste on cultivate land from Gurgaon canal (Mewat) and ground water quality affection were studied and then compared with the standards (Bureau of Indian Standards) for few important parameters like Phosphate, TDS, Acidity, Alkalinity, Electrical Conductivity, pH, DO, Total Alkalinity, Chloride, Total Hardness, Nitrate, Sulphate, BOD, COD . During analysis around of Gurgaon canal Mewat the range of parameters was found to be more as comparing to standards of India. As far as groundwater is concerned it was found that the parameters are beyond the prescribed limit.. It is observed that the water is polluted and affecting the human health, soil nutrients, livestock, biomass and environment in certain areas. Hence a study has been carried out for the quality of the available groundwater. Hence before use sources from where water is used should either be well treated and tested or the wells from where the water is used should be digged at greater height or located at greater distance from the gurgaon canal.

Keywords: Gurgaon Canal, Groundwater quality, Industrial Wastewater, Salinity, Physico- Chemical Parameters, Mewat NCR Haryana

I. INTRODUCTION

The availability of good quality water to most people in developing nations has become a serious social, economic growth and environmental issue. Increasing demands of growing population has placed stress on the existing sources of surface water and experts have predicted that this could lead to national and international disputes in the future. May be it will be a World war. Water only the most important source on earth. More than 70% of the part of earth is covered with water. Water used by human beings is mainly divided into two parts one is groundwater and other is surface water. Ground water is generally regarded as safest form used for drinking purposes if it is not contaminated (Dharaskar, 2015). On the other hand surface water may be used for farming and industrialized tasks (Wang et al., 2013). But it gets polluted in no time (Pathak et.al, 2015). Most of the canal take delivery of millions of industrial and domestic waste matter containing fluctuating quantity of undemanding nutrient and exceedingly contaminated materials and various harmful chemicals. Wastewater is actually the water embroidered physically, chemically as well as biologically. Wastewater discharged from domestic sources includes kitchen, festering tank liberation and grey water (Husain et.al, 2014). Wastewater from industries and marketable chattels on the whole contains profound metals, colossal quantity of untreated substances, nitrate, detergents, lifeless salt, oil etc (Rathore et al, 2014) In recent years, rising industrialization, urbanization and developmental activities with the population detonation leads to creation of huge quantity of wastewater from domestic, commercial, industrial and other sources (Singare, et.al, 2014). Water quality of the Indian rivers has aggravate due to unremitting release of industrial and domestic waste in last two to three decades (Krishnan et al 2007). It is now common and well known fact that more or less each and every river is contaminated by industries (Modak et al, 1996).. The waste also consists of much detergents that generate accumulation of rising high quantity bubbles in the gurgaon canal. Without treatment and unproper management the wastewater can cause several health problems to humans , farming and also the aquatic life (Chakravarty et.al 1959). Fishes have been affected the most as a result of the waste discharged from industries (Kumar, 1996). Beside this waste organization ways implemented in India have not really helped out in growth of industries which have resulted in increase in toxic waste ultimately polluting water). Mewat region of Haryana is classified as Mauntain area where surface water resources are limited, with the result, groundwater has become a major source of supply to the village population. The problem connected with supply of safe water to rural area from individual wells and handpumps is often neglected. Added to this with rapid solid wastewater leachate pollution of groundwater due to gurgaon canal, rapid increasing of population, urbanization, the available groundwater is rapidly getting polluted. Unfortunately the surrounding villages and catchment area aquifers affecting from the wastewater of Gurgaon Canal.

1.1 Study Area

Mewat district (Haryana) lies between 26° 39' 00"N and 28° 32' 25" N latitude and between 76° 39' 30" E and 77° 20' E longitudes having population of 1089263. It has a geographical area of 1507.00* square kilometer comprising 1441.71 square kilometer of rural area and 65.29 square kilometer of urban area Palwal is situated at the bottom of south Haryana. The district is located at a Longitude of 76° 59' east and the Latitude is 28° 40' north. It is situated at a height of 199.49 meters from the Sea level. Palwal is surrounded by Mewat (Nuh) from west, Gurgaon from North-West, Faridabad from North, Aligarh from East and Mathura from South having population of 1042708. The mean values of the humidity, however in a year ranges from 35% to 65% and the annual average I 51%. The temperature lies in the range of 5°C in winter and 47 °C in summer season. It can be observed that normally the wind in the area is light to moderate except in summer and South West monsoon periods in which it is little bit high. The direction of the wind is mostly from the direction between north and east. During most of the days the wind speed is repeated to be in the range of 7.2 to 32 km/hour. The annual average wind speed has been observed to be 16.1 km/hr. The two parameters i.e., temperature and humidity, taken together represents an index of the pleasantness and comfort ability of the climate to human beings.

1.2 Site Description

Gurgaon canal flowing in NCR has been chosen for analysis. It instigates from one of the main branch of the Okhla drain and Yamuna river, in close proximity to NCR at an elevation of 199 m above MSL. The catchment area is Guragon Canal and traverses a length of 70 km. It caters for catchment of 259 sq miles before out falling in river Yamuna in tehsil PalwaL. Its discharge is maximum during monsoon seasons. Downstream river flows through series of shallow gorges. The floods in the district are mainly due to heavy rains and over flow of Yamuna River. This district consist of hillocks valleys and undulated terrain. The topography of the district is such that no perennial river flows through it except River Yamuna which touches the eastern boundary of palwal and Hodal. However there are number of Barsati Nallahs/ Hill torrents which cross the whole of the district. Over flowing of some local streams also increases the quantum of floods. The floods in Yamuna River are caused due the excessive discharge of water from Tajewala head. Flooding in certain villages near Ballabgarh tehsil used to pose serious problems but all such villages have been provided with ring bund.

2. RESEARCH METHODOLOGY

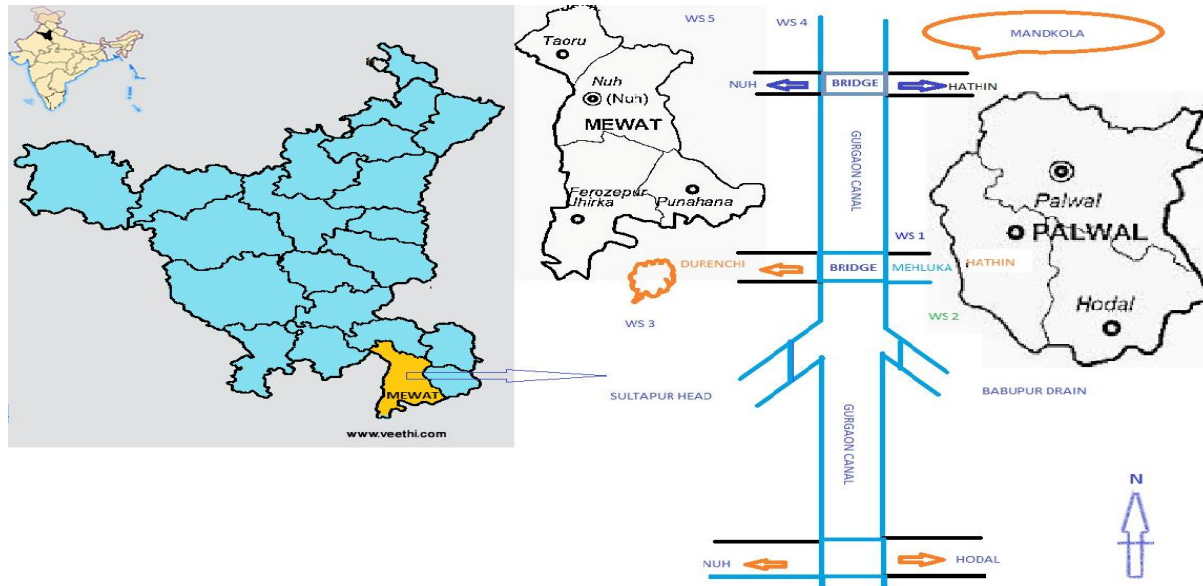
1 Sampling Location

The groundwater samples are collected during the pre monsoon period i.e., June 2017 from the five bore wells and one well located in the study area. Samples was collected from the site every day. The sampling location was at downstream of mixing point at a distance of 5m, 500m from both side of gurgaon canal Mewat (NCR). The locations of ground water and well samples are shown in figure 2. The quality analysis has been carried out for the parameters like pH, phosphate, COD,BOD, total alkalinity, electrical conductivity, acidity, total dissolved solids, total hardness, calcium hardness, magnesium hardness, nitrites, nitrates, sulphates, chlorides according to methods set by (American Public Health Association (APHA-AWWA-WPCF,1994) for examination of water and wastewater.

Table1:- Location of ground water sampling at Gurgaon canal (NCR)

SAMPLE NO.	SOURCE	LOCATION	DISTANCE FROM SITE GURGAON CANAL (M)
WS 1	HAND PUMP	GURGAON CANAL	5 (EAST)
WS 2	HAND PUMP	MEHLUKA	500 (EAST)
WS 3	WELL	DURENCHI	500 (WEST)
WS 4	HAND PUMP	MANDKOLA G CANAL	5 (WEST)
WS 5	HAND PUMP	MANDKOLA SOHNA ROAD	650 (WEST)

3. Map



1.3. RESULTS

Physicochemical Parameters of Groundwater: The Seasonal wise concentration of ions in groundwater samples is given in Table 1.1

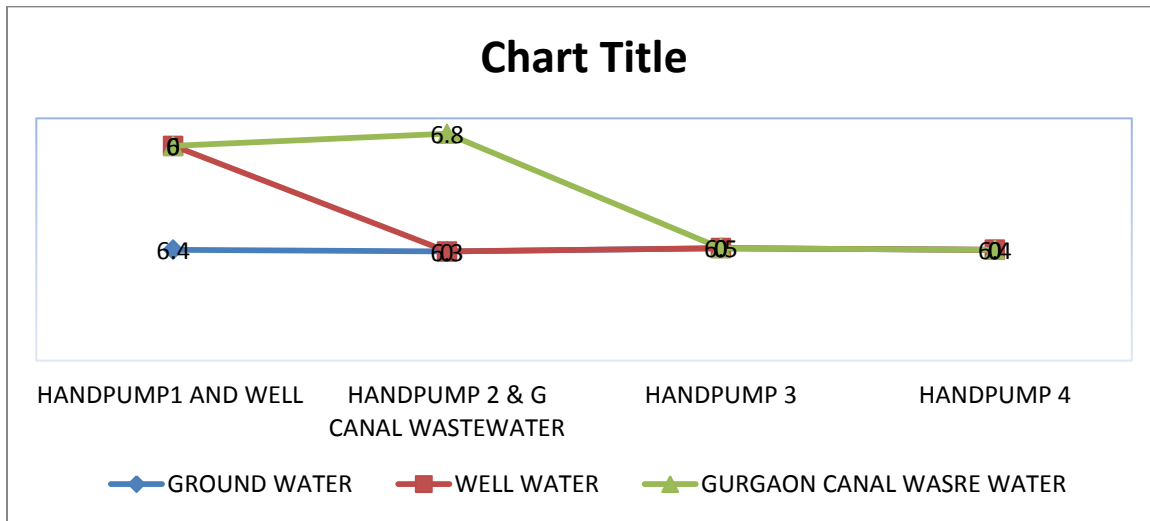
Table 1.1:- Variations of Water Quality Parameters in Groundwater Samples;-

SR.NO	Name of the Water Quality Parameter	Bureau of Indian Standard (IS 10500:1991)	WHO STANDARD	DRINKING WATER SAMPLES
1	pH	6.5 - 8.5	6.5 - 8.5	6.0-8.0
2	Total Alkalinity (mg/l)	00-600	200	500-1000
3	Electrical conductivity(μ mhos/cm	700-3000	700	1.79-4.23
4	Total Dissolved Solids(mg/l)	500-2000	500	114-754
5	Total Hardness (mg/l)	300-600	500	430-776
6	Calcium Hardness (mg/l)	75-200	50	268-532
7	Magnesium Hardness (mg/l)	30-100	30	40-244
8	Chloride	300	300	499-1574

Result Analysis

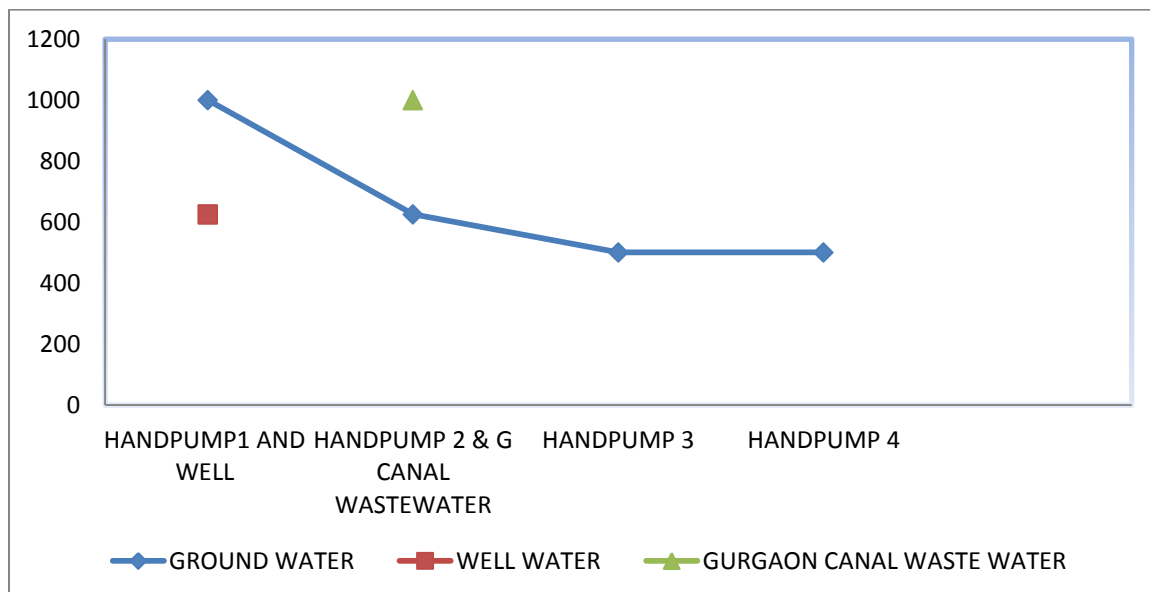
1.4 pH VALUE

The pH is a measure of the intensity of acidity or alkalinity and measures the concentration of hydrogen ions in water. All samples are slightly acidic. It has no direct adverse affect on health, however, a low value, below 4.0 will produce sour taste and higher value above 8.6 shows alkaline taste. A pH range of 6.0 – 6.8 is normally acceptable as per guidelines suggested by ISI. In the present study, the fluctuation of pH in the samples is from 6.0 to 6.8 which is acceptable.



1.5 ALKALINITY

In the present study Phenolphthalein Alkalinity was absent in all samples and Methyl Orange Alkalinity was ranged from 500 mg/l to 1000mg/l, this indicates the absence of Hydroxyl and Carbonate and availability of Bicarbonate. However the prescribed limit for Total Alkalinity is 120mg/l ppm). All samples of ground water including well exceed the prescribed limit as per Indian standard for drinking water quality. All the value as shown in graph with variation.



1.5 TOTAL HARDNESS

Hardness of water is objectionable from the view point of water use for bathing, laundry and domestic purpose since it consumes a large quantity of soap. Based on present analysis varied from 320 to 776mg/l. However the permissible limit of Hardness for drinking water is 300 mg/l (IS 10500). According to hardness classification (Durfur and Backer, 1964), the no of water samples of the study area can be classified as given in table below. All samples exceed the permissible limit and also found that the water which is very harmful for public use as comparing to drinking standards.

Classification of the water according to hardness:-

1	SOFT	0-60mg/l
2	MEDIUM	60-120mg/l
3	HARD	120-180mg/l
4	VERY HARD	>180mg/l

1.6 ELECTRIC CONDUCTIVITY

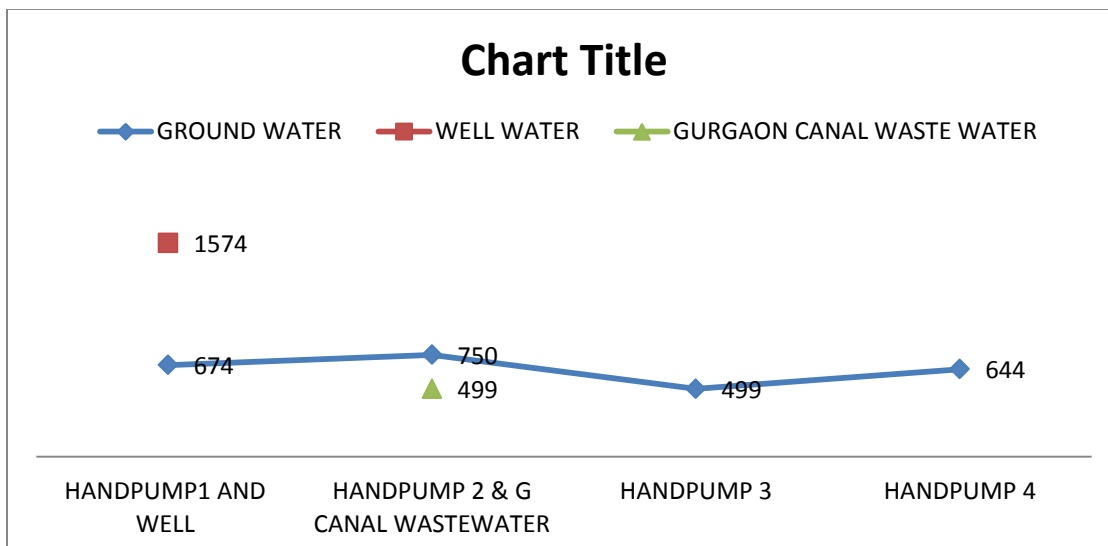
Pure water is not a good conductor of electricity. Ordinary distilled water in equilibrium with carbon dioxide of the air has a conductivity of about $10 \times 10^{-6} \text{ W}^{-1}\cdot\text{m}^{-1}$ (20 ds/m). Because the electrical current is transported by the ions in solution, the conductivity increases as the concentration of ions increases. Thus conductivity increases as water dissolved ionic species. All the samples within range except sample 1 and sample 4 because both the samples are very close to source.

Typical conductivity of waters:

Ultra pure water $5.5 \cdot 10^{-6} \text{ S/m}$, Drinking water 0.005 – 0.05 S/m, Sea water 5v S/m

1.7. CHLORIDE

In the study area there is all samples shows significant change in chloride concentration and it ranged from 499 to 750 mg/l. The well sample containing two times chloride then ground water sample. Chloride which have been associated with pollution as chart are found below the permissible value set at 250 mg/l in most of the study area. Chloride in excess (> 250 mg/l) imparts a salty taste to water and people who are not accustomed to high Chlorides can be subjected to laxative effects. All samples of ground water including well exceed the prescribed limit as per Indian standard for drinking water quality. All the values shown in graph with variation.



4. CONCLUSION

Groundwater quality in Mewat and around NCR, Haryana has been analysed in the present work. The groundwater is acidic in nature and total hardness observed in all samples fall under hard to very hard category. Salinity is increases day by day due to hardness and other parameters which exceed the prescribed limit of Indian standards and also World Health Organisation (WHO). Due to high salinity in rainy season water do not percolate easily into soil. So we can easily say that it is responsible for ground water recharge. Around 30 percent of total cultivated area surrounding the Gurgaon canal. Which are not good for social growth of the nation. The total dissolved solids falls under fresh water to saline categories. The hardness concentration in the northern and southern region exceeded the permissible limit. The concentration of physiochemical constituents in the water samples were compared with the Bureau of Indian Standards (B I S) to know the suitability of water for drinking. Based on the analysis, most of the area at many locations near the Gurgaon canal site falls in moderately polluted to severely polluted category indicating that the water is unsuitable for drinking purpose.

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