IMPACT ON MUNICIPAL SOLID WASTE MANAGEMENT ON GROUNDWATER NEAR KUMBAKONAM

M. PRIYANGA , S. SANGEETHA , R. SWEDHA , S. VIJAY

Abstract— The kumbakonam town depends on Cauvery River for its drinking water supply. Solid waste lead to contamination of ground water. Hence a detailed study has been carried out using Geographical Information System (GIS) to understand the spatial variation of ground water quality. The study region, and the samples are analyzed for various physical and chemical parameters such as pH, Electrical Conductivity, Total Dissolved Solids, Alkalinity, Hardness. The concentration of physical and chemical constituents in the water samples are compared with the Bureau of Indian Standards (BIS) and World Health Organisation (WHO) standard to know the suitability of water for drinking. The spatial variation of groundwater quality parameters will be also plotted using GIS.

Keywords -- Spatial Variation, Groundwater Contamination Geographical Information System.

I. INTRODUCTION

Since the beginning, human kind has been generating waste, each household generated garbage or waste day in or day out either solid or semisolid form and generally exclude industrial hazardous wastes. Non liquid, non-soluble material ranging from municipal garbage to industrial waste that contains complex and sometimes hazardous substances. Any combination of domestic, industrial and commercial waste, including non-hazardous species wastes, also known as community waste (waste, including non-hazardous species wastes, also known as community waste (Environment waikato, 1994).

According to Indian MSW Rule 2000, "Municipal solid waste" includes commercial and residential wastes generated in a municipal or notified area in either solid or semi solid form excluding industrial hazardous wastes but including treated bio-medical wastes (Sahu, 2009). Ground water contamination is generally irreversible i.e. once it is

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contaminated it is difficult to restore the original water, degrades water quality producing an objectionable taste, odour and excessive hardness. It is always better to protect ground water first rather than relying on technology to clean up water from a contamination source. Ground water is a principal source of drinking water.

Urbanization is now becoming a global phenomenon, but its ramifications are more *Impact of municipal solid waste dump on ground water quality in India Gawsia John, Harendra K. Sharma, Vikas Vatsa International Journal of Environmental Sciences Volume 5 No.3, 2014* 665 pronounced in developing countries. Natural growth population, reclassifications of habitation and migration trends are important in urban population of India. The population of urban India was 285 million as per 2001 census, which accounts for 27 percent of the total population. Global experience shows that when a country's urban population reaches almost 25% of the overall population (as in the case of India) the pace of urbanization accelerates (Kumar and Gaikwad, 2004).

The landfill was the point source for all contamination because ground water flow is outward from bhalaswa landfill site. The assessment is based on the assumption of per capita generation @ 0.4 kg/capita/day. Besides domestic, other major sources of MSW generation of the city are shops and commercial establishments, hotels and restaurants and fruits and vegetable market. So keeping in view the importance of groundwater and the effect of municipal solid waste dump on the quality of ground water we select the present dump site. The residential areas around this dump site mainly have bore-wells and hand pumps. The depth of these bore-well and hand pumps around the site varies from 350-450 feet.

Groundwater is a valuable resource often used for industry, commerce, agriculture and most importantly for drinking. Often, the raw water used for domestic purposes is vulnerable to contamination due to the human influence resulting in pollution. Groundwater pollution is mainly due to the process of industrialisation and urbanisation that has progressively developed over time without any regard for environmental consequences (Longe & Balogun 2010). Issues such as nutrients and other chemicals release rates, leaching of nutrients and metals through macro pores as suspended solids, and sludge organic matter effects on the sorption degradation are often not understood by many researchers (Mohammed *et al.* 2009). Toxic chemicals that have high concentrations of nitrate and phosphate derived from the waste in the soil can filter through the dump and contaminate both the ground and

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surface water. Insects, rodents, snakes, scavenger birds, dust, noise, or bad odour are some of the aesthetic problems associated with sanitary landfills. The volume of solid waste generated in Akure, South western Nigeria has increased significantly over time from the estimated quantity of 60 000 metric tons per year in 1996 to 75 000 metric tons in 2006 because of the increasing population as well as the industrial and economic development. While the population of A cure was about 283 108 in 1996, it increased to approximately 353 211 in 2006. The increasing waste generation and disposal resulted in increased groundwater pollution and unsuitability of the use of soils within the area for agricultural productivity purposes

II. METHODOLOGY

1) Water Sampling:

Prepare a sampling and analysis plan which describes the sampling location, numbers and types of samples to be collected and tha quality control requirements of the project collected samples in an area free of excessive dust, rain, snow are other sources of contamination. Collected samples from faucets which are high enough to put a bottle underneath, generally the bath tub or kitchen zinc without contacting the out of the container with the faucet.

2) Ground water analysis

Much of the earth fresh water is ground water. Ground water is the water that exist below the surface of the ground in the spaces between particles of rock or soil. Ground water can contain many constituents incuding micro organisums, gases, inorganic and organic materials.

Drinking water testing is a service we offer to ;

1..private well owners
2. Municipalities
3. School
4. Daycares
5. Private water sources owners

We can conduct variety of tests including;

1.Ultra-trace metal analysis
2.Metal specification
3.Cyanide specification
4.Microbial analysis

3) Water quality index

The level of degradation of water resources can be quantified by bio monitoring technology conventional chemical methods. The present study deals with the role of biological parameters especially phytoplankton community and its tropic status to assess the water quality different pattern of dominance and sub dominance of indicator phytoplankton community and specious along with the physio chemical quality observed the pollution status of the tank in the present investigation phytoplankton community ha been considered along with the various physio chemical parameters like water, temperature, pH, alkalinity, free co_2, dissolved oxygen, nitrate, phosphate and calcium for the assessment of water quality at

kumbakonam. Considering all the parameters and bionics, it was clearly shown that the water body was polluted to moderately polluted in different seasons. The bio monitoring approach was not static. This can be further modified to suite our area to monitor the quality of water in its natural condition for the particular usage of water.

4) Statistical analysis

Kumbakonam municipal town i selected for the precent study to the trace the past and explore existing condition of solid waste management in the kumbakonam town. to suggestion the optimum location of solid waste management it has been observed that were the high density of population. There were the high production of solid waste and very low density of population has registeredd the very low weight of solid waste.
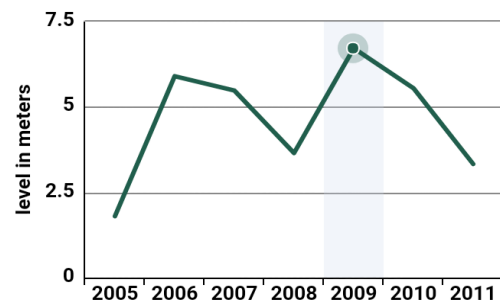
Figure 1

TABLENO:1 DETAILINGOF SAMPLING LOCATIONS

NO	SAMPLE STATION	SOURCE	LAT N	LONGI E
1	Karikulam	Bore	10.97694	79.41188
2	Karikulam	Bore	10.97728	79.41243
3	Karikulam	Bore	10.97671	79.41264
4	Karikulam	Bore	10.9758	79.41312
5	Karikulam	Bore	10.97575	79.41301
6	Karikulam	Bore	10.97588	79.41183
7	Karikulam	Bore	10.97602	79.41187
8	Karikulam	Bore	10.97724	79.41187
9	Karikulam	Bore	10.97608	79.41147
10	Karikulam	Bore	10.97554	79.41162
11	Karikulam	Bore	10.97481	79.41167
12	Karikulam	Bore	10.97746	79.41151
13	Karikulam	Bore	10.97797	79.41142
14	Karikulam	Bore	10.97736	79.41263
15	Karikulam	Bore	10.97789	79.41247
16	Karikulam	Bore	10.97842	79.41271
17	Karikulam	Bore	10.97821	79.41279
18	Karikulam	Bore	10.97819	79.41277
19	Karikulam	Bore	10.97695	79.41086
20	Karikulam	Bore	10.97718	79.41105
21	Karikulam	Bore	10.97544	79.41104
22	Karikulam	Bore	10.97522	79.41113
23	Karikulam	Bore	10.97823	79.41308
24	Karikulam	Bore	10.98048	79.42006
25	Karikulam	Bore	10.98049	79.42013
26	Karikulam	Bore	10.98034	79.41996
27	Karikulam	Bore	10.98056	79.41986
28	Karikulam	Bore	10.98088	79.41951
29	Karikulam	Bore	10.98032	79.42007
30	Karikulam	Bore	10.98008	79.42007

III. RESULT AND DISCUSSIONS

The suitability of ground water for irrigation depends upon its minerals constituents. The salt present in the water besides affecting the growth of the plants directly, also affect the soil structure, permeability and aeration, which in turn affect the plant growth. The samples generally range between good to permissible levels except for few sides where they are unsuitable for irrigation. The sodium hazard of irrigation water can be knowing the sodium absorption ratio. High sodium in water leads to the development of alkali soil, which has unfavourable structure and restricts aeration. Bicarbonate is an important constituent in the evaluation or irrigation water quality. In waters having high concentration of bicarbonate there is a tendency for calcium and magnesium to precipitate has carbonate.
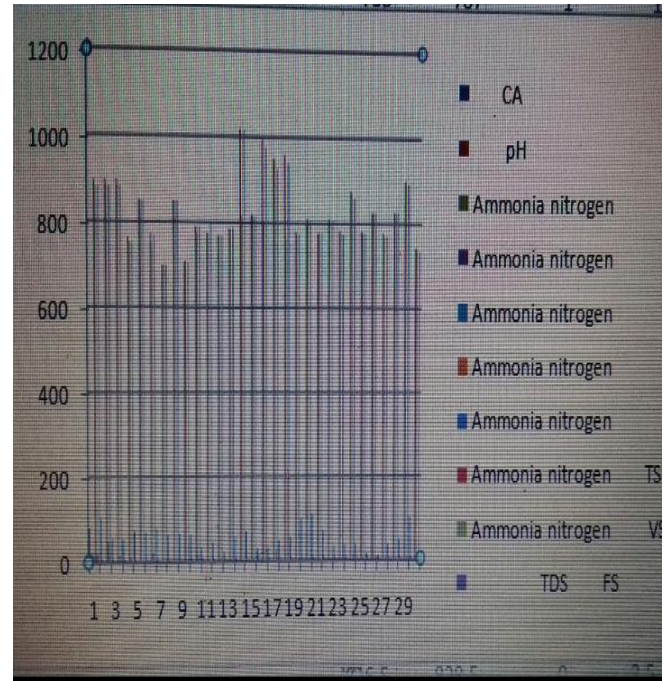

Figure 2

TABLE: 2

Sam. no	Ca	Ph	NH₃
1	81.48	7.43	1.4
2	103.08	7.46	1.4
3	55.41	7.62	1.4
4	53.21	7.38	1.4
5	73.34	7.29	1.4
6	68.04	7.24	1.4
7	77.41	7.25	1.4
8	62.33	7.45	1.4
9	65.18	7.15	1.4
10	63.55	7.27	1.4
11	31.37	7.37	1.4
12	46.03	7.53	1.4
13	20.37	8.05	1.4
14	57.85	7.50	1.4
15	70.48	7.52	1.4
16	28.11	7.29	1.4
17	32.06	7.87	1.4
18	49.29	7.41	1.4
19	57.04	8.00	1.4
20	102.00	7.90	1.4
21	110.00	7.30	1.4
22	73.74	7.66	1.4
23	33.00	7.49	1.4
24	37.48	7.62	1.4
25	39.52	7.50	1.4
26	15.48	7.65	1.4
27	8.96	7.46	1.4
28	32.706	7.47	1.4
29	52.15	7.81	1.4
30	101.85	7.22	1.4

TABLE NO: 3

S.NO	TDS					
	TS	VS	FS	SUSS	NS	SS
1	900	882.65	17.35	0	16.8	883.2
2	900	883.95	16.05	49	16.3	883.7
3	900	883.85	16.15	0	16.8	883.2
4	764.5	753.5	11	0	11	753.5
5	852	851.5	0.5	0	0	852
6	774.5	754	20.05	2.5	6.5	768
7	700	700.5	0	1	0	700
8	851.5	852.5	0	3	0	851.5
9	709	709	0	0	2.5	706.5
10	791	775	16	0	6.5	791
11	779	777	2	2	2	797
12	771.5	771.5	0	2.5	0	771.5
13	788	787	1	1	0	788
14	1019	814.5	2.04	2	4	1015
15	820	819.5	0.5	3	2.5	817.5
16	996.5	796.5	0	4	196	976.9
17	952	951	1	1	23.5	928.5
18	961	767.5	1.9	1	216	939.5
19	779.5	777.5	2	1	3.5	776
20	807.5	812	0	1.5	0	807.5
21	779.5	777.5	2	0	2.5	777
22	807.5	811	0	0	0	807.5
23	784.5	779.5	5	1	8.5	776
24	875	875	0	1	15	860
25	783	778	5	1	5	778
26	826.5	828.5	0	1	0	826.5
27	778	773.5	4.5	1.5	4.5	773.5
28	826.5	828.5	0	2.5	0	826.5
29	900.5	896.5	4	0	6.5	894
30	743	742.5	0.5	0	6	737

IV. CONCLUSION

The groundwater quality was studied in regions of Kumbakonam and Thiruvaidaimarthur taluks of Thanjavur district.south Indian by analysis. In general about the recommended limits for drinking water quality were exceeded in one or the other parameters. In most parts of the study area the water is suitable for domestic and irrigational use. However, there are few places where the water is not suitable for irrigation. Thus, this preliminary work has given some insight into groundwater pollution in regions of Kumbakonam and Thiruvaidaimarthur taluks of Thanjavur district where in further detailed investigations are planned. Growth and development on the earth surface has rendered surface water of certain areas of the world useless despite its availability in large quantity groundwater pollution.

Concentration of the examined parameters were analysed , discussed and explained   with   relevant statistical tools. Hydrogen ion (Ph) has the highest degree of correlation with other examined variables, that is, concentrations of hydrogen ion in water directly influenced some parameters.

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