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EFFECT OF INDUSTRIAL SOLID WASTE ON SOIL AND SUBSURFACE WATER

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ABSTRACT : *Water and soil is essential for all life forms on the earth. Clean water for drinking is a major requirement for healthy society. Water for human society is mainly available from two major sources to fulfill most of the human needs, Ground Water and is largely affected by pollution of these sources and also affect soil surface. Soil and subsurface water samples were collected nearer to Gomtinagar in Lucknow and study the possible impact of solid waste effect on soil and groundwater quality. The water is treated and tested in this research.*

KEYWORDS - *Gomtinagar, ground water, solid waste.*

I.INTRODUCTION

1.1 GENERAL

Environmental pollution is the major problem associated with rapid industrialization, urbanization and rise in living standards of people. For developing countries, industrialization was must and still this activity very much demands to build self reliant and in uplifting nation's economy. However, industrialization on the other hand has also caused serious problems relating to environmental pollution. Therefore, wastes seem to be a by-product of growth. The country like India can ill-afford to lose them as sheer waste. On the other hand, with increasing demand for raw materials for industrial production, the non-renewable resources are dwindling day-byday. Therefore, efforts are to be made for controlling pollution arising out of the disposal of wastes by conversion of these unwanted wastes into utilizable raw materials for various beneficial uses. The problems relating to disposal of industrial solid waste are associated with lack of infrastructural facilities and negligence of industries to take proper safeguards. The large and medium industries located in identified (conforming) industrial areas still have some arrangements to dispose solid waste. However, the problem persists with small scale industries. In number of cities and towns, small scale industries find it easy to dispose waste here and there and it makes difficult for local bodies to collect such waste though it is not their responsibility. In some cities, industrial, residential and commercial areas are mixed and thus all waste gets intermingled. Therefore, it becomes necessary that the local bodies along with State Pollution Control Board (SPCB) work out requisite strategy for organizing proper collection and disposal of industrial solid waste.

1.2 SOLID WASTE MANAGEMENT

Solid waste refers to the range of garbage materials—arising from animal and human activities—that are discarded as unwanted and useless. Solid waste is generated from industrial, residential, and commercial activities in a given area, and may be handled in a

variety of ways. As such, landfills are typically classified as sanitary, municipal, construction and demolition, or industrial waste sites.

Regardless of the origin, content, or hazard potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it must be incorporated into environmental planning.

1.3 REUSING OF WASTEAGES

The dumping of solid wastes in the open areas creates aesthetic problems as the beauty of aplace is destroyed. The garbage forms a source of food for rats, flies, mosquitoes and the like. Hencetyphoid, plague, dysentery, diarrhea epidemics could occur. Toxic hazardous substances in the wastes would be harmful to human and animal health. The plastics if eaten by cows could be fatal. Solid wastes could also pollute water and their burning could lead to air pollution.

II.METHODOLOGY

Monitoring was carried out at 5 stations in the month of October 2016 to December 2016. Ground water quality was assessed to know the ground water quality status. Ground water source for sampling were bore well and hand pumps. The samples were collected in sampling bottles. The collected samples were analyzed for various physico-chemical parameters like Temperature (Temp.), pH, Turbidity (Turb.), Conductivity (Cond.), Total Dissolved Solids (TDS), Alkalinity (Alkal.), Chloride (Cl-), Fluoride (F-), Total Hardness (T.H.), Calcium (Ca++), Magnesium (Mg++), Sulphate (SO4--), Phosphate (PO4--) and Nitrate Nitrogen (NO3- -N) and All the parameters were analysed as per Standard methods for examination of water and wastewater (APHA AWWA WPCF-2012).

III.CASE STUDY

LOCATION OF STUDY AREA : To assess Ground water quality of Lucknow City five stations were selected. Stations of sampling stations with their coordinates are given in Table-1.

Table -1 showing Sampling station with their GPS location

Station code	Stations	GPS Location

GW1	Teeley wali Masjid	**26º 52'17.1''N 80º 54'53.5''E**
GW2	Near Shani Mandir Qaisar Bagh	**26º 51'25.4''N 80º 56'10.5''E**
GW3	Near Lakshman Mela Ground, Nishat Ganj	**26º 51'36.8''N 80º 56'58.3''E**
GW4	Janeshwar Mishra Park ,Gomti Nagar	**26º 50'19.9''N 80º 59'50.3''E**
GW5	Near Sai Vitista Infratech, Shaheed Path	**26º 49'10.4''N 81º 00'44.2''E**

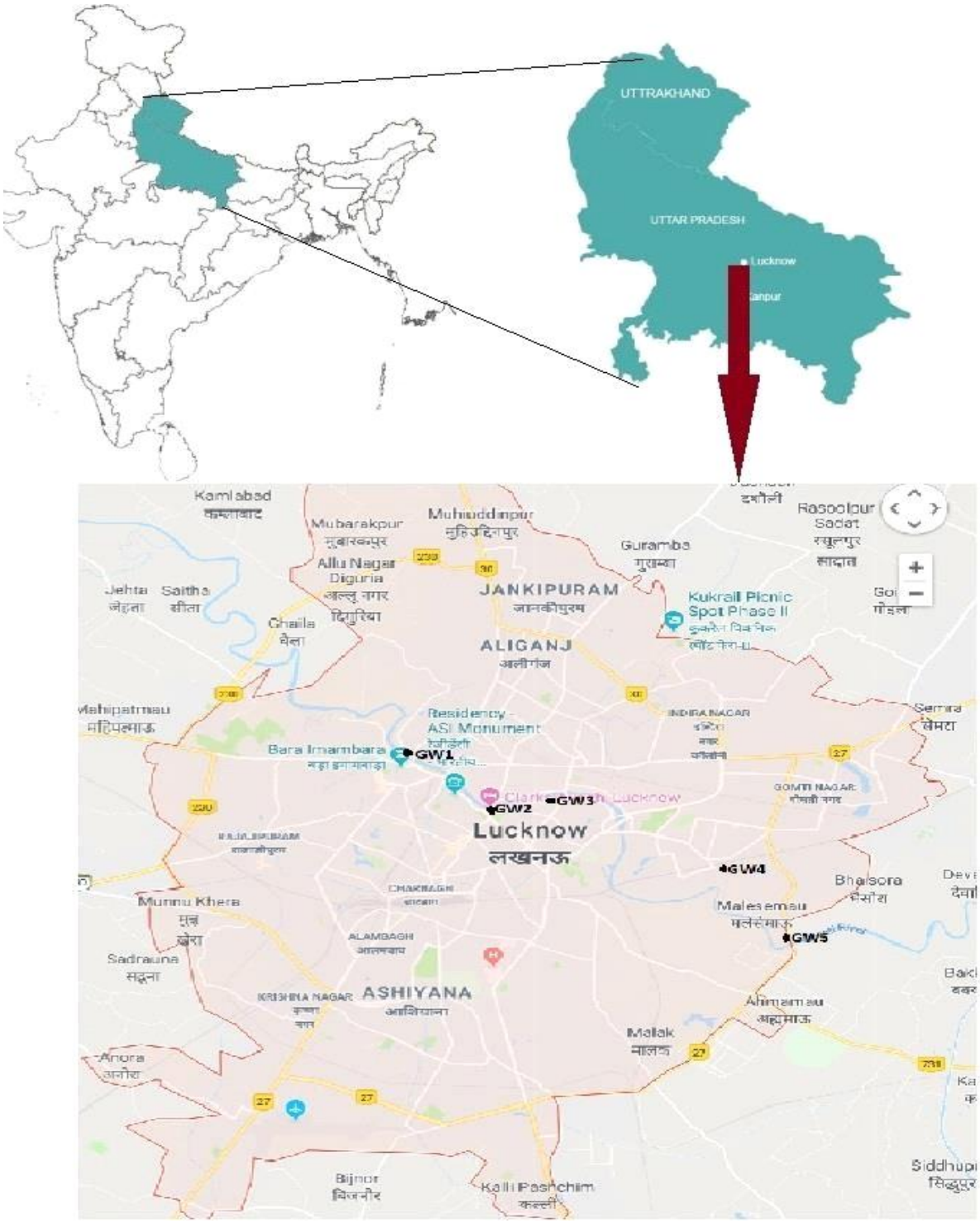

Figure -1 Map of Lucknow showing sampling stations

V. RESULT:

Table-2 Showing average concentration of various physico- chemical parameter and standarddeviation at diffrent sampling station

S.No.	Parametersand Unit	IS: 10500 Drinking Water Standards	GW1	GW2	GW3	GW4	GW5
1.	Temp. (^oC)	-	21.16±2.25	21.13±2.01	22.93±0.73	22.83±0.83	21.77±2.01
2.	pH	6.5-8.5	7.86±0.11	7.70±0.20	7.23±0.15	7.63±0.15	7.46±0.15
3.	Turb. (NTU)	1	< 1	<1	< 1	< 1	<1
4.	Cond. (µmhos/cm)	-	617.67±19.13	344.33±11.15	1057.33±103.51	1030±49	2042.67±61.81
5.	TDS (mg/l)	500	320±20	263.67±5.13	580.44±4.51	533.40±10.52	1018.33±43.98
6.	Alkal. (mg/l)	200	225.67±6.02	15(	244.33±4.04	371.67±11.23	355.0±5.0
7.	Cl^- (mg/l)	250	34.67±3.51	40.33±2.51	143.67±5.10	44.60±2.86	91.66±1.52
8.	F^- (mg/l)	1.0	0.19±0.25	0.04±0.01	0.22±0.28	0.06±0.01	0.29±0.37
9.	T.H. (mg/l)	200	131.66±7.63	135.0±5.0	291.66±10.40	97.43±2.45	255.33±4.50
10.	Ca^{++} (mg/l)	75	32.66±1.15	31.33±1.15	80.0±2.0	8.66±1.15	38.66±1.15

11.	**Mg^{++} (mg/l)**	**30**	12.13±2.13	13.8±0.69	22.3±1.83	18.4±1.22	38.57±0.58
12.	**SO_4^{--} (mg/l)**	**200**	0.40±0.02	10.20±0.30	40.26±1.25	3.20±0.26	232.33±3.01
13.	**PO_4^{--} (mg/l)**	**--**	0.0093±0.0005	0.019±0.001	0.0277±0.0032	0.018±0.0026	0.0187±0.0015
14.	**$NO_3^{--}N$ (mg/l)**	**45**	0.50±0.03	6.63±0.35	36.96±1.66	0.96±0.05	2.63±0.15

Table-3 Correlation between various physico-chemical

	Temp.	**pH**	**Cond.**	**TDS**	**Alkal.**	**Cl^-**	**F^-**	**T.H.**	**Ca^{++}**	**Mg^{++}**	**SO_4^{--}**	**PO_4^{--}**	**NO_3^--N**
Temp.	1.000												
pH	-0.706*	1.000											
Cond.	0.321	-0.522*	1.000										
TDS	0.330	-0.574*	0.996*	1.000									
Alkal.	0.554*	-0.247	0.773*	0.739*	1.000								
Cl^-	0.601*	-0.959*	0.490	0.531*	0.136	1.000							
F^-	0.038	-0.438	0.722*	0.706*	0.281	0.606*	1.000						
T.H.	0.326	-0.859*	0.590*	0.629	0.076	0.941*	0.778*	1.000					
Ca^{++}	0.274	-0.740*	0.128	0.169	-0.319	0.877*	0.557*	0.868*	1.000				
Mg^{++}	0.232	-0.587*	0.968*	0.985*	0.625*	0.543*	0.699*	0.673*	0.216	1.000			
SO_4^{--}	-0.039	-0.406	0.909*	0.922*	0.491	0.397	0.725*	0.608*	0.156	0.963*	1.000		
PO_4^{--}	0.674*	-0.925*	0.230	0.301	0.033	0.828*	0.089	0.674*	0.660*	0.341	0.155	1.000	
NO_3^--N	0.555*	-0.810*	-0.013	0.035	-0.254	0.863*	0.249	0.719*	0.910*	0.057	-0.091	0.834*	1.000

Note- *- is showing significant correlation

IV. CONCLUSION

The study reveals that TDS, Total Hardness, Sulphate, Alkalinity and calcium and Magnesium was found higher than prescribed Indian Standard 10500-2012 while Turbidity, pH, Temperature, Conductivity, Chloride, Fluoride, Nitrate Nitrogen and Phosphate were within prescribed permissible limit. In this study it was found that GW2 station Near Shani Mandir Qaisar Bagh was safe for drinking purpose.

The Total Dissolved Solids at most of the sampling stations were found higher than the drinking water standards (IS:10500) due to increased dissolution or evaporative enrichment. Human activities may also have affected the TDS levels in ground water i.e. application of synthetic fertilizers, manures, and wastewater percolation can all contribute salt to groundwater. High values of TDS influence the taste, hardness, and corrosive property of the water and causes excessive scaling in water pipes, heaters, boilers, and household appliances

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